Tim Brownnell

From:	Steve Wright <steveoutdoors22@gmail.com>
Sent:	Thursday, March 14, 2024 9:58 PM
To:	managethefuture
Subject:	Proposed Landfill Sites, Moon Pit and Roth East

[EXTERNAL EMAIL]

Tim Brownell, SWAC, and DCC,

Please consider the following comments when making your choice for the future landfill site in Deschutes County.

The Moon Pit is an active surface mining operation that was started long before the establishment of the Badlands Wilderness area. The view of the Moon Pit is hidden from Highway 20 and the wilderness area due to topography and trees. A landfill site at the Moon Pit in conjunction with the surface mining activity seems to be the best choice between the two finalist landfill sites.

Over the past 25 years, I have recreated in many areas east of Bend, including the Badlands, Horse Ridges, Mountain Bike Trails, Dry River Canyon, BLM lands around the Moon Pit, Millican Valley, Pine Mountain, BLM, USFS lands, Brothers area, and many more. There are so many beautiful areas in these remote high desert landscapes.

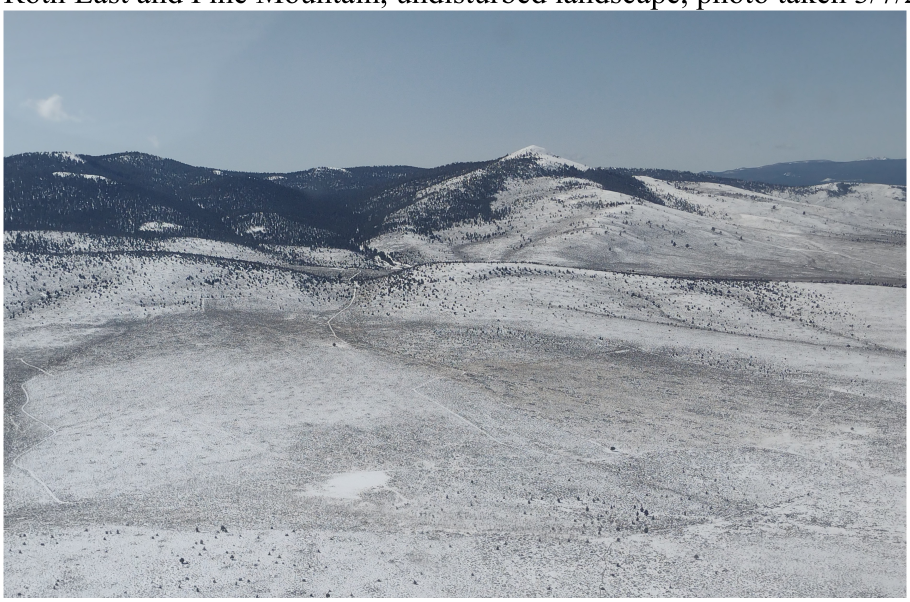
The Roth East site on Pine Mountain is located on an undisturbed, rural desert landscape. This is the real wilderness, with unique wildlife, including sage grouse, bald eagles, golden eagles, herds of pronghorn antelope, to name just a few. There are outdoor recreationists that frequent the area because of its beauty and remote location. There are public lands, private lands, cabins, and ranches in the Millican/Pine Mountain area. The night skies are very clear at the Roth East site, being located far away from population centers. The Pine Mountain Observatory operated by the University of Oregon is located just 4 miles south.

The elevation of the Roth East site is at 4,600 feet above sea level and is located 7 miles southeast of the Horse Ridges. The Moon Pit site is at 3.600 feet and located on the northwest side of Horse Ridges. Due to the elevation differences and location of Horse Ridges, the weather in these two areas is quite different The Millican Valley and Pine Mountain area can experience extreme winds and very cold wintertime temperatures. This will have a huge impact on operating a landfill and keeping the garbage off Highway 20 and the now beautiful desert landscape.

Moon Pit, current surface mining, disturbed landscape, photo taken 3/9/24

A landfill location at the Moon Pit would avoid having landfill traffic maneuver the 2 mile long climb up Horse Ridge Summit.

Roth East and Pine Mountain, undisturbed landscape, photo taken 3/7/24



Beautiful Pine Mountain

Please No Landfill at Roth East.

Choose the Moon Pit.

Thank You,

Steve Wright
Deschutes County Resident since 1998
Millican Valley Landowner
Pine Mountain Enthusiast

From: Curt Buskuhl
To: managethefuture
Subject: New landfill
Date: Monday, March 18, 2024 12:06:46 PM

Some people who received this message don't often get email from curt322@gmail.com. Learn why this is important

[EXTERNAL EMAIL]

My name is Curt Buskuhl and as I resident of Deschutes county I would like to comment on the propesed sites for the new landfill. I don't like either proposed site but i feel the Pine mountain area should be taken off the table. As someone who frequents pine mountain I have come to love and cherish the natural beauty of the area, and have seen many of the animals that call this area home. The mountain and surrounding desert landscape is home to many deer, pronghorn, coyote, cougar and birds of prey not to mention sage grouse who have increasingly come under threat. It would be a devastating blow to the wildlife in the area and would negatively impact recreation as well as the OSU observatory on top. Please consider this and the impacts it could have on not just wildlife but the many people who love this place.

Thank you

Curt Buskuhl

From:	Patrick Kruse
To:	managethefuture
Subject:	Proposed Dump
Date:	Monday, March 18, 2024 1:01:26 PM

[Some people who received this message don't often get email from patrick@ruffwear.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

[EXTERNAL EMAIL]

Hello,

I am writing to express my concerns of placing the proposed dump at Roth East.

I believe the better option is the Moon Pit.

I would like to add my voice to the mix and ask that you reconsider placing the proposed dump at the Roth East site. I believe the treasured and natural resources at the base of Pine Mountain and the surrounding area would be negatively impacted by this location.

Please focus the proposed dump to be located at the Moon Pit for these considerations.

Impact on natural resources
Impact on heritage sites
Impact on sage grouse and other animals
Proximity to Bend
Use of existing road as opposed to needing to improve a road to Roth East
Access to water at the moon pit
Access to power at the moon pit
And many other considerations why the better location for the proposed dump would best be located at the Moon Pit.

Respectfully,

Patrick Kruse
1133 NW Elgin
Bend OR 97703
541-350-6828

From: Sue Monette
To: managethefuture
Subject: FW: SWAC Meeting - 3/19/24
Date: Monday, March 18, 2024 1:43:34 PM
Attachments: image013.png
image014.png
image015.png
image016.png
image001.png
image002.png
image003.png
image004.png
Sage Grouse 1.pdf
image001.png
image002.png
image003.png
image004.png

Sue Monette | Management Analyst
DESCHUTES COUNTY DEPARTMENT OF SOLID WASTE
61050 SE 27th Street | Bend, Oregon 97702
Tel: (541) 322-7178 | Fax: (541) 317-3959
sue.monette@deschutes.org | www.deschutes.org/sw

Let us know how we're doing: Customer Satisfaction Survey.

From: Harrison Ruffin [mailto:climbflykite@gmail.com]
Sent: Monday, March 18, 2024 1:39 PM
To: Sue Monette <Sue.Monette@deschutes.org>
Subject: Re: SWAC Meeting - 3/19/24

[EXTERNAL EMAIL]

Hi Sue,
I want a few minutes to speak at the next meeting regarding some new issues that could affect the SWAC committees' decision on the location of the new landfill. Here is an article from the New York Times and supporting BLM documentation. This legislation will create insurmountable hurdles in the permitting process and substantial resistance from the BLM for the Roth East or West candidate areas under consideration as they are sage grouse habitats. I believe the Moon Pit is one of the county's best options, especially as there are already ongoing industrial concerns and permits.
Best Regards
https://www.nytimes.com/2024/03/14/climate/sage-grouse-protection.html

Sage Grouse 3.pdf

On Thu, Mar 14, 2024 at 6:52 PM Sue Monette <Sue.Monette@deschutes.org> wrote:

Hello –

Attached find a revised public comment file including an additional comment submitted today from the Oregon Natural Desert Association. The information has also been posted on the SWAC meeting webpage [file].

Regards,

Sue Monette | Management Analyst
DESCHUTES COUNTY DEPARTMENT OF SOLID WASTE
61050 SE 27th Street | Bend, Oregon 97702
Tel: (541) 322-7178 | Fax: (541) 317-3959
sue.monette@deschutes.org | www.deschutes.org/sw

Let us know how we're doing: Customer Satisfaction Survey.

Bcc: SWAC and Interested Parties

**** Click unsubscribe to be removed from the SWAC mailing list ****

From: Sue Monette
Sent: Wednesday, March 13, 2024 9:36 AM
To: Sue Monette <Sue.Monette@deschutes.org>
Subject: SWAC Meeting - 3/19/24

Hello –

Attached find the agenda packet for the Solid Waste Advisory Committee (SWAC) meeting scheduled **Tuesday, March 19, 2024** from **9 a.m. to 12 p.m.** via Zoom or at the Deschutes Services Building – Barnes Sawyer Rooms (1300 NW Wall Street, Bend, OR 97703) *[map]*. **(Please note new meeting location)**

- Attachments include the agenda, prior minutes and draft Deschutes County SWMF Final Site Evaluation Report for review.

- Attached is a new public comment that is posted on the SWAC meeting webpage [file]. Public comments will also be shared with the Board of County Commissioners.

- Please follow the project Story Map for interactive maps and project updates: deschutes.org/solidwasteplanning

Managing the Future of Solid Waste: Solid Waste Management Facility resource information
Story Map: Deschutes County Managing the Future of Solid Waste informational story map including Frequently Asked Questions
Solid Waste Advisory Committee Meetings: April 2022 to June 2023 agendas, minutes of the meetings, and other material
Deschutes County Meeting Portal - Solid Waste Advisory Committee Meetings: August 2023 and later calendar dates, agendas, minutes of the meetings

Please let me know if I can provide additional information or assistance.

Regards,

Sue Monette | Management Analyst
DESCHUTES COUNTY DEPARTMENT OF SOLID WASTE
61050 SE 27th Street | Bend, Oregon 97702
Tel: (541) 322-7178 | Fax: (541) 317-3959
sue.monette@deschutes.org | www.deschutes.org/sw

Enhancing the lives of citizens by delivering quality services in a cost-effective manner.

Bcc: SWAC and Interested Parties

***** Click unsubscribe to be removed from the SWAC mailing list *****

--

Harrison Ruffin
Astro Paragliding
(541)399-7765

From:	heather amaryllis
To:	managethefuture
Subject:	Deadline extention
Date:	Monday, March 25, 2024 8:09:34 AM

Some people who received this message don't often get email from ha.mnco@gmail.com. Learn why this is important

[EXTERNAL EMAIL]

Dear member of SWAC committee,

I am Heather Amaryllis, a landowner in the millican valley, who attended the last meeting as well as some of the previous meetings.

In regards to the timing of the final decision, I feel that given the amount of new information delivered at the last meeting, and the amount of requests by SWAC to add important missing information to the metrics team's analysis, more time is needed.

Please consider adding at least one more meeting where the new information can be added to the presentations, graphs, and analysis, and presented to the public and the SWAC team for discussion.

My impression from the last meeting was that the timeline for making a final decision is in question by a number of committee members as well.

Thank you for your consideration.

Best regards,
Heather Amaryllis
541-399-2643

From:	David Williams
To:	managethefuture
Subject:	Deschutes County Landfill - Roth Sites vs Moon Pit Site
Date:	Tuesday, March 19, 2024 12:13:39 AM

Solid Waste Advisory Committee

I am writing once again to voice my opposition to the Roth Site for a future County Landfill.

The executive summary of the DRAFT Deschutes County Solid Waste Management Facility report states that the County should prioritize environmental protection and community values.

Environmental Protection. I remain unconvinced that operations at the Roth Site can mitigate adequately for wind or other weather conditions. The Site is simply too exposed. The Moon Pit location provides much more natural protection from wind. Additionally this site sets at the northeast corner of Pine Mountain. Pine Mountain is a significant geological feature and as such generates its own weather conditions. It is not uncommon to see a dozen or more dust devils from the highway in the Millican Valley in the spring time. These thermals go from the ground and reach elevations of 8,000 to 12,000 feet. Debris and light material will be lifted up to the tops of these thermal be spread by the upper winds over a large area. The Moon Pit site experiences far fewer of these events.

As an owner of property within the 2-mile radius of the proposed site if believe the impact will be hugely negative. Having spent considerable time in the area over the last 40 years this is one of the few areas in Deschutes County that has not been significantly impacted by human development. I do not believe that development of the Roth Sites and the resulting pollution and problems it will create are consistent with the **Community Values** in Deschutes County.

David R. Williams
Cell: 541.410.8620
Email: davewflyt2c@gmail.com

From: Brenda Fritsvold
To: Tim Brownell
Subject: FW: Proposed Landfill Sites in Deschutes County
Date: Monday, March 25, 2024 5:00:47 PM
Attachments: image001.png

Hi Tim:

You may have already received this, but I wanted to make sure you're aware this email was sent to the Board. Sharing fyi only--

Brenda Fritsvold | Executive Assistant
DESCHUTES COUNTY BOARD OF COMMISSIONERS
(541) 388-6572

Enhancing the lives of citizens by delivering quality services in a cost-effective manner.

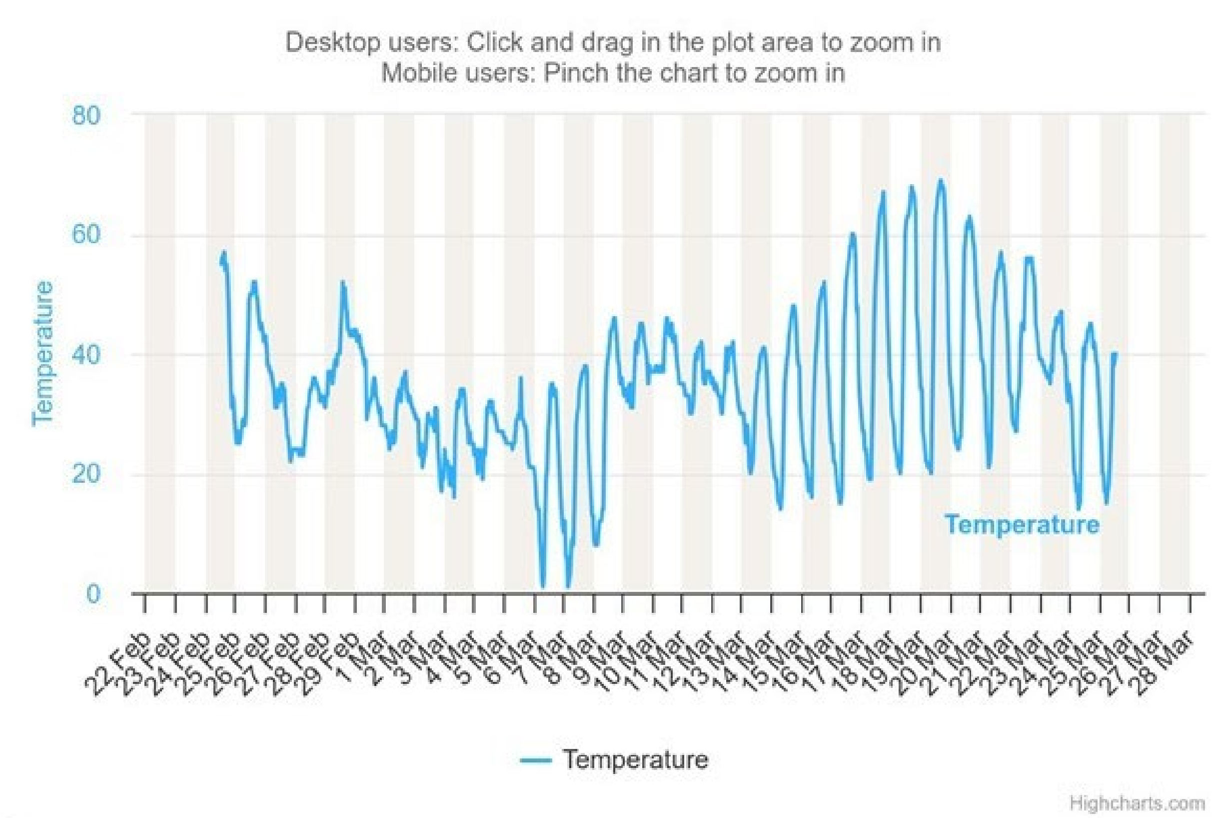
From: SW <wright@bendcable.com>
Sent: Monday, March 25, 2024 2:32 PM
To: managethefuture <managethefuture@deschutescounty.gov>
Cc: Board <Board@deschutes.org>
Subject: Proposed Landfill Sites in Deschutes County

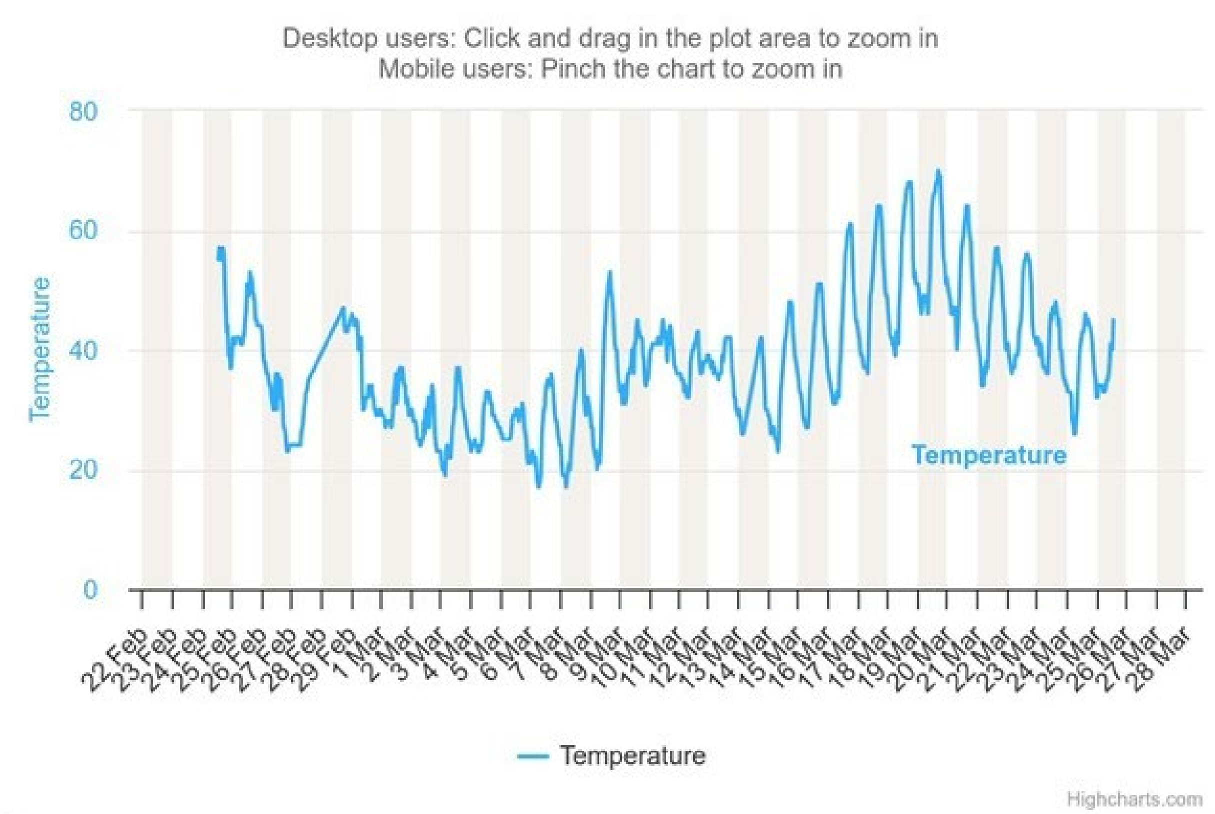
Parametrix (Dwight&Ryan), SWAC, Tim B, and DCC,

I have commented in the past that the Millican Valley (Roth East) can have extreme winds and frigid cold wintertime temperatures. This partly comes from actual outdoor experiences in both the Millican Valley near Roth East and Badlands/BLM areas near the Moon Pit. The Horse Ridges separate these two areas.

There are weather stations nearby that also provide evidence of weather differences for the two areas. Weather station information can be found at https://www.wrh.noaa.gov/map/?obs=true&wfo=pdt There is 1 weather station in the Millican Valley, know as Horse Ridge. It is approx. 6 miles northwest of Roth East. There is another weather station located on Calgary Loop in rural southeast Bend, approx. 9 miles northwest of the Moon Pit. The Horse Ridges separate these two weather stations. These two weather stations serve to compare the Roth East weather versus the Moon Pit weather. The graphs below provide 30 days of weather data.

Millican Horse Ridge weather station for Roth East Calgary Loop E8160 weather station for Moon Pit




Desktop users: Click and drag in the plot area to zoom in
Mobile users: Pinch the chart to zoom in
Temperature
80
60
40
20
0
22 Feb
23 Feb
24 Feb
25 Feb
26 Feb
27 Feb
28 Feb
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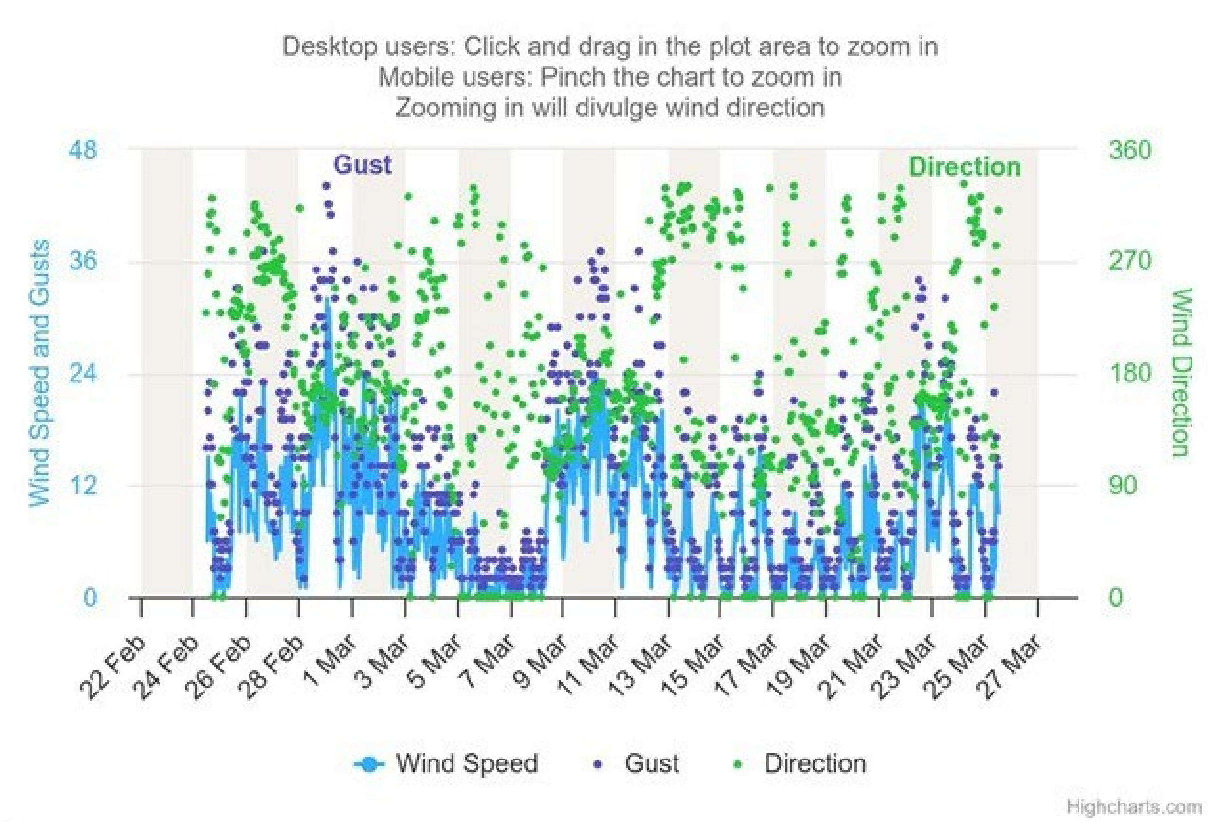
Temperature
Temperature
Highcharts.com


Desktop users: Click and drag in the plot area to zoom in
Mobile users: Pinch the chart to zoom in
Zooming in will divulge wind direction
Wind Speed and Gusts
48
36
24
12
0
Gust
Direction
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270
180
90
0
Wind Direction
22 Feb
24 Feb
26 Feb
28 Feb
1 Mar
3 Mar
5 Mar
7 Mar
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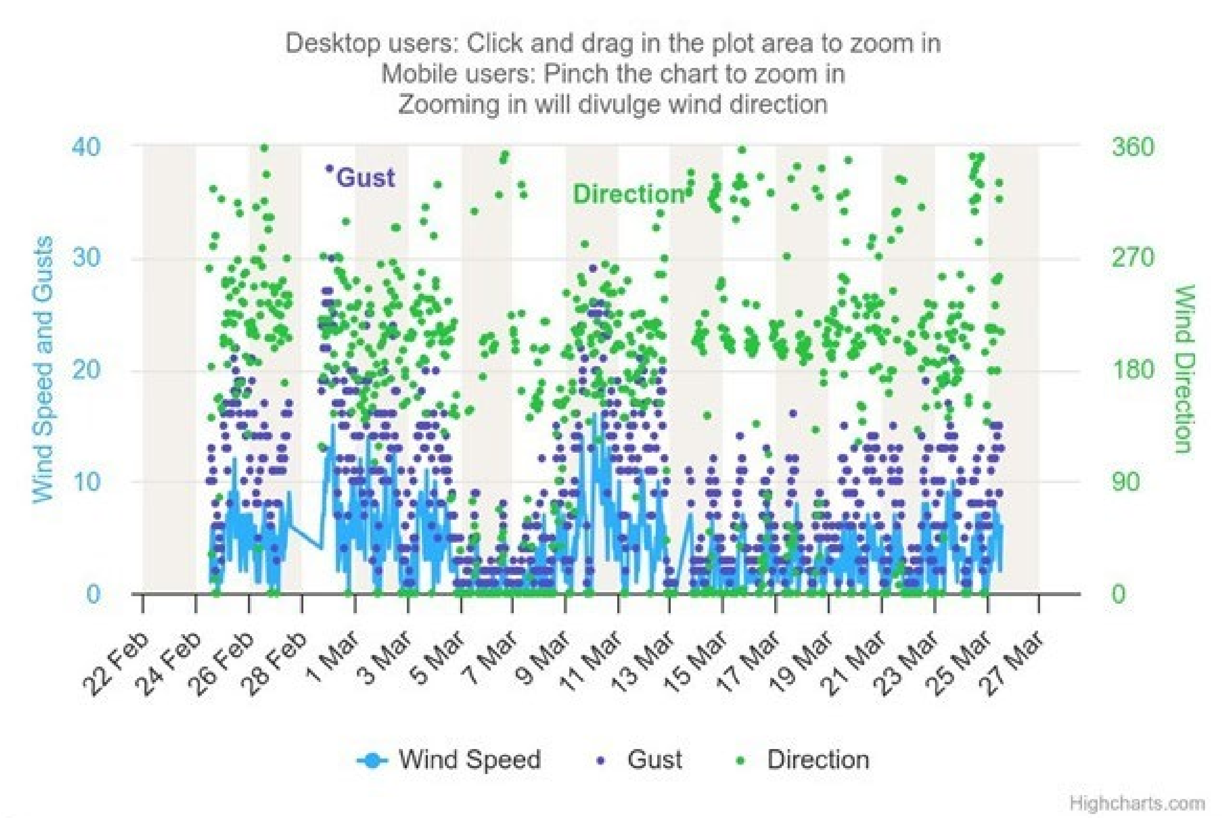
23 Mar
25 Mar
27 Mar
Wind Speed
Gust
Direction
Highcharts.com



On the Millican temperatures graph, there were 14 days where the cold temperatures were 20 degrees or lower and 2 days when the temperatures were near 0. For the Calgary Loop weather station, there were only 4 days at 20 degrees and lower. On the Millican winds graph, you can see the light blue lines wind and dark blue dots gusts are much higher versus the Calgary Loop graph.

The main point of these weather findings is that Millican experiences some extreme weather. Many people would not know this unless they had real lifetime experiences in these areas and/or study the weather stations. This extreme weather will have a big impact on operating a landfill and keeping the garbage off Highway 20 and the Millican Valley landscape. Driving the landfill trucks in extreme weather conditions is not safe. Landfill employees and equipment will also be affected by the extreme weather. The Moon Pit area in comparison has far less wind and cold temperatures versus Roth East.

Regarding water rights: The Moon Pit has water rights. The Roth East site does not have water rights. My understanding is that the State of Oregon is not currently issuing any new water rights. This is a big deal as a future landfill needs adequate water supply and volume to operate. Furthermore, an analysis of the wells located in the Millican Valley indicate most wells are low producing. Info. on wells can be found at the Oregon

Water Resources Department Well Report Query
https://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx

In conclusion, the Moon Pit is the best choice for a future landfill site out of the two finalist landfill sites.

Thank You,

Steve Wright
Millican Landowner
Hang Glider Pilot
Pine Mountain Enthusiast
Deschutes County
Resident since 1998

From: Rick Christen
To: managethefuture
Subject: Land fill
Date: Monday, March 18, 2024 4:51:17 PM

[EXTERNAL EMAIL]

Hello,
I'm a lifelong Oregonian, and have lived in Bend since 1996. I discovered Bend in 1960, on camping trips to Cultus Lake where I fell in love with the beautiful sky, water, topography, and wildlife. In 1980 I was one of the first hang glider pilots to fly from Pine Mountain. This mountain is the gateway to the vast Oregon desert. Over the last 44 years, I've been lifted like eagles in rising desert air and surveyed every inch of the this precious land of ours stretching into Idaho and California.

Surprisingly, in this fragile remote area from Pine Mountain to the north, east and south, we have snow capped mountains, trees, rivers, valleys, canyons, rimrocks, lakes and diverse wildlife. All of which is our Oregon treasure to protect and nurture.

During my decades of flying over our area, I've seen much change in Bend and the Oregon desert. Not all has been good for the forests, water, wildlife and even our future.

We're looking at the two remaining sites for a landfill. The only sensible choice is the Moon Pit it because it is already heavily disturbed and closer to the source of our landfill debris. I see no reason to drive further out into our desert and destroy this pristine resource. Please use a conservative approach and utilize resources that are already established.

Thanks for taking this into consideration when making your decision about our future.

Rick Christen

Sent from my iPhone

From: Scott Michalek
To: managethefuture
Subject: Landfill new location-Save Pine Mountain!!
Date: Tuesday, March 26, 2024 4:25:24 PM

[Some people who received this message don't often get email from michalek_scott@yahoo.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

[EXTERNAL EMAIL]

Dear Commissioner,

I really hope the right decision is made and the Moon Pit is selected.

It would be a real shame to trash a resource as important as Pine Mountain is for many user groups when the already developed/disturbed Moon Pit is the obvious choice.

Scott Michalek
17257 Mountain View Rd.
Sisters, Or. 97759

U.S. Department of the Interior
Bureau of Land Management

March 2024

Greater Sage-Grouse

Volume 1: Executive Summary, Chapters 1—6, Glossary, and Index

Draft Resource Management Plan Amendment and Environmental Impact Statement

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

Cover Photo: Steve Ting

Lower Bar Photos (L to R):

US Fish and Wildlife, Rachel Woita, James Yule

Greater Sage-Grouse Rangewide Planning
Draft Resource Management Plan Amendment and
Draft Environmental Impact Statement

DOI-BLM-WO-2300-2022-0001-RMP-EIS

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

Type of Action: Administrative (X) Legislative ( )

Document Status: Draft (X) Final ( )

Abstract: This draft resource management plan (RMP) amendment and draft environmental impact statement (EIS) has been prepared by the United States Department of the Interior, Bureau of Land Management (BLM) with input from cooperating agencies. This document considers amendments to 76 BLM RMPs across the range of greater sage-grouse (GRSG). The draft EIS describes and analyzes six alternatives for adjusting a subset of specific GRSG habitat management on BLM-administered surface estate and split-estate lands with BLM-administered subsurface mineral rights directly underlaying non-federal ownership. Alternative 1 is a continuation of current management; use of public lands and resources would continue to be managed under the BLM RMPs, as amended in 2015. Alternative 2 represents a continuation of management under the BLM RMPs amended in 2019. Alternative 3 represents the alternative with the most restrictions on resource uses to preserve GRSG. Alternative 4 was developed by the BLM to update the habitat management area boundaries and associated management based on new information and science that has become available since the 2015 and 2019 efforts. Alternative 5 was developed to consider other potential alignments of habitat management areas and associated management to try and balance GRSG conservation with public land uses. Under Alternative 6, management for all habitat management areas and the management actions being considered in the range of alternatives would be the same as described for Alternative 5, but with the addition of ACECs. Alternative 5 is the agency's preferred alternative, though this does not constitute a final decision and there is no requirement that the preferred alternative identified in the draft EIS be selected as the agency's decision in the Record of Decision. Major planning actions addressed include habitat management area boundaries, disturbance caps, habitat objectives, adaptive management, mitigation, energy and minerals, renewable energy, livestock grazing, wild horses and burros, and minimizing threats from predation.

Review Period: Comments on the Greater Sage-Grouse Draft Resource Management Plan Amendment and Draft Environmental Impact Statement will be accepted for 90 calendar days following publication of the United States Environmental Protection Agency's Notice of Availability in the *Federal Register*.

For further information, contact:

Pat Deibert, BLM National Sage-Grouse Conservation Coordinator
BLM Wyoming State Office
5353 Yellowstone Road,
Cheyenne, WY 82009
Email: BLM_HQ_GRSG_Planning@blm.gov
Project Website: https://eplanning.blm.gov/eplanning-ui/project/2016719/510

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
National Office
1849 C Street NW
Washington, DC 20240

Dear Reader:

The Greater Sage-Grouse Draft Resource Management Plan Amendment/Draft Environmental Impact Statement (Draft RMPA/EIS) for greater sage-grouse habitat management is available for your review and comment. This draft is available for review beginning March 15, 2024 through June 13, 2024. This planning process is considering amendments to 77 BLM RMPs to amend management of up to 69 million acres greater sage-grouse habitat management areas in portions of California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, Utah, and Wyoming. All actions analyzed in the Draft RMPA/EIS would apply only to lands managed by the BLM.

The BLM identified Alternative 5 as the preferred alternative in the Draft EIS. Identifying a preferred alternative does not indicate any decision or commitments from the BLM. In developing the Proposed RMPA/Final EIS the BLM may select various goals, objectives, allocations, and management actions from any of the alternatives analyzed in the Draft RMPA/EIS. This combination may also vary by state to address circumstances that vary between the states. The BLM has the discretion to prepare a Proposed RMPA as an alternative or set of state-specific alternatives that allows the BLM to select the best strategy that incorporates appropriate greater sage-grouse management to meet the purpose and need, meets the BLM's multiple use and sustained yield mandates, and aligns with state and local plans and policies to the extent possible.

The BLM encourages the public to review and provide comments on the Draft RMPA/EIS. Viewing the document electronically on the project website (https://eplanning.blm.gov/eplanning-ui/project/2016719/510) is encouraged. Paper copies are available for public review at BLM state offices throughout the planning area. Inquire at the front desk of an office to review copies to review in the office's public room. Public comments will be accepted for ninety (90) calendar days following the Environmental Protection Agency's (EPA) publication of its Notice of Availability in the Federal Register. As a member of the public, your timely comments on the Greater Sage-Grouse Draft RMPA/EIS will help formulate the Proposed RMPA/Final EIS. Comments are most useful that provide the BLM feedback concerning the adequacy and accuracy of the proposed alternatives, the analysis of their respective management decisions, and any new information that would help the BLM as they develop the plan. Your comments should be as specific as possible and include suggested changes, sources, methodologies and references to a section or page number. Comments containing only opinion or preferences will be considered and included as part of the decision-making process; however, they will not receive a formal response from the BLM.

We encourage you submit your comments electronically through the project website: https://eplanning.blm.gov/eplanning-ui/project/2016719/510

Comments may also be submitted by mail to: BLM Utah State Office, ATTN: HQ GRSG RMPA, 440 West 200 South #500, Salt Lake City, UT 84101

To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

A series of informational open houses will be held to answer questions you may have on the project. The BLM will be holding two virtual public meetings and eleven in-person public meetings throughout the planning area. The specific dates and locations of these meetings will be announced at least 15 days in advance through the ePlanning page and media releases.

There are numerous values and concerns associated with the management of greater sage-grouse habitat across the West. We will continue to incorporate the most current information we have available as we prepare forthcoming greater sage-grouse planning documents. We remain committed to implementing the policies and conservation measures that will meet both agencies' multiple-use mandates, provide for the habitat needs to conserve the greater sage-grouse, avoid the need to list under the Endangered Species Act, and minimize long-term regulatory burdens. Thank you for your interest in the Greater Sage-Grouse RMPA.

Sincerely,

SHARIF BRANHAM Digitally signed by SHARIF BRANHAM
Date: 2024.03.08 18:21:31 -05'00'

Sharif Branham,
Assistant Director for Resources and Planning

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TABLE OF CONTENTS

Chapter Page

TABLES

Page

APPENDIXES

ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations	Full Phrase
°F	degrees Fahrenheit
ACEC	area of critical environmental concern
ADH	all designated habitat
AML	appropriate management level
AMP	allotment management plans
AO	authorized officer
APD	application for permit to drill
ARMPA	approved resource management plan amendment
AUM	animal unit month
BCC 2021	Birds of Conservation Concern 2021
BFO	Butte Field Office
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practices
BSU	biologically significant unit
CA	California
CBNG	coalbed natural gas
CEQ	Council on Environmental Quality
CFA	causal factor analysis
CFR	code of federal regulations
CHMA	Connectivity Habitat Management Area
CO	Colorado
COA	conditions of approval
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COT	Conservation Objectives Team
CRVFO	Colorado River Valley Field Office
CSU	controlled surface use
CWA	Clean Water Act
DDT	dichlorodiphenyltrichloroethane
DDCT	density and disturbance calculation tool
DK	North and South Dakota
DOI	United States Department of the Interior
EGS	Enhanced Geothermal Systems
EIS	environmental impact statement
EOI	Expression of Interest
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESD	Ecological Site Description
ESR	emergency stabilization and rehabilitation
EVT	existing vegetation type
ES&R	Emergency Stabilization and Rehabilitation

FLPMA	Federal Land Policy and Management Act of 1976
FR	federal regulation
GBBO	Great Basin Bird Observatory
GHG	greenhouse gas
GHMAs	general habitat management areas
GIS	geographic information system
GJFO	Grand Junction Field Office
GPS	global positioning system
GRSG	greater sage-grouse
HAs	herd areas
HAF	habitat assessment framework
HAP	hazardous air pollutant
HBP	held by production
HMAs	habitat management areas
ID	Idaho
IHMAs	important habitat management areas
IM	instruction memorandum
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
KPLA	known phosphate lease areas
kV	kilovolt
LCHMA	linkage and connectivity habitat management area
LCT	Lahontan cutthroat trout
LMA	linkage management area
LUP	land use plan
LUPA	land use plan amendment
LWC	lands with wilderness characteristics
MA	management area
MD	management direction
MLB	management of land boundary
MR	mineral resources
MSHA	Mine Safety and Health Administration
MT	Montana
MW	megawatt
MZ	management zone
NAAQS	national ambient air quality standards
NEPA	National Environmental Policy Act
ND	North Dakota
NDOW	Nevada Department of Wildlife
NHPA	National Historic Preservation Act of 1966, as amended
NIFC	National Interagency Fire Center
NOx	nitrogen oxides
NRHP	National Register of Historic Places
NSO	no surface occupancy

NTT	National Technical Team
NV	Nevada
OHMA	other habitat management areas
OHV	off-highway vehicle
OR	Oregon
PAC	priority area of conservation
PEIS	programmatic environmental impact statement
PHMAs	priority habitat management areas
PM_{10}	particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 microns
RA	Restoration Area
RDF	required design feature
RFD	reasonably foreseeable development
RHMA	restoration habitat management area
RIPS	Rangeland Improvement Project System
RMP	resource management plan
RMPA	resource management plan amendment
RNA	research natural area
ROD	record of decision
ROW	right-of-way
SD	South Dakota
SDWA	Safe Drinking Water Act
SFAs	sagebrush focal areas
SHPO	State Historic Preservation Office
SMA	Surface Management Agency
SO	Secretarial Order
SO2	sulfur dioxide
SRP	special recreation permit
SSS	special status species
STM	State and Transition Model
TAWS	targeted annual warning system
T&C	terms and conditions
TL	timing limitation
TUP	temporary use permit
UMRBNM	Upper Missouri River Breaks National Monument
US	United States
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UT	Utah
VOC	volatile organic compound

WEM	waivers, exceptions, and modifications
WHB HMAs	wild horses and burros herd management areas
WO	Washington Office
WSA	wilderness study area
WY	Wyoming

Executive Summary

ES.1 Executive Summary

The greater sage-grouse (GRSG) is a state-managed species that depends on intact functioning sagebrush ecosystems. This expansive sagebrush landscape is managed by a mix of federal, tribal, state, and local agencies (e.g., counties and conservation districts), as well as private landowners. The Bureau of Land Management (BLM) manages approximately half of GRSG habitat as part of the agency's multiple use/sustained yield mission.

State and Tribal-led efforts to conserve the species and its habitat date back to the 1950s. For the past three decades, state wildlife agencies, the BLM and other federal agencies, and many others in the range of the species have collaborated to conserve GRSG and its habitats. The BLM's land management plans (collectively referred to as resource management plans [RMP]) include goals, objectives, and management actions for managing GRSG habitat on BLM-administered public lands in ten Western states (California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah and Wyoming). These plans include management for GRSG Habitat Management Areas to provide for conservation, enhancement, and restoration of GRSG habitat. GRSG also occur in Washington but have limited distribution on BLM-administered lands and are primarily influenced by actions on private lands. Therefore, GRSG in Washington are not included as part of this plan amendment.

The U.S. Fish and Wildlife Service identified the threats to GRSG as part of evaluating whether GRSG warranted being listed as threatened or endangered in 2005, 2010 and 2015. Many of these threats have been addressed in the BLM's prior GRSG planning efforts in the 2014/2015 plan revisions and amendments, and again in all states except Montana and the Dakotas with a 2019 series of state-specific amendments. Despite years of management attention from multiple state and federal agencies GRSG habitat continues to be impacted and lost.

The BLM has prepared this Draft Resource Management Plan Amendment (RMPA)/Draft Environmental Impact Statement (DEIS) to analyze potential amendments to specific GRSG goals, objectives, and management actions contained in 77 existing RMPs to enhance GRSG conservation through management of GRSG habitats on BLM-administered lands. These amendments seek to continue providing the BLM with locally relevant decisions that achieve rangewide GRSG conservation goals consistent with the agency's multiple use and sustained yield mission, and GRSG management efforts with Federal, State, local, and Tribal partners. The ten-state planning area includes nearly 121 million acres of BLM-administered public land. GRSG habitat management areas occur on approximately 69 million acres and are the focus of this effort.

ES.2 Purpose of and Need for Action

The 2015 and 2019 GRSG planning efforts address the threats to GRSG and their habitat. Given continuing losses of habitat across all landownerships, and resulting long-term population declines, the BLM's purpose and need is to consider amending RMPs to update a sub-set of the GRSG goals, objectives, allocations, and management actions to ensure management on BLM-administered lands respond to changing land uses, improve efficiency and effectiveness of GRSG management, provide for consistent conservation based on ecological boundaries, and provide the BLM with locally relevant decisions that accord with rangewide GRSG conservation goals. The BLM is focusing on the following rangewide management actions:

- Clarifying the existing GRSG RMP goal
- GRSG habitat management area alignments (i.e., to incorporate new science and improve alignment along state boundaries) and the major land use allocations therein, including criteria-based management for non-habitat within the habitat management areas
- Mitigation for impacts to GRSG habitats
- GRSG habitat objectives
- Disturbance cap
- Fluid mineral development and leasing objective
- Fluid mineral leasing waivers, exceptions, and modifications
- Renewable energy development and associated transmission
- Minimizing threats from predation
- Livestock grazing
- Wild horse and burro management
- Areas of Critical Environmental Concern
- Adaptive Management

Given the diversity of GRSG habitats and their conditions across the sagebrush landscape, some habitat management concerns are more effectively addressed at the local level. As such, the purpose of this planning effort also includes amending some state-specific RMP management actions to facilitate GRSG habitat conservation efforts.

Changes to RMPs may be needed to –

- address the continued GRSG habitat losses that are contributing to declines in GRSG populations,
- ensure habitat management areas and associated management incorporate recent relevant science to prioritize management where it will provide conservation benefit (including providing durability when considering the effects of climate change),
- provide continuity in managing GRSG habitats based on biological information versus political boundaries, while allowing for management flexibility to address different strategies in identifying habitat management areas with state agencies (see Appendix 3) as well as local habitat variability, and
- refine and clarify other aspects of RMPs.

ES.3 Resource Topics Identified Through Scoping

In the November 2021 Notice of Intent the BLM invited the public to identify issues, management questions, or concerns related to the preliminary purpose and need. Public comments were evaluated to identify issues related to GRSG habitat management and management for other public land resources and values. Issues were invited at both the range-wide and state-specific perspectives. Based on input received, the BLM refined the list of specific management actions and topics to consider for amendment (see Scoping Report chapter 3 at: https://eplanning.blm.gov/eplanning-ui/project/2016719/570).

This RMPA is not reconsidering all existing GRSG management actions from the 2015 RMP Amendments and revisions or the 2019 RMP Amendments. Management actions in the existing RMPs that do not need to be changed to meet GRSG conservation goals will not be considered for amendment and will remain unaltered in the existing RMPs (see **Appendix 2** for the list of existing GRSG RMP goals, objectives, and management actions from each state, and which are being considered for amendment). See Section 1.6.2 in Chapter 1 for issues and management from the Scoping Report that are not being considered for amendment in this RMPA/EIS and associated rationale. Existing RMP management decisions related to these issues/management will continue to apply.

ES.3.1 Issues Retained for Further Consideration in this RMPA/EIS

The following resource topics identified during public scoping are being carried forward for further analysis in this RMP Amendment/EIS.

- Special status species (including GRSG)
- Fish and wildlife
- Air resources and climate
- Soil resources
- Water resources
- Vegetation, including riparian areas and wetlands
- Wild horses and burros
- Cultural resources
- Lands with wilderness characteristics
- Wildland fire ecology
- Livestock grazing
- Recreation
- Travel and transportation
- Mineral resources
- Lands and realty
- Areas of Critical Environmental Concern (ACECs)
- Tribal interests
- Social and economic conditions, including environmental justice

ES.4 Alternatives Considered

The development of alternatives was guided by the BLM's identified purpose and need, while remaining responsive to issues identified by our partners, in alignment with planning criteria, and compliant with Federal laws, regulations, policies, and standards, including the multiple-use mandates specified by FLPMA. This planning process considers six alternatives. These alternatives have been derived from scoping, interagency coordination, and internal discussions. The alternatives developed provide strategies to address management trade-offs related to planning components while aligning with the purpose and need.

ES.4.1 Alternative 1

Alternative 1 includes the applicable elements of the 2015 Approved RMPAs (ARMPA) that are being analyzed for potential amendment. It does not include all the goals, objectives, and actions from the 2015 ARMPAs, as not all need to be changed to meet GRSG conservation goals. Under Alternative 1, the BLM would re-adopt the applicable GRSG habitat management area boundaries, goals, objectives, and actions from the 2015 Records of Decision (ROD)/ARMPAs (as updated through applicable maintenance actions). The existing language in the plans from the 2019 ARMPAs would revert to that contained in the 2015 ARMPAs (as maintained). Due to the U.S. District Court of Idaho's preliminary injunction preventing implementation of the 2019 amendments (see explanation in Alternative 2 summary below) this alternative reflects how the BLM is currently managing GRSG habitat on public lands. While the states have similar concepts in their RMPs (e.g., disturbance cap, adaptive management, livestock grazing, threats on predation), the detail on application varies. This alternative also includes designation of some areas of PHMA as Sagebrush Focal Areas (SFA) with a recommendation to withdraw them from mineral location and entry under the Mining Law of 1872 and prioritization for various other activities related to vegetation treatments, livestock grazing, and wild horses and burros.

ES.4.2 Alternative 2

Alternative 2 is the No-Action Alternative and includes the applicable decisions from the 2019 Greater Sage-Grouse ROD/ARMPAs efforts except areas in Montana/Dakotas. Management in Montana/Dakotas would be based on the 2015 amendments because they were not amended in 2019. This alternative, including the habitat management area boundaries and associated management in the 2019 amendments, is the No Action alternative because it reflects management currently in the BLM's approved RMPs. The U.S. District Court for the District of Idaho has issued a preliminary injunction, preventing the BLM from implementing the 2019 amendments, but not vacating them or their Records of Decision. Because the 2019 RODs were not vacated, the decisions from the 2019 amendment effort remain the GRSG management language in the BLM's RMPs. Under this alternative the BLM would apply the applicable management from those 2019 efforts. Alternative 2 was developed through coordination with each state's applicable agencies, cooperating agencies, and public input to increase alignment with the State's GRSG conservation plan and strategies. It was further refined for alignment with BLM policies at the time those RMPAs were developed. While major land uses are similar to Alternative 1, differences between the states increased (e.g., differences in mitigation between states [required vs. voluntary, net gain vs. no net loss], as well as the potential to use compensatory mitigation instead of avoidance). SFAs would be removed from the BLM RMPs in all states except Oregon and Montana. Areas formerly identified as SFAs would still be managed with all the protections of PHMA, but would no longer include a recommendation for withdrawal and prioritizations would be the same as the rest of PHMA.

ES.4.3 Alternative 3

Alternative 3 includes the most restrictive measures to protect and preserve GRSG and its habitat. Alternative 3 would update the habitat management area boundaries based on new information and science that has become available since the 2015 and 2019 efforts. All habitat management areas would be managed as PHMA. The BLM would close PHMA to new fluid mineral leasing, saleable minerals/mineral materials permits and nonenergy leasable minerals leasing (development associated with existing permits and leases would not be precluded). PHMA would be recommended for withdrawal from location and entry under the Mining Law of 1872 and would be unavailable for livestock grazing. PHMA would also be right-of-way (ROW) exclusion areas. Where there are currently designated wild horse and burro herd management areas overlapping PHMA, the wild horse and burros herd management area would become a Herd Area that is not managed for wild horses and burros. Under Alternative 3, the BLM would designate 11,139,472 acres of ACECs specific to the management of GRSG; the ACECs would include portions of PHMA and would have the same allocations (i.e., allowable uses) as the rest of PHMA. No areas would be identified as SFA because Alternative 3 considers the greatest level of restrictions on resource uses in all GRSG HMAs.

ES.4.4 Alternative 4

Alternative 4 would update the habitat management area boundaries and associated management based on new information and science that has become available since the 2015 and 2019 efforts. While many of the allocations would be similar to Alternatives 1 and 2, areas to which management would be applied are updated to reflect new science. In Wyoming all PHMA management would be changed to no surface occupancy stipulations for new oil and gas leases (all other states already have this stipulation in PHMA). In addition, management associated with some of the major minimization measures (e.g., disturbance cap, adaptive management) is adjusted to address cross-boundary coordination of shared populations, rangewide biological and managerial concerns based on monitoring, and experience gained since 2015. Alternative 4 allows compensatory mitigation to be used under specific conditions. Additional compensatory mitigation may be required where habitat and/or population adaptive management thresholds have been met. Alternative 4 also provides more opportunity for consideration of local habitat characteristics when applying mitigation exceptions but requires functional habitat prior to granting the exception. Areas previously identified as SFAs are managed as PHMA with removal of the withdrawal from mineral entry recommendation and prioritization strategies.

ES.4.5 Alternative 5

Alternative 5 considers other potential alignments of habitat management areas and associated management to balance GRSG conservation with public land uses. Updated state GRSG management area boundaries are considered on public lands in this alternative. Habitat management areas are similar to but refined from Alternative 4. Restrictions would generally be similar to Alternative 4, except for oil and gas in Wyoming which is similar to Alternative 2. However, reasonable differences in management would be considered while still providing GRSG conservation. Alternative 5 considered options with fewer restrictions on resources and provide more opportunities for considering compensatory mitigation to offset impacts on GRSG and its habitat. There are additional flexibilities associated with granting exceptions to fluid mineral stipulations and the disturbance cap. For wind, solar, and major rights-of-way Alternative 5 has less direct avoidance and provides more opportunities for considering compensatory mitigation to offset impacts on GRSG and its habitat. Areas previously identified as SFAs are managed as PHMA with removal of the withdrawal from mineral entry recommendation and prioritization strategies.

The BLM identified Alternative 5 as the preferred alternative in this Draft EIS. This alternative was selected after review of comments submitted by other government agencies, public organizations, state and tribal entities, interested individuals (during scoping) and cooperating agencies. Identifying a preferred alternative does not indicate any decision or commitments from the BLM. In developing the Proposed RMPA/Final EIS, the next stage of the planning process, the decision maker may select various goals, objectives, allocations and management prescriptions from each of the alternatives analyzed in the Draft RMPA/EIS. The combination of goals, objectives, and management prescriptions may also vary by state to address circumstances that vary between the states. This allows the BLM to select the best strategy that incorporates appropriate GRSG habitat management actions to meet the RMP goals and objectives, is consistent with the purpose and need, is in accordance with the agency's mandate to manage public lands for multiple use and sustained yield and aligns with state and local plans and policies to the extent possible.

ES.4.6 Alternative 6

Under Alternative 6, management for all habitat management areas and the topics being considered in the range of alternatives would be the same as under Alternative 5, but with the addition of designating ACECs. ACEC boundaries (and acres) would be the same as under Alternative 3, but management would be less restrictive within the ACECs compared to Alternative 3, though generally more restrictive than the rest of Alternative 6 PHMA.

ES.5 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

GRSG: All alternatives would apply some restrictions on resource uses within habitat management areas to reduce impacts on GRSG. The acreage and location of habitat management areas varies by alternative, and impacts on GRSG would similarly vary, with the BLM managing the most PHMA under Alternative 3, followed by Alternatives 4, 1, and 5/6 in descending order. The fewest acres of PHMA and General Habitat Management Areas (GHMA) would be managed under Alternative 2. The simple comparison of acreages does not reflect the incorporation of new science published since 2015 that more accurately identify important GRSG habitats. Under Alternative 1, restrictions on development and avoidance/exclusion areas, would be focused in PHMA, while energy development, mining, ROWs, and other surface disturbing activities would be focused outside of PHMA. The BLM would incorporate adaptive management, mitigation, disturbance caps, habitat objectives, and monitoring, to reduce the total net impact on GRSG. Impacts from Alternative 2 would be similar to those under Alternative 1, with more flexibility incorporated in the management of activities that can impact GRSG, and the BLM would remove SFA in all states except OR and MT. Increased flexibility could increase potential impacts on GRSG habitat, including the potential for disturbance, degradation, and loss. Alternatives 1 and 2 habitat management areas do not reflect the most current research identifying habitat value for long-term persistence of GRSG, including potential habitat impacts resulting from climate change. Therefore, management actions may be incongruent with long-term conservation where Habitat Management Areas overlap areas of little conservation value, or do not capture areas key to GRSG persistence.

The greatest protection for GRSG habitat is under Alternative 3, which has the largest PHMA acreage with the greatest restrictions. However, actions to implement the Alternative 3 allocation making public lands unavailable to grazing would require increased fencing to separate federal and nonfederal grazing lands, resulting in possible habitat fragmentation, increased collision risks, increased opportunities for GRSG predators. Further, removal of grazing could allow for the buildup of fine fuels, which may increase the risk of a large-scale wildfire that would damage or destroy large areas of GRSG habitat.

Under Alternatives 4, 5, and 6, incorporation of new information and science that has become available since the 2015 and 2019 efforts would refine management for GRSG and associated habitats and improve cross-boundary coordination of shared populations compared with Alternatives 1 and 2, thus potentially improving management of GRSG across its range. These alternatives also retain components of the 2015 and 2019 amendments that continue to provide conservation to GRSG. Alternatives 5 and 6 may have more impacts than Alternative 4, given the fewer restrictions on resource uses and providing more opportunities for considering compensatory mitigation to offset impacts on GRSG and its habitat.

Natural, biological, and cultural resources: Protections for GRSG under all alternatives would result in incidental protections for other natural, biological, and cultural resources, including vegetation, fish and wildlife, other special status species, soil resources, water resources, cultural resources, tribal interests, air quality, climate change, and wilderness characteristics. The location and magnitude of impacts would be similar to those summarized for GRSG, based on habitat management area acreages and particular restrictions under each alternative. As described for GRSG, the removal of livestock grazing under Alternative 3 could result in an increased risk of wildland fire that could destroy or damage natural, biological, or cultural resources. Removal of all horses and burros from herd management areas that overlap with PHMA under Alternative 3 would result in short-term disturbances from human presence and round up activities. In the long-term the combination of removing livestock grazing and wild horses and burros could have positive benefits for grazing wildlife due to removal of uses that compete for similar resources.

Resource uses: Impacts on resource uses, including mineral development, livestock grazing, lands and realty, and renewable energy, are typically inversely related to impacts on GRSG. Alternative 3 would have the greatest effects on resource uses by making PHMA unavailable for livestock grazing and closing PHMA to mineral, ROW, and renewable energy development. There would be less variability in the differences between Alternatives 1, 2, 4, 5, and 6, and would be based on HMAs acreages and resource management differences. For instance, management of PHMA as no surface occupancy (NSO) in Wyoming under Alternative 4 would increase restrictions on fluid mineral development compared to the other alternatives for that state. However, the NSO stipulations in areas of high development could limit flexibility of managers to locate disturbances in areas with the least potential for conflict with GRSG conservation. Areas managed as limited to existing routes and minimizing GRSG impacts through measures on recreation permits and facilities will vary by alternative based on differences in acres of PHMA. While SFAs under Alternative 1 and all PHMA under Alternative 3 would be recommended for withdrawal from location and entry under the Mining Law of 1872, the recommendation for withdrawal does not itself restrict any resource uses. As such, there would be no effects on locatable mineral claims or mine development. If, in the future, the Secretary of the Interior were to propose a withdrawal of the land from location and entry under the Mining Law of 1872, that proposal would be subject to appropriate NEPA and other analysis and if the Secretary were to withdraw the land following such analysis, location and entry under the Mining Law of 1872 would no longer be allowable, subject to valid existing rights.

Special designations: ACEC management would be unchanged under Alternative 2, 4, and 5 compared with Alternative 1. ACECs under Alternative 3 would have the most restrictive management, thus providing the greatest level of protection to the GRSG habitat in these areas, but reduce flexibility in application of the BLM multiple use mandate. The same ACEC boundaries are identified in Alternatives 3 and 6, but management of these areas is less restrictive under Alternative 6. For example, ACECs would be open to leasing but not allowing surface occupancy (Alternative 6) versus closed to leasing fluid minerals (Alternative 3). However, Alternative 6 management actions would still protect GRSG habitat and prevent most damaging habitat impacts.

Social and economic conditions: The nature and types of social and economic impacts associated with management actions under the alternatives would be similar across GRSG range, however, effects would not be evenly distributed and may be felt at the individual community-level to a greater degree. Under Alternative 3, the BLM would no longer manage PHMA for livestock grazing, mineral, and renewable and non-renewable energy development, supporting lower levels of these activities across GRSG range. Although the adverse economic impacts under Alternative 3 are likely to be concentrated in mineral extraction and livestock production sectors, reduced economic activity in public land-dependent sectors will have a ripple effect which causes economic activity in other sectors of the economy slow. Changes in economic conditions could affect rural quality of life and reduced levels of mineral development which could lead to shifts in the local economic base that create higher levels of unemployment and underemployment in some mineral dependent economies. Displaced workers in more diversified economies are likely to have an easier time finding new employment while rural residents may have to commute further for work or may have to consider re-locating out of the area. Those lacking financial resources to either commute further or relocate will be especially impacted. The scale of closures under Alternative 3 would have adverse impacts on social and economic conditions in a large number of communities and could affect fiscal budgets at both the local and state level of government, especially in states like Wyoming where taxes on mineral production serve as the largest source of tax revenue for multiple levels of government. However, Alternative 3 would provide the greatest protection of nonmarket values for GRSG and sagebrush ecosystems.

Alternatives 1, 2, 4, 5 and 6 would support higher levels of economic activity in natural resource-dependent economies across the planning area relative to Alternative 3. The adverse economic impacts of PHMA closures under Alt 3 would be compounded in communities where a significant portion of residents either work in the oil and gas and mining sector or operate small family-owned ranches with affected grazing permits and ranching is their sole source of income, or where rural residents work in mineral extraction as a way to support a family while operating a small family-owned ranch. Restrictions on O&G development under Alts 2, 4, 5, and 6 could have a large negative impact on economic and fiscal conditions in some Western Colorado counties, which may affect social conditions and quality of life in some affected communities.

Chapter 1. Introduction

1.1 Introduction

The greater sage-grouse (GRSG) is a state-managed species that depends on intact functioning sagebrush ecosystems. This expansive sagebrush ecosystem is managed by a mix of federal, tribal, state, and local agencies (e.g., counties and conservation districts), as well as private landowners. State and Tribal-led efforts to conserve the species and its habitat date back to the 1950s. For the past three decades, state wildlife agencies, the Bureau of Land Management (BLM) and other federal agencies, and many others in the range of the species have been collaborating to conserve GRSG and its habitats.

The BLM manages GRSG habitat as part of the agency's multiple use mission, and approximately half of available GRSG habitat is managed by the BLM. The BLM's land management plans (collectively referred to as resource management plans {RMP}) include goals, objectives, and management actions for managing GRSG habitat on BLM-administered public lands in ten Western states (California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah and Wyoming). These plans include specific land use allocations, resource objectives and management actions for designated GRSG Habitat Management Areas to help ensure conservation, enhancement, and restoration of GRSG habitat. The BLM uses RMP management as a platform for our ongoing commitment to on-the-ground activities that promote conservation through close coordination with federal state, local, Tribal, and private partners. Since completion of the initial GRSG plan amendments (or GRSG considerations in revisions) in 2014 and 2015 the BLM has applied management to address threats to GRSG habitat. The BLM has also treated hundreds of acres of GRSG habitat every fiscal year in coordination with partner contributions, accomplishing important goals for GRSG conservation and other programs and activities (e.g., fuels, riparian, and range management). These planning and implementation-level habitat projects show that successful conservation of GRSG requires a shared vision among Tribes, states, private citizens, landowners and federal land management agencies.

The Federal Land Policy and Management Act of 1976 (FLPMA) directs the BLM to develop and periodically revise or amend its RMPs, which guide the management of BLM-administered public lands. The planning process follows BLM planning regulations codified in 43 Code of Federal Regulations (CFR) Part 1600 and Council on Environmental Quality (CEQ) regulations codified in 40 CFR Part 1500. BLM RMPs identify the allowable and restricted uses of public land resources; set forth overall goals and objectives to manage, protect, and provide for the appropriate use of resources; and establish systems for monitoring and evaluating the health of resources and effectiveness of management practices.

The BLM has prepared this Draft Resource Management Plan Amendment (RMPA)/Draft Environmental Impact Statement (DEIS) to analyze potential amendments to specific GRSG goals, objectives, and management actions contained in 77 existing RMPs (see Appendix 2 for a list of plans and the existing GRSG management, as amended and maintained). These amendments seek to continue providing the BLM with locally relevant decisions that achieve rangewide GRSG conservation goals consistent with the agency's multiple use and sustained yield mission and GRSG management efforts with Federal, State, local, and Tribal partners.

1.2 BACKGROUND

1.2.1 GRSG Planning Background

In 2010, the US Fish and Wildlife Service (USFWS) determined that listing the GRSG under the Endangered Species Act of 1973 (ESA) was "warranted but precluded" by other priorities. The USFWS made this determination based on two factors identified in section 4(a)(1) of the ESA: continued decline of GRSG habitats, and inadequacy of regulatory mechanisms guiding habitat management. In response, the BLM, in coordination with other agencies in the United States Department of the Interior and the United States Forest Service (USFS), developed a management strategy that included updating GRSG conservation actions in its land use plans.

The purpose and need of the 2015 plan amendment effort was to respond to the USFWS's 2010 listing determination for GRSG by incorporating appropriate measures in RMPs to conserve, enhance, and restore GRSG habitat by avoiding, minimizing, or compensating for unavoidable impacts on GRSG habitat in the context of the BLM's multiple use and sustained yield mission under FLPMA. Changes in management of GRSG habitats were determined necessary to avoid the continued decline of populations across the species' range.

In September 2015, the BLM and USFS adopted amendments and revisions to 98 RMPs across 10 western states. The purpose of these amendments was to address the various threats to GSRG on GRSG habitats on BLM-administered surface and mineral estates, as well as on National Forest System Lands in an effort to avoid a potential for the species to be listed through the ESA. Collectively, these plans govern the management of 67 million acres of GRSG habitat. Subsequently, the USFWS determined that the GRSG did not warrant listing under the ESA based in part on the regulatory mechanisms included in the federal RMP amendments and revisions.

On March 31, 2017, the US District Court for the District of Nevada held that the BLM violated the National Environmental Policy Act of 1969, as amended (NEPA), by failing to prepare a supplemental environmental impact statement (EIS) for the designation of sagebrush focal areas (SFAs) and other changes in habitat management areas in the 2015 Nevada and Northeastern California Greater Sage-Grouse Resource Management Plan Amendment. However, the court did not vacate or enjoin implementation of the 2015 Great Basin ROD.

In October 2017, the BLM initiated another planning process in all states except Montana and North and South Dakota to consider specific changes to some GRSG management actions from the 2015 amendments, and to address the concerns identified by the US District Court for the District of Nevada. The planning process also sought to increase alignment with recently completed or updated state GRSG management plans. The purpose and need for the amendments built on the 2015 effort but focused specifically on: modifying GRSG management to enhance cooperation and coordination with states and tribes where applicable; aligning with updated Department of the Interior (DOI) and BLM policy directives; and incorporating updated local science, research, and information. The subsequent Record of Decisions (RODs) were issued in March 2019. Changes to GRSG management actions through the 2019 planning process varied by state resulting in multiple changes in some states, fewer in others. Because the BLM offices in Montana and North and South Dakota did not initiate an amendment, no changes were made and GRSG management remained as described in the 2015 efforts.

In October 2019, the US District Court for the District of Idaho issued an order that preliminarily enjoined the BLM from implementing the 2019 RODs but did not vacate the amendments or their RODs. Because the 2019 RODs were not vacated and therefore the associated management actions are being considered for amendment in this planning process. In 2020, the BLM prepared supplemental EISs for each state that participated in the 2019 amendments to address and clarify the issues identified in the Court's injunction and to determine whether additional planning was necessary. The BLM concluded that no further planning was necessary and the existing NEPA analyses supported the original 2019 RODs. RODs associated with those supplemental EISs were signed in January 2021 acknowledging this conclusion and made no further management decisions. Until the court makes a final ruling in the case or otherwise lifts the preliminary injunction, the BLM is enjoined from implementing the decisions from the 2019 RODs, and as such the actions contained in the 2015 RODs remain in effect.

The maps and language for the 2015, 2019, and 2021 planning efforts can be accessed through links on the BLM's GRSG website: https://www.blm.gov/programs/fish-and-wildlife/sagegrouse/blm-sagegrouse-plans.

1.2.2 Summary of GRSG Population and Habitat Trends

Each spring state wildlife agencies lead efforts to conduct lek (see Glossary) counts to track GRSG populations. While GRSG populations experience natural fluctuations, monitoring indicates the most recent nadirs (low point of population cycles) are lower than the prior nadirs in most states. The U.S. Geological Survey[1] has also analyzed state-collected lek data and reported estimated range-wide population declines of nearly 80 percent from 1966-2021 and of 41 percent from 2002-2021. While the study identified areas in the range where GRSG populations were stable to increasing, the researchers found that over 87 percent of areas throughout the range had declining populations since 2002. The quantity and quality of available habitat, as well as non-habitat factors such as disruptive activities and prolonged drought can affect the size and trend of GRSG populations.

For the 2015 GRSG planning effort the BLM worked closely with States to identify population and habitat adaptive management triggers. If a triggers was met, the plans stated management changes may be appropriate. The BLM's 2021 *Greater Sage-Grouse Plan Implementation Rangewide Monitoring Report for 2015-2020*[2] identified 42 population triggers that had been tripped through 2020, nearly half of the areas evaluated, suggesting management changes may be needed to address causal factors. Management changes can include either RMP-level changes or more specific and localized changes made to decisions that implement the RMPs.

Analyses of west-wide satellite maps determined sagebrush availability across all land ownerships declined by approximately 3 percent (1.9 million acres) between 2012 and 2018. Nearly 60 percent of the sagebrush losses occurred on BLM-managed lands (approximately 1.1 million acres range wide). Sixteen adaptive management habitat triggers were tripped between 2015 – 2020, mostly the result of sagebrush loss to wildfires. The Monitoring Report also estimated habitat loss of less than one percent in GRSG Priority Habitat Management Areas (PHMA) – and Important Habitat Management Areas (IHMA) in Idaho – due to anthropogenic disturbance. This loss is less than what scientific literature has identified as the threshold where GRSG abandon leks (Knick et al., 2011; Leu and Hanser 2011; Knick et al., 2013; Kirol et al., 2020).

[1] Coates, P.S., Prochazka, B.G., Aldridge, C.L., O'Donnell, M.S., Edmunds, D.R., Monroe, A.P., Hanser, S.E., Wiechman, L.A., and Chenaille, M.P., 2023, Range-wide population trend analysis for greater sage-grouse (*Centrocercus urophasianus*)—Updated 1960–2022: U.S. Geological Survey Data Report 1175, 17 p., https://doi.org/ 10.3133/ dr1175.

[2] Herren, V., E. Kachergis, A. Titolo, K. Mayne, S. Glazer, K. Lambert, B. Newman, and B. Franey. 2021. Greater sage-grouse plan implementation: Rangewide monitoring report for 2015–2020. U.S. Department of the Interior, Bureau of Land Management, Denver, CO.

Disturbance from infrastructure in General Habitat Management Areas (GHMA) and other state-specific habitat management area designations averaged approximately 1.58 percent.

Additional descriptions on GRSG population and habitat are presented in **Chapter 3**.

1.2.3 New GRSG Science

The GRSG planning processes have consistently been based on and informed by science. Since the 2015 and 2019 planning efforts, hundreds of peer-reviewed scientific publications on GRSG and management of their habitats have been published. Many of the BLM's state and federal partners are significant contributors to this new science, and much of it is based on the data collected by state wildlife agencies. Some of these new publications are consistent with science that the BLM previously considered while others identify information not previously available. Several provide new spatial information on important population and habitat parameters for GRSG. The USGS has also compiled and summarized peer-reviewed journal articles, data products, and formal technical reports related to GRSG since January 2015 (Carter et. al., 2020, Teige, et. al., 2023). The BLM considers this new information and relevant science from our previous in developing and analyzing proposed management on BLM administered lands.

1.3 Purpose and Need

This amendment effort recognizes the importance of including RMP actions that address GRSG habitat threats on BLM-administered public lands in context of the 2010 and 2015 USFWS GRSG listing decisions. This effort also recognizes the need to coordinate management with state, federal, tribal, and local plans and policies. Many actions from the 2015 and 2019 efforts already address threats to GRSG habitats. As a result, the BLM's purpose and need is to consider amending RMPs to address a sub-set of the GRSG goals, objectives, allocations and management actions that need updates to ensure management on BLM-administered lands responds to changing land uses, improve efficiency and effectiveness of GRSG habitat management, provide for consistent conservation across state lines, and provide the BLM with locally relevant decisions that accord with range-wide GRSG conservation goals. In the November 2021 Notice of Intent initiating this process the BLM sought public input on specific management actions to consider amending. Based on internal review informed by public and State partner input, the BLM is focusing on the following rangewide management actions:

- Clarifying the existing GRSG RMP goal
- GRSG habitat management area alignments (i.e., to incorporate new science and improve alignment along state boundaries) and the major land use allocations therein, including criteria-based management for non-habitat within the habitat management areas
- Mitigation
- GRSG habitat objectives
- Disturbance cap
- Fluid mineral development and leasing objective
- Fluid mineral leasing waivers, exceptions, and modifications
- Renewable energy development and associated transmission
- Minimizing threats from predation
- Livestock grazing
- Wild horse and burro management
- Areas of Critical Environmental Concern
- Adaptive Management

Some management concerns are localized to circumstances in individual states actions and are influenced by the ecological diversity across the sagebrush ecosystem. As such, the purpose of this planning effort also includes amending specific RMP management actions associated with these state-specific circumstances to facilitate GRSG habitat conservation efforts.

Changes to RMPs may be needed to –

- address the continued GRSG habitat losses that are contributing to declines in GRSG populations,
- ensure habitat management areas and associated management incorporate recent relevant science to prioritize management where it will provide conservation benefit (including providing for durable planning decisions when considering the effects of climate change),
- provide continuity in managing GRSG habitats based on biological information versus political boundaries, while allowing for management flexibility to address different strategies in identifying habitat management areas with state agencies (see Appendix 3) as well as local habitat variability, and
- refine and clarify other aspects of RMPs.

1.4 Planning Area and Decision Area

The planning area is the geographic area within which the BLM will make decisions during a planning effort. A planning area boundary includes all lands regardless of jurisdiction; however, the BLM can only make decisions on the public lands and federal mineral estate within the agency's jurisdiction.

This west-wide amendment's planning area includes those BLM offices with GRSG habitat, excluding the bi-state and Columbia Basin populations (which are addressed in other planning efforts). This planning area includes much of the western United States, comprising portions of the States of California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming – see **Map 1.1a**, Surface Management Agencies in the Planning Area. Within each of these states GRSG habitat management areas comprise only a portion of the planning area – see **Map 1.1b**, Greater Sage-Grouse Habitat Management Areas for a depiction of the GRSG habitat management areas from the 2015 ARMPAs.

The decision area is a subset of the planning area subject to the decisions made through this effort. For this RMPA and EIS, the decision area applies to lands where the BLM-administers the surface within the GRSG habitat management areas (see **Map 1.1c**, Greater Sage-Grouse Habitat Management Areas on BLM Surface Administered Lands), as well as split-estate lands with BLM-administered subsurface mineral rights directly underlying non-federal ownership (e.g., private, state, etc.). The decision area for some alternatives may also include areas near to, but outside the habitat management areas to address potential indirect impacts to habitat within the habitat management areas (identified in specific management alternatives). Because this effort is considering changes to the GRSG habitat management area boundaries based on new data in some alternatives, the decision area varies by alternative. No decisions are being are being made on National Forest System lands and therefore the decision area for this RMPA does not include either the National Forest System surface lands or the federal mineral estate underlying National Forest System lands. For non-federal surface lands with underlying split federal mineral estate, only decisions associated with management/development of the underlying federal minerals would be applicable.

The decision area is further divided into GRSG habitat management areas. Every state includes priority habitat management areas (PHMA) and general habitat management areas (GHMA). These areas were first developed as part of the 2015 planning process in coordination with state agencies. Because the areas were developed on a state-specific basis, the specific strategy/approach used to identify the areas varies by state (see **Appendix 3**).

Across the range of GRSG PHMA is identified by areas with higher conservation value for maintaining the GRSG populations. By comparison, GHMA includes areas that do not provide as high of a conservation value for reasons that vary by state (e.g., heavily impacted by existing infrastructure, historic habitat, potential habitat, poor quality, low population density, on the periphery of more important areas, etc.).

Some states include additional habitat management areas, such as Important Habitat Management Areas (IHMA) in Idaho and Restoration Habitat Management Areas (RHMA) in Montana. These additional areas were developed to fit the GRSG strategy associated with the given state. Additional information on each state's habitat management area strategy is included in **Appendix 3**, which also describes how areas are being considered for update in this effort.

Habitat management areas are intentionally referred to as "management" areas, rather than just referring to them as priority or general "habitat" (or other state-specific areas). These areas are the designations/labels the BLM uses to apply the management necessary in managing threats to GRSG habitats on public lands in coordination with the states. Not every acre of habitat management areas is habitat, and they are not intended to reflect a site-level habitat survey. Additional information regarding the presence or absence of habitat should be considered during implementation of specific actions.

1.5 PLANNING CRITERIA

Planning criteria are the standards, rules, and guidelines that "guide development of the resource management plan" to ensure it is tailored to the issues previously identified" and "that the BLM avoids unnecessary data collection and analysis" (43 CFR Part 1610.4-2). In conjunction with the planning issues, planning criteria ensure that the planning process is focused. The criteria also help guide final plan selection and provide a basis for judging responsiveness of the planning options. The BLM developed preliminary planning criteria before public scoping meetings to set sideboards for focused planning of the RMPA and guide decision making by topic. These criteria were included in the November 2021 Notice of Intent (86 FR 66331) and the BLM encouraged the public to comment on, and suggest additions to, the preliminary criteria through the scoping period. The following criteria guide this RMPA effort:

- The RMPA and associated environmental analyses developed will be completed in compliance with FLPMA and NEPA, respectively;
- The RMPA will be completed in compliance with all relevant Federal laws and regulations, Executive Orders, and management policies of the BLM;
- Where existing planning decisions are still valid, those decisions may remain unchanged by this RMPA effort and would remain unaltered in the existing RMPs;
- The RMPA will be limited to making RMP decisions specific to conservation of GRSG habitats, with consideration of impacts from climate change;
- The BLM will consider adequacy of conservation measures for GRSG habitats in existing RMPs;
- The RMPA take into account climate change and the accelerating effects that climate change has on GRSG habitats;
- The BLM RMPs shall be consistent with plans, policies, and programs of other Federal agencies, State agencies, local governments, and Indian tribes to the maximum extent consistent with Federal law and the purposes of FLPMA (see FLPMA Section 202(c)(9) and 43 CFR Subpart 161-.3-2);

- The BLM will endeavor to use current scientific information, research, technologies, and results of inventory, monitoring, and coordination to determine appropriate management strategies that will enhance or restore GRSG habitats;
- Lands addressed in the RMPA will be for BLM-managed public lands (including surface and sub-surface estate, including split estate) for conservation of GRSG habitats; and
- The RMPA will recognize valid existing rights.

1.6 Resource Topics Considered

In the November 2021 Notice of Intent initiating this planning effort the BLM invited the public to identify issues, management questions, or concerns related to the preliminary purpose and need. (see section 5.4.1 for more information on scoping). Public comments were evaluated to identify issues related to GRSG and sagebrush habitat management and management for other public land resources and values. Issues were invited at both the range-wide and state-specific perspectives. The BLM compiled comments received from members of the public and various public, governmental and non-governmental groups to describe the issues and analysis concerns that are discussed in this document. Based on input received, the BLM refined the list of issues that included specific management actions and topics to consider for amendment (see Scoping Report chapter 3 at: https://eplanning.blm.gov/eplanning-ui/project/2016719/570).

When reviewing comments provided during scoping in context of the purpose and need, the BLM considered points of disagreement, debate, or dispute regarding an anticipated outcome from a proposed action or land use. When determining whether to retain a resource topic for more detailed consideration or analysis in this RMPA/EIS, the interdisciplinary team considered several questions, including–

- Is there new science that indicates a different decision could be considered based on potential impacts?
- Is there decision-space and statutory discretion at the RMP-level between existing management in the RMPs and recommended/suggested management from scoping comments?
- Are similar management tools being implemented differently across BLM offices (e.g., mitigation, disturbance cap, adaptive management) based on different local/state-specific circumstances (e.g., site-specific science, ecological conditions, etc.)?
- Are there lessons learned through implementing existing management actions that could change or clarify management actions to more efficiently address threats?
- Are environmental impacts associated with the issue a substantial point of contention among the public and other agencies?

1.6.1 Resource Topics Considered / Analyzed

The following resource topics identified during public scoping are being carried forward for further analysis in this RMP Amendment/EIS.

- Special status species (including GRSG)
- Fish and wildlife
- Air resources and climate
- Soil resources
- Water resources
- Vegetation, including riparian areas and wetlands
- Wild horses and burros
- Cultural resources
- Lands with wilderness characteristics
- Wildland fire ecology
- Livestock grazing
- Recreation
- Travel and transportation
- Mineral resources
- Lands and realty

- Areas of Critical Environmental Concern (ACECs)
- Tribal interests
- Social and economic conditions, including environmental justice

1.6.2 GRSG Issues/Management Not Considered for Rangewide Amendment

This RMPA is not reconsidering all existing GRSG management actions in the 2014 and 2015 RMP Amendments and revisions or the 2019 RMP Amendments. Consistent with the planning criteria, management actions in the existing RMPs that do not need to be changed to meet the purpose and need will not be considered for amendment and will remain unaltered in the existing RMPs (see **Appendix 2** for the list of existing GRSG RMP goals, objectives, and management actions from each state, and which are being considered for amendment). **Table 1-1** identifies the GRSG issues and management from the Scoping Report that relate to goals, objectives, and management actions that are not being considered for amendment as rangewide changes in this RMPA/EIS and associated rationale. Existing RMP management decisions related to these issues/management will continue to be applicable, unchanged by this effort.

Table 1-1. GRSG Issues/Management Not Being Considered for Rangewide Amendment

Issue/Management	Rationale
How can the BLM adapt habitat management areas over time to reflect best available science?	The BLM's planning process (43 CFR Part 1610 and BLM handbook H-1601-1) includes regular evaluation of RMPs and making adjustments using the appropriate planning process (i.e., maintenance, amendment, or revision). All GRSG ARMPAs and associated RODs include language on how new information and adjustments to GRSG habitat management will be considered, through BLM's established planning processes. Because existing language addresses this issue no changes are necessary in this amendment process.
What approaches should the BLM consider to minimize disturbance to GRSG habitats to ensure appropriate protection for the species while being able to concurrently implement other portions of the BLM's management responsibilities? This could include whether design features (including noise and tall structure restrictions), disturbance and density caps, and buffers around important GRSG habitat types (e.g., leks) provide sufficient protection.	The BLM included several management tools in the 2015 amendment efforts to avoid and minimize disturbance of GRSG habitats. A primary tool was identifying HMAs and making land use allocations associated with the different land uses and HMA priorities. Another was disturbance and density caps to limit infrastructure at or below levels GRSG tolerance as indicated by research Other management tools included required design features (RFDs), application of lek buffers, seasonal limitations, and constraints on noise and tall structures, all of which would be considered and applied when analyzing a proposal. As part of the current effort the BLM is considering amending HMAs, allocations, and disturbance caps. However, after reviewing existing plans, available literature, and habitat and population trends, changes to existing language on RFDs and lek buffers, as well as the other minimization measures, would not be made for the following reasons: There is no single buffer distance that would be appropriate for all populations and habitats across the range of GRSG (Manier et al. 2014). Lek buffers are generally used to conserve breeding and nesting habitats and are developed and applied as a uniform tool used in the lack of more accurate local information. As more specific data are collected on nesting habitats the applicability of generalized buffers across GRSG range will become less important to identifying and managing seasonal habitats. As described above, lek buffers are not the only or final conservation tool to avoid or minimize disturbance. GRSG habitats vary across its' range, with topography and vegetation influencing GRSG use of an area within a given buffer. These differences influenced state management decisions in the prior efforts. Application of

Issue/Management	Rationale
(continued from above)	buffers, and subsequent consideration of departures (either larger or smaller) from these buffers based on site-specific information, was adjusted to the landscape characteristics and management strategy applied in each state. A rangewide buffer standard would be inconsistent with both landscape characteristics and GRSG management strategies. Therefore, existing lek buffer language will remain in place unless state-specific circumstances warrant adjustments in that state. Since the prior planning efforts there has been no publication that reviews research related to buffer sizes and provides broad recommendations for buffers to be applied throughout the range. In the absence of new literature, and because local conditions and strategies drive the role of lek buffers in avoiding and minimizing disturbance, there is no rationale to reconsider use of lek buffers across the range. Similarly, each prior amendment effort included an appendix with a series of required design features (RDFs) to be considered and applied when considering authorizations. These RDFs were developed in coordination with state partners and cooperating agencies and were adjusted to the major issues associated with each BLM State Office's amendment effort. These RDFs have been considered as tools to avoid or minimize the effects of specific projects in each state.
Do some existing management actions have unintended effects, such as additional surface disturbance associated with burying power lines or co-locating powerlines?	After reviewing management actions from the 2015 and 2019 GRSG RMPA efforts across the range, this issue was found to be limited to certain states. In those states, management would not require burying powerlines or co-location if it would negatively impact GRSG. These strategies and associated impacts would be considered during project planning and impacts documented as part of that decision-making process. This approach satisfies the consideration requirement in existing GRSG management.
Could land tenure adjustments be considered as a conservation tool to consolidate land ownership into more manageable areas?	Existing language in the2015 and 2019 GRSG RMPAs regarding land tenure adjustments allow for potential ownership adjustments that could be beneficial to GRSG conservation. Because such actions are consistent with the purpose and need, no changes in management need to be considered in this effort.
What vegetation/habitat management strategies are needed to sustain resilient and resistant GRSG and sagebrush habitat (e.g., limit invasives, effective restoration) while avoiding unintended consequences to other species that occupy these habitats?	The 2015 GRSG RMPA included substantial vegetation/habitat management strategies in GRSG habitat. This included documentation before using sagebrush reduction treatment types and prescribed fire. Where pinyon/juniper encroachment is a concern management actions focused where treatments should be prioritized. Existing management also includes the critical need to coordinate treatments with partners, incorporate GRSG habitat objectives in monitoring treatments, and considers an array of treatment types to achieve GRSG habitat objectives, including the ability to consider the use of targeted livestock grazing. These actions were presented in the context of managing for GSRG habitat considering biological and ecological resistance and resilience when planning and applying treatments. Because the 2015 management actions provided these side-boards, considerations, and desired conditions, few, if any changes to these actions were made in the 2019 RMPA effort. Similarly, after reviewing existing management actions, in context of new science, existing RMP management actions for vegetation/habitat management strategies are sufficient, and no changes need to be considered.

Issue/Management	Rationale
What management strategies could limit the vast acreages of GRSG and sagebrush habitat lost to wildland fire and invasive species?	The 2015 GRSG planning efforts included many management actions addressing the threat of wildland fire in GRSG habitat management areas. This included prioritization of suppression efforts to limit loss of GRSG habitat, guidance for suppression efforts, the need for proactive efforts such as fuel breaks and fuel reduction projects, and considerations and commitments associated with reclamation and restoration after wildland fires in GRSG habitat management areas. The management included requirements for use of prescribed fire in GRSG habitat management areas, as well as the importance of coordinating all levels of fire management (suppression, pre-suppression, and restoration) with partners across the landscape. There were few, if any changes to these wildland fire management actions in the 2019 RMPA effort, as they were already consistent with state strategies. Similarly, reviewing existing wildland fire and invasive species RMP management actions, in context of the new literature, existing wildland fire and invasive species management action are sufficient for RMP-level decision-making, and no changes need to be considered. Any management changes necessary in wildland fire management to reduce wildland fire risk to GRSG would be made at the project/implementation level. While changes to existing wildland and invasive species management actions will not be considered, changes to other management actions will be considered based on the threats from wildland fire and invasive species. For example, management actions that could limit the potential for ignition sources or the prevalence of or spread of fine fuels and invasives that contribute to uncharacteristically large and intense wildfires will be considered. Additionally, the effect of wildland fire on GRSG habitat quantity and quality will also be considered when evaluating habitat management areas. This includes the potential for habitat management areas to be durable in the face of changing conditions associated with climate change. The potential effects of the alternatives on the number, size and intensity of wildfires and the spread of invasive species and their impacts on GRSG habitat quality and quantity will be considered in this EIS.
How should recreation and travel be managed to protect GRSG and sagebrush habitat?	Recommendations for recreation and travel management received during public scoping are either already in the existing RMP language from 2015 and 2019, or are not RMP-level decisions (e.g., guidance on site-specific route designations, recommended route densities, limitations on dispersed recreation). Because such actions would be consistent with existing management or are not applicable at the RMP-level, no changes in RMP management actions need to be considered.

1.6.3 Resource Topics Considered but Not Further Analyzed

Decision-makers and the public need to understand the impacts each alternatives would have on specific resources and resource uses. Therefore, the BLM uses resource topics as a heading to indicate which resources and uses would be affected by the targeted management changes in the alternatives. Resource topics will help organize the discussions of the affected environment (**Chapter 3**) and environmental consequences (**Chapter 4**).

Though changes will be targeted to specific management actions, changes to habitat management areas could change the area to which many existing, unchanged management actions apply. As such, the analysis will consider effect on most of the public land resources and uses, with the exception of the following:

- ***Paleontology:*** RMP-level management of GRSG would not substantially affect paleontological resources. There are no proposed disturbances, nor would any management for GRSG provide benefits to paleontological resources. While subsequent implementation could result in impacts, analysis and mitigation would be better identified at the project-specific level, and any impacts would be required to conform to existing paleontology law, policies, and RMP decisions.
- ***Visual Resources (VRM):*** Neither this RMPA effort, nor existing GRSG management actions address VRM decisions. There are no proposed disturbances or alteration of the visual settings proposed in any of the alternatives. While subsequent implementation actions could result in impacts, analysis and mitigation would be better identified at the project level, and any impacts would be required to conform to existing law, policies, and RMP decisions.
- ***Cave/Karst:*** RMP-level management of GRSG would not substantially affect cave and karst resources. There are no proposed disturbances, nor would any management for GRSG provide benefits to cave/karst resources.
- ***Forestry:*** There are no management actions specific to forestry in the GRSG amendments. GRSG habitat is not congruent to forestry resources.
- ***Existing Special Designations other than new potential ACECs specifically for GRSG and Research Natural Areas in Oregon:*** There are a variety of special designations that occur throughout the west and may overlap with GRSG habitat management areas. This includes the following:
  - Existing designated ACECs (whether for GRSG or other resources/values)
  - Wild and Scenic Rivers (suitable or eligible)
  - National Trails
  - National Monuments
  - National Conservation Areas
  - Congressionally designated wilderness areas
  - Wilderness Study Areas

These areas are identified and/or designated under a variety of statutory authorities, policies, and/or legislation. They include management specific to protect the values for which they were established. Decisions made through this RMPA would not supersede existing laws, regulations, policies, or existing RMP decisions directing management of any resources or values in these areas other than GRSG habitat. Such existing management from those various sources is designed to manage/protect the associated values/resources for which these areas were identified/designated, which may include GRSG habitat. For example, GRSG essential winter range is listed in the Monument Proclamation, for the Upper Missouri River Breaks National Monument in Montana, and therefore requires special management attention that is complementary with other underlying management for which the Monument was established. Those GRSG values are considered in this RMPA. For all management associated with other non-GRSG resources and values in these areas, any authorized activities would need to be consistent with protection of those resources and values. This RMPA effort would only alter the existing management associated with GRSG habitat. All other existing management that is already designed to protect/manage the non-GRSG resources and /values. Because of existing management, there would be no substantial impacts to the non-GRSG resources and values in these areas from the changes considered in this amendment.

1.7 Statutory and Regulatory Context

The BLM develops land use plans through a planning and NEPA process that includes public involvement. Section 202 of FLPMA and its implementing regulations direct the BLM to develop and periodically revise or amend its RMPs, which guide management of BLM-administered public lands. (43 USC 1712, 43 CFR Part 1600). FLPMA further provides that the BLM "shall manage the public lands under principles of multiple use and sustained yield … except that where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law" (43 USC 1732(a)). FLPMA also directs the BLM to coordinate with other federal departments and agencies, state and local governments, and Tribal Nations to seek to promote consistency among land use plans across jurisdictions (43 CFR Subpart 1610.3-2).

In NEPA, Congress directs "all agencies of the Federal Government…[to]…utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment" (42 USC 4332(A)). This EIS and RMPA examine a range of alternatives to resolve the issues in question. Alternatives represent complete but different means of satisfying the agency's identified purposes and needs.

1.8 Consistency with State and Local Land Use Plans and Programs and Policies Therein

Section 202 of FLPMA directs the BLM to coordinate planning efforts with Native American Indian tribes, other federal departments, and agencies of state and local governments. To accomplish this directive, the BLM is directed to keep apprised of state, local, and tribal plans; assure consideration is given to such plans; and assist in resolving inconsistencies between such plans and federal planning. Subsection (c)(9) states "Land use plans of the Secretary [of the Interior] under this section shall be consistent with state and local plans to the maximum extent he finds consistent with federal law and the purposes of this Act."

The BLM's FLPMA resource management planning regulations (43 CFR Subpart 1610.3-2) provide additional details, requiring BLM RMPs be consistent with officially approved or adopted resource-related plans of other Federal, State, local, and Tribal governments and policies and programs contained therein, to the extent that they are consistent with the purposes, policies and programs of Federal laws and regulations applicable to public lands. The BLM follows the procedures set forth in the regulations to address any potential inconsistency.

State and local officials have reviewed and provided input on the alternatives as cooperating agencies. Two states (Idaho and Wyoming) submitted language specific to their state they proposed for consideration. Some counties identified their preferences for management actions from one alternative or another. It is important to note that these preferences did not specifically cite state or county plan, program, or policy language. However, no county or state plan, program or policy is as broadly restrictive as Alternative 3, under which all habitat management areas would be managed as PHMA, would be closed to most minerals and lands and realty actions, and would be unavailable for livestock grazing. Some counties did express support for the wild horse and burro management under Alternative 3.

Some state and county comments have expressed concerns related to aspects of Alternative 4, especially in Wyoming where all PHMA would be managed with no surface occupancy stipulations for fluid minerals, which is inconsistent with the Wyoming Governor's GRSG executive order. The fluid mineral leasing and development objective would be most consistent in Wyoming under Alternative 2, and to a lesser extent, Alternative 5. Based on cooperating agency communications, state and agency preferences align most with Alternative 5, as well as Alternative 2.

Many states and counties have expressed concern with ACEC designation under Alternatives 3 and 6. There is mixed opposition to other actions, such as use of compensatory mitigation as a tool related to granting exceptions to fluid mineral lease stipulations and the disturbance cap. Some cooperating agencies have expressed concern with that approach while other have encouraged its broader application. Some states have expressed concerns related to the proposed adaptive management approach under Alternatives 3-6, preferring state-specific approaches of Alternative 1 and 2, or deferring any population threshold entirely to the state wildlife management agency with no identified metric used to monitor habitat concerns through population trends.

According to 43 CFR Subpart 1610.4-7 of the BLM Resource Management Planning regulations, the Draft RMP/EIS is provided to the Governor, other federal agencies, state and local governments, and Native American tribes for comment. Through this process, additional input will be obtained on how state and local plans may or may not be consistent with the alternatives. The resulting comments will be addressed in the Proposed RMPA/Final EIS. The Final EIS will also identify known inconsistencies the proposed plan amendments have with State or local plans, policies, or programs. The formal 60-day consistency review by the Governor will occur after the Proposed RMPA/Final EIS is published, as outlined in 43 CFR Subpart 1610.3-2(e) of the BLM planning regulations. Information from all these efforts will help inform BLM state specific RODs.

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Chapter 2. Alternatives

2.1 Introduction

This chapter describes the six alternatives this resource management plan amendment (RMPA)/environmental impact statement (EIS) analyzes in detail. The alternatives consider changes to existing greater sage-grouse (GRSG) actions that are currently in the BLM's plans (Alternative 2 - No Action Alternative), and five action alternatives. This chapter also describes alternatives considered but eliminated from detailed analysis.

2.1.1 Components of Alternatives

This amendment process builds on planning efforts from 2015 and 2019. It considers amending GRSG goals, objectives, management actions, and allowable uses, including administrative designations. Definitions of these components can be found in Section II of the BLM's land use planning handbook (BLM-H-1601-1). In the previous BLM GRSG planning efforts, individual actions were identified in some BLM state amendments as "management actions" and in others as "management decisions." While the BLM planning handbook has a specific definition for "management decisions," in this document – including **Appendix 2** – management action and management decision are used interchangeably.

2.2 Description of Alternatives

2.2.1 Alternative 1 (Applicable Decisions from the 2015 ARMPA)

Alternative 1 includes the applicable elements of the 2015 Approved RMPAs (ARMPA) that are being analyzed for potential amendment as part of this planning effort. It does not include all the goals, objectives, and actions from the 2015 ARMPAs, as this effort is considering targeted amendments. Under Alternative 1, the BLM would re-adopt the applicable GRSG habitat management area (HMA) boundaries, goals, objectives, and actions from the 2015 Records of Decision (ROD)/ARMPAs (as updated through maintenance actions). The existing language in the plans from the 2019 ARMPAs would revert to that contained in the 2015 ARMPAs (as maintained). Due to the U.S. District Court of Idaho's preliminary injunction preventing implementation of the 2019 amendments (see explanation in Alternative 2 summary below) this alternative reflects how the BLM is currently managing GRSG habitat on public lands. This includes designation of some areas of PHMA as Sagebrush Focal Areas (SFA) with a recommendation to withdraw them from mineral location and entry under the Mining Law of 1872 and prioritization for various other activities related to vegetation treatments, livestock grazing, and wild horses and burros.

2.2.2 Alternative 2 (Applicable Decisions from the 2019 ARMPA – No-Action)

Alternative 2 is the No-Action Alternative and includes the applicable decisions from the 2019 Greater Sage-Grouse ROD/ARMPAs efforts except areas in Montana/Dakotas, which would be based on management in the 2015 amendments because they were not amended in 2019. This alternative, including the HMA boundaries and associated management in the 2019 amendments, is the No Action because it reflects the management language currently in the BLM's approved land use plans. The U.S. District Court for the District of Idaho has issued a preliminarily injunction, preventing the BLM from implementing the 2019 amendments, but not vacating them or their Records of Decision. Because the 2019 RODs were not vacated, the decisions from the 2019 amendment effort remain the GRSG management language in the BLM's RMPs. Under this alternative the BLM would apply the management from those 2019 efforts. Alternative 2 was developed through coordination with each state's applicable agencies, cooperating agencies, and public input to increase alignment with the State's GRSG conservation plan and strategies. It was further refined for alignment with

BLM policies at the time those RMPAs were developed. SFAs would be removed from the BLM RMPs in all states except Oregon and Montana; these areas would still be managed with all the protections of PHMA, but would no longer include a recommendation for withdrawal (including in the Oregon SFAs), and prioritizations would be the same as the rest of PHMA.

2.2.3 Alternative 3

Alternative 3 includes the greatest measures to protect and preserve GRSG and its habitat. Alternative 3 would update the HMA boundaries based on new information and science that has become available since the 2015 and 2019 efforts, however all HMAs would be managed as priority HMA (PHMA). The BLM would close PHMA to new fluid mineral leasing, saleable minerals/mineral materials permits, and nonenergy leasable minerals leasing (development associated with existing permits and leases would not be precluded). PHMA would be recommended for withdrawal from location and entry under the Mining Law of 1872 and unavailable for livestock grazing. PHMA would also be ROW exclusion areas. Where there are currently designated wild horse and burro herd management areas overlapping PHMA, the wild horse and burro herd management area would become a Herd Area that is not managed for wild horses and burros. Under Alternative 3, the BLM would designate 11,139,472 acres of ACECs specific to the management of GRSG; the ACECs would include portions of PHMA and would have the same allocations (i.e., allowable uses) as the rest of PHMA. No areas would be identified as SFA because Alternative 3 considers the greatest level of restrictions on resource uses in all GRSG HMAs.

2.2.4 Alternative 4

Alternative 4 would update the habitat management area boundaries and associated management based on new information and science that has become available since the 2015 and 2019 efforts. While many of the allocations would be similar to Alternatives 1 and 2, the areas to which management would be applied are updated to reflect new science. One difference in Alternative 4 is in Wyoming all PHMA would be managed with no surface occupancy stipulations for new oil and gas leases (all other states already have this stipulation in PHMA). In addition, management associated with some of the major minimization measures (e.g., disturbance cap, adaptive management) is adjusted to address cross-boundary coordination of shared populations, range-wide biological and managerial concerns based on monitoring, and experience gained from implementing management for GRSG since 2015. Alternative 4 allows compensatory mitigation to be used under specific conditions. Additional compensatory mitigation may be required where habitat and/or population adaptive management thresholds have been met. Areas previously identified as SFAs are managed as PHMA. The primary difference between management of SFAs in the 2015 Plans and PHMAs in this planning effort is that PHMA would not include a recommendation for withdrawal or prioritization strategies.

2.2.5 Alternative 5

Alternative 5 considers other potential alignments of habitat management areas and associated management to try and balance GRSG conservation with public land uses. If State governments updated the GRSG management area boundaries in their specific State plans, the BLM is considering those boundaries on public lands in Alternative 5. HMAs are similar to but refined from Alternative 4 and restrictions would generally be similar to Alternative 4, except for oil and gas in Wyoming which is similar to Alternative 2. However, reasonable differences in management would be considered while still providing GRSG conservation, Alternative 5 considered options with fewer restrictions on resource uses and provided more opportunities for considering compensatory mitigation to offset impacts on GRSG and its habitat. Areas previously identified as SFAs are managed as PHMA. The primary difference between management of SFAs in the 2015 Plans and PHMAs in this planning effort is that PHMA would not include a recommendation for withdrawal or prioritization strategies.

2.2.6 Alternative 6

Under Alternative 6, management for all habitat management areas and the topics being considered in the range of alternatives would be the same as described for Alternative 5, but with the addition of ACECs. ACEC boundaries would be the same as described for Alternative 3, but management would be less restrictive compared to Alternative 3, though generally more restrictive than the rest of Alternative 6 PHMA.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The BLM also reviewed all of the alternatives considered in the separate 2015 and 2019 planning processes, none of which was suggested for reanalysis during public scoping. The range of alternatives already considered in detail in this effort includes the most protective alternatives from the prior efforts. Alternatives from those prior efforts with broad reductions in GRSG protections compared to what is being considered in this effort would not be consistent with the current purpose and need. In addition, the rationale for dismissing alternatives from detailed analysis in the prior efforts are still applicable to this effort. Such dismissed alternatives includes a USFWS-listing alternative; managing all designated habitats as ACECs; eliminating recreational hunting; closing GRSG habitat to OHV use; adopting county-specific plans to BLM-administered lands; increased grazing alternative; and leasing GRSG habitat for oil shale and tar sands development or including stipulations for such development. The prior alternatives dismissed from detailed analysis will again be dismissed from detailed analysis for the same reasons as described previously and are incorporated by reference into this EIS. As such, none of the previously considered alternatives will be explicitly evaluated in this RMPA.

Further, the BLM, the USFWS, States and other federal agency partners prepared the NTT (2011) and the Greater Sage-grouse Conservation Objectives: Final Report (COT Report–2013) reports to identify rangewide GRSG conservation objectives and conservation measures that would: inform the USFWS 2015 decision under the Endangered Species Act and inform partners; and provide guidance for the BLM to consider through land use planning, which the BLM did in 2015, 2019, and again in 2020 planning efforts. The NTT and COT reports constituted starting points for the BLM to consider in at least one alternative to be considered through the NEPA and land use planning process. They are not compendiums that, standing alone, represent best available science. The NTT and COT reports do not address how the implementation of their GRSG conservation measures would affect other uses of the public lands—such as recreation, fluid mineral development, mining, and livestock grazing. Moreover, the NTT and COT reports do not quantify the GRSG conservation benefits of each respective conservation measure. Additional context related to the COT and NTT reports and rationale why they were not included as specific alternatives in this effort is provided in **Appendix 6**.

During the alternative development process, the States of Idaho and Wyoming each suggested a "state alternative." The BLM determined that most of the actions included in each subject alternative were already evaluated among other alternatives. In some instances, the exact language was already in the range of alternatives or was incorporated in Alternative 5. In other instances, the proposed language was substantially similar to language already being considered, or that would result in substantially similar effects. In very few instances, the BLM determined the proposed language was not consistent with the purpose and need (e.g., removing the disturbance cap), included recommendations that were not consistent with BLM policies (e.g., changing RMP allocations outside a plan amendment), or would be addressed during the implementation process (e.g., requiring and setting time-frames for removing wild horses if they contribute to an area not meeting land health standards). Because the RMP-level actions in the submissions are considered in the range of alternatives, developing a stand-alone state alternative is not necessary for consideration of effects. Proposed plan amendments of BLM RMPs at the state level will be able to draw from any of the actions considered in the range of alternatives. Because of this, alternatives in the Draft EIS specific to each state that duplicate actions already considered in the range of alternatives are not necessary.

During scoping, the public suggested several alternatives or components of alternatives that the BLM considered but did not analyze in detail. These are summarized in **Table 2-1** below. Further details on alternatives proposed by the public during scoping and where they were considered in the EIS are provided in the public scoping report on the project's website: https://eplanning.blm.gov/eplanning-ui/project/2016719/570.

Table 2-1. Alternatives Proposed During Public Scoping but Not Analyzed in Detail

Alternative Proposed	Rationale for Dismissal
An alternative where AUMs in GRSG habitat are based on prolonged drought, warmer temperatures, and reduced grass production.	Adjustments to the existing number of AUMs are completed at the allotment scale based on site-specific conditions to meet management objectives during grazing authorization renewals, AMP development, or other appropriate implementation-level planning. Additionally, temporary adjustments can be made annually to livestock numbers, the number of AUMs, and season of use within the range of the terms and conditions and in accordance with applicable regulations. The BLM is better suited to make adjustments that respond to drought through activity- and implementation-level decision making at the allotment level.
Alternatives that conduct a capability and suitability-type analysis of grazing conflicts with GRSG needs; apply mandatory, measurable conservative use periods; and avoid the breeding period, hot season, and winter use in GRSG habitats in any lands where grazing might continue.	There are alternatives that specifically address GRSG habitat needs through identification of habitat objectives. In addition, the BLM's grazing regulations require the BLM manage grazing to meet Land Health Standards, including the standard that provides for special status species habitat. However, developing terms and conditions for how grazing in specific areas should be conducted to meet these is associated with implementation-level decisions related to allotment management plans or term permit renewals.
Alternatives for constructing exclosures to use as ungrazed reference areas: identify that during land health evaluations, small (10 acres or less) reference areas would be considered in priority sage-grouse habitat to exclude livestock use for the purposes in aiding BLM's ability to establish control areas when analyzing impacts to permitted activities such as livestock grazing and better inform management decisions.	Out of scope; not generally a planning level decision. Establishing small exclosure areas for research purposes is better suited for decision-making at the allotment level, not at the RMP level.
Alternatives that specify acceptable livestock grazing utilization, trampling levels, and shrub structural protections and other mandatory and enforceable terms and conditions for both upland and riparian vegetation.	Out of scope; generally not a planning level decision. Establishing terms and conditions for grazing permits is a decision best made at the implementation-level decision making where those terms can be tailored to the environmental conditions present in the given allotment. The EIS considers GRSG habitat objectives, and the BLM's regulations require adherence to land health standards. Terms and conditions needed to meet these conditions can be implemented at the site-scale when issuing/renewing a grazing permit.

Alternative Proposed	Rationale for Dismissal
An alternative relative to livestock grazing management to facilitate sagebrush recruitment and survival. That alternative should develop allotment management plans, cooperatively with willing permittees, with objective utilization levels sufficient to facilitate sagebrush recruitment and survival.	Out of scope; not a planning level decision. The EIS considers GRSG habitat objectives, and the BLM's regulations require adherence to land health standards. Development of allotment management plans is conducted in a manner to meet regulatory and planning requirements in context of the local ecological circumstances and conditions. Such actions as requested can be implemented at the site-scale.
An alternative that follows the same approach used by the Ely District BLM that implements sagebrush habitat restoration in a systematic fashion at a watershed scale.	Out of scope; not a planning level decision. The EIS considers GRSG habitat objectives at multiple spatial scales. The specific restoration strategies needed to achieve the objectives are developed through the implementation process.
An alternative that includes close coordination with local and state fire managers for coordinated fire suppression in GRSG habitat and for aggressive fuels reduction projects and postfire rehabilitation.	While not a planning level decision, the 2015 ARMPAs speak to coordination across ownerships and managerial responsibilities. In addition, while specific fire suppression efforts, identification and implementation of fuels reduction projects, and postfire rehabilitation, including coordination across multiple agencies and jurisdictions, are critical to successfully reducing wildfire risks, they are conducted at the site-specific scale.
An alternative that defers SFA designation to states.	Out of scope. The management needed for public lands, whether PHMA, GHMA, or other designations, needs to occur in the BLM's land use plans to comply with FLPMA. However, states can recommend management of certain areas through this process. However, the EIS does include alternatives that consider not designating SFAs.
A deferral alternative of federal land" and minerals in southwestern Montana from oil and gas leasing pending revision of the Dillon RMP. The BLM should also evaluate a deferral alternative that would commit to not lease in the Beaverhead, Big Hole, and Centennial valleys until it revises the 2006 Dillon RMP.	An alternative that defers leasing in a given area would be substantially similar in effect to an alternative that considers closing an area to leasing. BLM has developed a range of alternatives related to areas available or not available for oil and gas leasing, as well as stipulations for leasing activities to address the continued GRSG habitat losses and declines in GRSG populations. Alternative 3 considers closing PHMA to oil and gas leasing. A commitment to not offer lands for oil and gas leasing is not an RMP decision.
An alternative that focuses on increasing development, including additional mineral leasing and development, wind and solar, or rights-of-way.	Out of scope. An alternative that decreases stipulations/restrictions in an effort to encourage more development would not be consistent with the purpose and need to address the continued GRSG habitat losses and declines in GRSG populations. In addition, mineral leasing and granting rights-of-way are implementation-level decisions. The RMP identifies areas available or not available for such uses and any stipulations required for protection of GRSG. The RMP does not directly lease areas or grant rights-of-way.
An alternative that considers removing the disturbance cap.	As explained in the BLM's Purpose and Need, this planning effort addresses the continuing losses of GRSG habitat and the associated population declines. Research across the species' range has identified relationships between various anthropogenic developments and GRSG avoidance behavior or lek abandonment. An alternative that considers removing a tool that addresses a threat to GRSG would not be consistent with the purpose and need described in Chapter 1.

Alternative Proposed	Rationale for Dismissal
A climate action plan/multiple-use alternative that considers policies that require optimizing the domestic development of minerals.	The purpose and need of this planning process is to address the continued GRSG habitat losses and declines in GRSG populations. The alternatives considered do address whether and where various mineral development activities would align with GRSG management. Considering an alternative that focuses on increasing activities that are known to impact GRSG would not be consistent with the purpose and need.
An alternative that balances economic, social, and conservation considerations.	Some scoping comments recommended consideration of an alternative that balances considerations for conservation with economic and social needs. As a concept without more specific suggestions the recommendation was too general to develop a specific alternative around. However, the many of the alternatives considered in detail address differing levels of management constraints within GRSG habitat and their associated effects on public land uses.
A preferred alternative focused on multiple use: avoid public lands that are off limits to use; instead provide active management and appropriate mitigation measures that can be implemented based on site-specific information.	All the BLM's alternatives comply with the direction in FLPMA that public lands be managed "on the basis of multiple use and sustained yield" (FLPMA Sec. 102(a)(7)). Beyond that, an alternative that does not avoid disturbance eliminates the primary tool research has shown protects GRSG and their habitat, and therefore would not be consistent with the purpose and need. In addition, all the alternatives considered in detail apply the full mitigation spectrum of avoiding impacts, then minimizing effects if avoidance is not possible, and then providing compensatory mitigation for residual effects. Alternative 3 focuses on avoidance whereas alternatives 2 and 5 provide more consideration for compensatory mitigation and consideration of local circumstances. Given the general nature of the alternative proposed, the current range of alternatives include actions that are similar in both content and effect.
An alternative as part of any new RMPA that is consistent with the October 5, 2020, Humboldt County approved Policy on Rangeland Management and Health and with other policies on livestock grazing. The BLM should also consider the references cited within the county's policy as part of the overall body of science used to inform any new BLM RMPA.	The BLM must comply with its grazing regulations which require managing for land health standards, including providing habitat for special status species, including GRSG. However, consistency with local plans and policies will be conducted as part of the EIS process. In addition, as a rangewide conservation effort, a county-focused plan for a species that uses large landscapes that may include multiple counties is too narrow. As part of this planning process, we have coordinated and sought input from counties.

2.4 PREFERRED ALTERNATIVE

The BLM identified Alternative 5 as the preferred alternative in this Draft EIS. This alternative was selected after review of comments submitted by other government agencies, public organizations, state and tribal entities, interested individuals (during scoping) and cooperating agencies. The preferred alternative represents goals (see **Section 2.5.1**), objectives (see **Section 2.5.4**), and management direction determined to be most effective at resolving planning issues by adjusting management options based on internal and external input and administration priorities, balancing resource uses by managing multiple use according to GRSG habitat designation, and meeting the purpose and need by ensuring management on BLM-administered lands support GRSG conservation goals and provides the BLM with locally relevant decisions that accord with range-wide GRSG conservation goals.

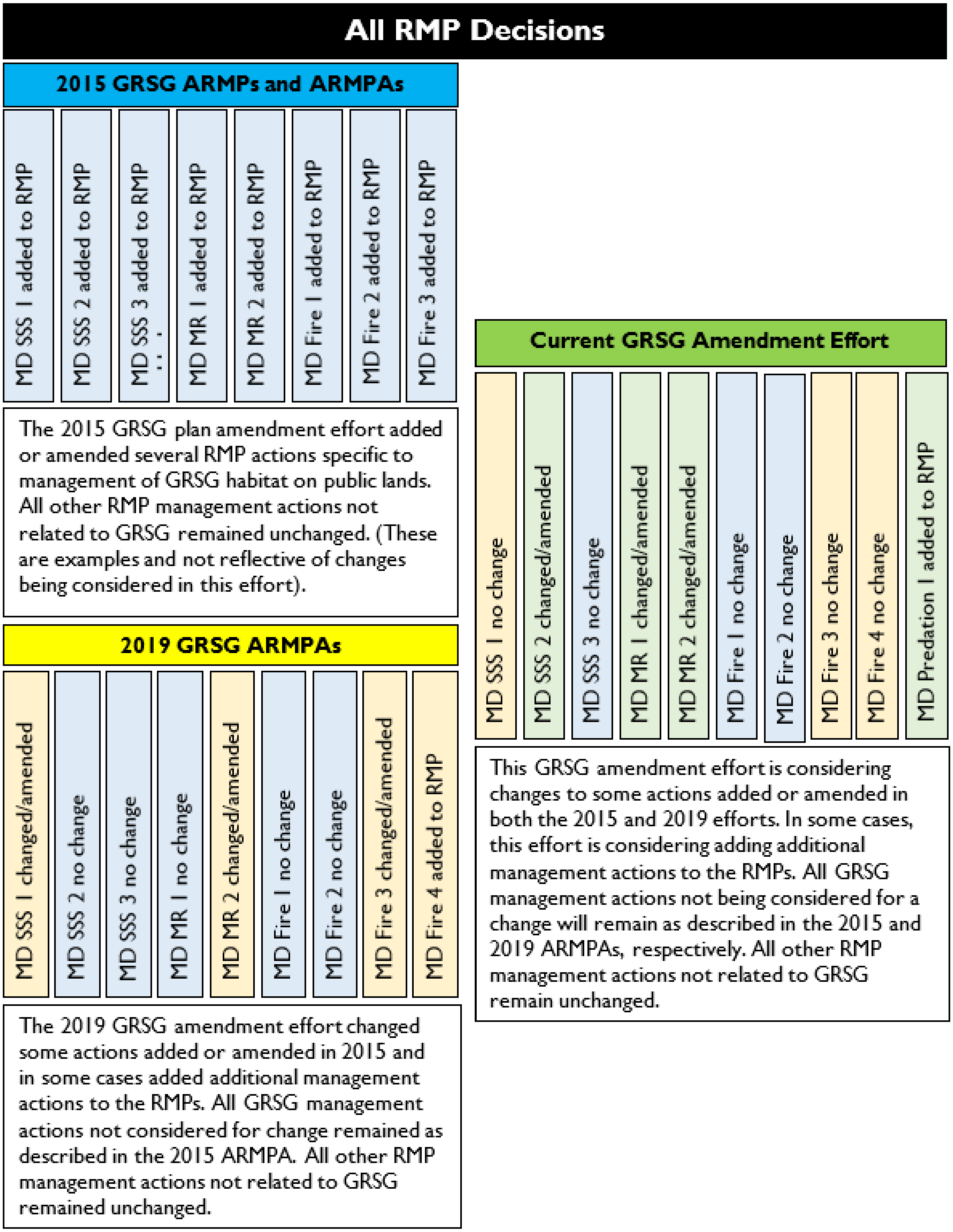
Identifying a preferred alternative does not indicate any decision or commitments from the BLM. In developing the Proposed RMPA/Final EIS, the next phase of the planning process, the decision maker may select various goals, objectives, allocations and management prescriptions from each of the alternatives analyzed in the Draft RMPA/EIS. The combination of goals, objectives and management prescriptions may also vary by state to address circumstances that vary between the states. The Proposed RMPA/Final EIS may also reflect adjustments based on comments on the Draft RMPA/EIS, new information, or changes in BLM policies or priorities. The BLM has the discretion to select as a Proposed RMPA, an alternative or set of state-specific alternatives that uses an alternative in its entirety or to combine aspects of the various alternatives presented in this Draft RMPA/EIS. This allows the BLM to select the best strategy that incorporates appropriate GRSG habitat management actions to meet the RMP goals and objectives, is consistent with the purpose and need, is in accordance with the agency's mandate to manage the public lands for multiple use and sustained yield and aligns with state and local plans and policies to the extent possible.

2.5 DETAILED DESCRIPTION OF DRAFT ALTERNATIVES

The sections describe the draft alternatives' goals, objectives, and management decisions/actions. At the beginning of each section there is a brief description introducing the action/topic and rationale for alternatives development. These introductions are not planning decisions but are included to establish context for the alternatives. **Section 2.5** includes rangewide alternatives applicable to all states, organized by the cross-cutting management topics/issues identified during scoping (see **Section 1.6**). Accompanying these narratives are tables showing side-by-side descriptions of the alternatives. **Section 2.6** includes the alternatives associated with state-specific circumstances, organized by state. Alternatives 1 and 2 in **Section 2.5** are presented as summaries due to variations by state or planning area. Not all decisions from the 2015 and 2019 amendment efforts are included in Alternatives 1 and 2. Only management actions being considered for amendment in Alternatives 3, 4, and 5 are brought forward from the 2015 and 2019 efforts. The remaining decisions from the prior planning efforts will remain in place regardless of which alternative is selected. **Appendix 2**, Existing GRSG Management in BLM RMPs identifies all existing GRSG management (inclusive of both 2015 and 2019 ARMPAs) for each state and identifies whether an action may be amended in the current effort. The figure on the next page is an example of how some decisions may be considered for amendment, while others will remain unchanged.

Actions applicable to all alternatives are shown in one cell across a row and would be implemented regardless of which alternative is ultimately selected. Actions applicable to more than one but not all alternatives are indicated by either combining cells for the applicable alternatives, or by denoting them as the same for another alternative (e.g., "same as Alternative A"). "No similar action" is used to indicate there is no similar goal, objective or action to the other alternatives, or that the similar goal, objective or action is reflected in another management action in the alternative.

Figure 2.1. Example Conceptual Model for the BLM GRSG Planning Amendments



Many management actions are informed by the location of GRSG leks (breeding areas associated with GRSG nesting habitat). Existing management actions across the species' range use different lek definitions (e.g., active, occupied, pending, or historic), as identified by state wildlife agencies where the lek occurred. In 2022, the Western Association of Fish and Wildlife Agencies (WAFWA) published standardized definitions for leks to resolve inconsistencies between states, thereby allowing for comparable data analyses across the species' range (Cook et. al., 2022). Through these plan amendments, the BLM proposes to adopt the lek definitions published by WAFWA and use them when implementing GRSG management. **Appendix 4** compares the new WAFWA lek definitions to definitions used in each existing BLM RMP/EIS. Unless otherwise specifically noted, the term "lek" applies to the WAFWA definition for "active lek."

2.5.1 Clarifying the RMP Goal for GRSG

In 2015, BLM RMPs were amended or revised to include updated goals or objectives for GRSG management in consideration of the National Technical Team (NTT) Report (BLM 2011). The NTT comprised resource specialists and scientists from the BLM, State Fish and Wildlife Agencies, U.S. Fish and Wildlife Service (USFWS), Natural Resources Conservation Service (NRCS) and U.S. Geological Survey (USGS). In the report the authors identified a management goal to: "Maintain and/or increase sage-grouse abundance and distribution by conserving, enhancing or restoring the sagebrush ecosystem upon which populations depend in cooperation with other conservation partners."

Some iteration of the NTT Report goal is in all current BLM RMPs for GRSG. Through this planning effort, the BLM proposes to clarify its goal, which is to conserve, enhance, restore, and manage GRSG habitats to support persistent, healthy populations, consistent with BLM's Special Status Species Management Policy (BLM-M-6840) and in coordination and cooperation with state wildlife agencies. Habitat conservation and management should maintain existing connectivity between GRSG populations.

Table 2-2, Comparison of Alternatives, GRSG RMP Goal, presents management by alternative for this management issue.

Table 2-2. Comparison of Alternatives, GRSG RMP Goal

<table>
<tr><th>Summary of Alternative 1</th><th>Summary of Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="2">All states have at least one goal or objective that includes the following language and/or concept:
• Maintain and enhance populations and distribution of GRSG by protecting and improving sagebrush habitats and ecosystems that sustain GRSG populations.
• Conserve, enhance, and restore the sagebrush ecosystem upon which GRSG populations depend in an effort to maintain and/or increase their abundance and distribution, in cooperation with other conservation partners.
• Maintain and enhance quality/suitable habitat to support the expansion of GRSG populations on federally-administered lands within the planning area.</td><td colspan="3">BLM resource management plans (RMPs) would identify the desired condition for GRSG in the following overarching goal:
Conserve, enhance, restore and manage GRSG habitats to support persistent, healthy populations, consistent with BLM's Special Status Species Management Policy (BLM-M-6840) and in coordination and cooperation with state wildlife agencies. Habitat conservation and management should maintain existing connectivity between GRSG populations.</td></tr>
</table>

2.5.2 Habitat Management Area Alignments and Associated Major Land Use Allocations

The BLM has reviewed new scientific publications since our previous planning efforts which provide key population (e.g., Doherty et al. 2016, Coates et al., 2021), genetic (e.g., Cross et al., 2018, Oyler-McCance et al., 2022) connectivity (e.g., Row et al. 2018, Cross et al., 2023) habitat (e.g., Doherty et al., 2016, Wann et al., 2022, Doherty et al., 2022) and climate change (Palmquist et al., 2021, Rigge et al., 2021). This information was used to update GRSG habitat designations in concert with state wildlife agencies, to determine if BLM was applying appropriate management allocations consistent with the purpose and need of this amendment. While HMAs may encompass multiple land ownerships, reflecting the wide-ranging ecological needs of GRSG, management actions that follow are specific to BLM-administered lands.

Priority Habitat Management Areas (PHMA) have the highest value to maintaining sustainable GRSG populations and can include breeding, late brood-rearing, winter concentration areas, and migration or connectivity corridors. The BLM objective for these areas is to maintain and enhance habitat conditions that will support persistent and healthy GRSG populations through management to minimize habitat loss and degradation. See **Appendix 3** for a description of the strategies applied by each state to identify PHMA.

Important Habitat Management Areas (IHMA; ID only) are defined as lands that encompass moderate to high-quality GRSG habitat and populations necessary for providing a management buffer for PHMA, connecting patches of PHMA, and in some cases supporting important populations and habitat independent of PHMA. The objective for IHMA is to maintain habitat conditions that will support persistent and healthy GRSG populations.

General Habitat Management Areas (GHMA) are lands that are or have the potential to become occupied seasonal or year-round habitat outside of PHMA or IHMA, managed to sustain GRSG populations. These areas are defined differentially by state wildlife management agencies, but generally are of poorer GRSG habitat quality with reduced occupancy when compared to PHMA. Some state wildlife agencies have identified areas of GHMA as important for restoration, connectivity, or seasonal habitats, and most require mitigation for unavoidable impacts within this designation. The objective for GHMA is to maintain habitat conditions to support GRSG populations consistent with the state agency designations of recovery, connectivity, or seasonal habitats.

Other habitat management areas are identified by individual states for a variety of purposes, typically as subsets of GHMA (i.e., lower priority than PHMA). These are defined and described in detail in **Appendix 3**.

Table 2-3, Comparative Summary – Acres GRSG Habitat Management Areas by State by Alternative. **Appendix 3** provides a summary of each state strategy in developing their habitat management areas, as well as the definitions for the GRSG habitat management areas used in each state. **Maps 2.1** through **2.6** show the relationship of the habitat management areas across the west.

In addition to habitat management areas, this section summarizes allocations for major land uses. Additional details for alternatives 1 and 2 (e.g., specific avoidance criteria for rights-of-way, specific controlled surface use stipulations for fluid minerals, etc.), is presented in **Appendix 2**. If specific language from previous plans is not included in this amendment, it is not being considered for amendment in this effort.

Table 2-3. Comparative Summary – Acres GRSG Habitat Management Areas by State by Alternative (BLM administered surface only)

Habitat Management Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Rangewide Habitat Management Area Alignments					
PHMA	32,465,000	32,535,000	69,199,000	36,701,000	34,803,000
GHMA	26,383,000	25,878,000	N/A	25,946,000	23,718,000
Colorado Habitat Management Area Alignments					
PHMA	748,000	921,000	1,538,000	751,000	751,000
GHMA	788,000	727,000	N/A	786,000	786,000
LMA	97,000	82,000	97,000	97,000	97,000
Idaho Habitat Management Area Alignments					
PHMA	4,178,000	4,106,000	8,860,000	4,472,000	4,573,000
IHMA	2,736,000	2,796,000	N/A	2,477,000	2,503,000
GHMA	1,958,000	1,958,000	N/A	1,910,000	1,722,000
Montana/Dakotas Habitat Management Area Alignments					
PHMA	3,275,000	3,275,000	5,254,000	3,300,000	3,300,000
GHMA	2,384,000	2,384,000	N/A	1,859,000	1,859,000
RHMA	165,000	165,000	N/A	94,000	94,000
CHMA	N/A	N/A	298,000	298,000	298,000
Nevada/California Habitat Management Area Alignments					
PHMA	9,266,000	9,268,000	21,138,000	9,780,000	9,661,000
GHMA	5,783,000	5,749,000	N/A	7,551,000	6,183,000
OHMA	4,862,000	4,870,000	N/A	3,806,000	2,977,000
Oregon Habitat Management Area Alignments					
PHMA	4,589,000	4,557,000	11,022,000	6,283,000	6,281,000
GHMA	5,634,000	5,662,000	N/A	4,739,000	3,539,000
Utah Habitat Management Area Alignments					
PHMA	2,080,000	2,080,000	3,568,000	2,192,000	1,627,000
GHMA	438,000	N/A	N/A	1,195,000	646,000
Wyoming Habitat Management Area Alignments					
PHMA	8,328,000	8,328,000	17,821,000	9,921,000	8,609,000
GHMA	9,397,000	9,397,000	N/A	7,905,000	8,981,000
Stewardship Areas	N/A	N/A	N/A	N/A	15,000

Table 2-4. Comparison of Alternatives, Habitat Management Area Alignments, Associated Major Land Use Allocations, and Non-Habitat

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Habitat Management Area Alignments and Associated Major Land Use Allocations				
GRSG habitat management areas would be identified and managed using the boundaries from the 2015 amendments or revisions (as maintained). See **Map 2.1** for the HMA map. Acres by state and rangewide are shown in **Table 2-3** above. Information on state-by-state GRSG HMA mapping strategies is in **Appendix 3**. ID, MT, NV, OR, UT, WY: Manage Sagebrush Focal Areas (SFAs) as described in the 2015 amendments or revisions. CA, CO, ND, SD: Does not include SFAs.	GRSG habitat management areas would be identified and managed using the boundaries from the 2019 amendments. See **Map 2.2** for the map of the HMAs. Acres by state and rangewide are shown in **Table 2-3** above. Information on state-by-state GRSG HMA mapping strategies is in **Appendix 3**. MT/DK: Manage the same HMAs as Alternative 1. ID, NV, UT, WY removed SFAs and associated management. CA, CO, MT/DK are the same as Alternative 1. OR retained the SFAs, but removed the recommendation for withdrawal from location and entry under the Mining Law of 1872.	GRSG habitat management areas would be identified and managed as shown on **Map 2.3**. Acres by state and rangewide are shown in **Table 2-3** above. Information on state-by-state GRSG HMA mapping strategies is in **Appendix 3**. Under Alternative 3, all areas managed for GRSG would be PHMA. (In addition to the PHMA, there would be ACECs designated.See the ACEC section below, and **Appendix 5**.)	GRSG habitat management areas would be identified and managed as shown on **Map 2.4**. Acres by state and rangewide are shown in **Table 2-3** above. Information on state-by-state GRSG HMA mapping strategies is in **Appendix 3**. No areas would be identified or managed as SFAs.	GRSG habitat management areas would be identified and managed as shown on **Map 2.5**. Acres by state and rangewide are shown in **Table 2-3** above. Information on state-by-state GRSG HMA mapping strategies is in **Appendix 3**. No areas would be identified or managed as SFAs. (HMA boundaries under Alternative 6 are the same as those under Alternative 5. **Map 2.6** shows the HMA boundaries and the GRSG ACECs that would be designated.See the ACEC section below, and **Appendix 5**.)

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Summarized <u>PHMA</u> (and ID IHMA) allocations: (Wind, solar, livestock grazing, and major ROWs are addressed in separate tables below.)	**Summarized <u>PHMA</u> (and ID IHMA) allocations:** (Wind, solar, livestock grazing, and major ROWs are addressed in separate tables below.)	**Summarized <u>PHMA</u> allocations**: (Wind, solar, livestock grazing, and major ROWs are addressed in separate tables below.)	**Summarized <u>PHMA</u> allocations:** (Wind, solar, livestock grazing, and major ROWs are addressed in separate tables below.)	**Summarized <u>PHMA</u> allocations:** (Wind, solar, livestock grazing, and major ROWs are addressed in separate tables below.)
• Fluid minerals: ○ Except as noted below, all states are open to new leasing, with no surface occupancy (NSO) stipulations in PHMA (and in IHMA in ID). ○ WY: NSO within 0.6 mi of leks. PHMA outside 0.6 mi has seasonal limitations (breeding, nesting, early brood-rearing & winter habitat) and CSU (density and disturbance). ○ CO: Closed within 1 mile of leks.	• Fluid minerals: Same as Alternative 1, except CO PHMA is NSO (no closed areas).	• Fluid minerals: Closed to leasing	• Fluid minerals: ○ Except as noted below, all states have NSO in PHMA (and IHMA in ID and RHMA in MT). ○ MT: Closed in UMRBNM; CSU in Cedar Creek RHMA; NSO 0.6 mile from lek, then CSU for Musselshell RHMA. (See the CO, MT/DK, and WY state specific circumstances for additional details for fluid mineral allocation decisions)	• Fluid minerals: ○ Same as Alternative 2. (See the CO, MT/DK, and WY state specific circumstances for additional details for fluid mineral allocation decisions)
• Saleable Minerals/Mineral Materials: ○ Except as noted below, all states are closed in PHMA (and in IHMA in ID), but open for new free use permits and expansion of existing pits. ○ WY: Open subject to occupancy, seasonal limitations, disturbance, and density.	• Saleable Minerals/Mineral Materials: Same as Alternative 1, except as noted below: ○ NV/CA: Exception criteria added to the closure.	• Saleable Minerals/Mineral Materials: Closed	• Saleable Minerals/Mineral Materials: ○ Except as noted below, all states are closed in PHMA, but open for new free use permits and expansion of existing pits. ○ ID: open for new free use permits and expansion of existing pits if screening and development criteria met ○ ID IHMA open ○ WY: Same as Alternative 1. (See the ID and OR state specific circumstances for additional details for saleable mineral allocation decisions)	• Saleable Minerals/Mineral Materials: Same as Alternative 4 except ID PHMA, which is open for new free use permits and expansion of existing pits subject to screening and development criteria. (See the ID and OR state specific circumstances for additional details for saleable mineral allocation decisions)

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Non-Energy minerals: o Except as noted below, all states are closed, but can consider expansion of existing leases. o WY: Open subject to occupancy, seasonal limitations, disturbance, and density. o IHMA in ID is open in Known Phosphate Leasing Areas (KPLAs). IHMA Outside KPLAs is open subject to disturbance thresholds.	• Non-Energy minerals: Same as Alternative 1, except NV/CA added exception criteria to the closure.	• Non-Energy minerals: Closed	• Non-Energy minerals: o Except as noted below, all states are closed. o NV/CA: Closed with exceptions. o ID IHMA: Open o WY: Same as Alternative 1. (See the NV/CA state specific circumstances for additional details for non-energy mineral allocation decisions)	• Non-Energy minerals: Same as Alternative 4.
• Coal: o CO, MT/DK, UT, and WY include the following language: At the time an application for a new coal lease or lease modification is submitted to the BLM, the BLM will determine whether the lease application area is "unsuitable" for all or certain coal mining methods pursuant to 43 CFR Part 3461.5. PHMA is essential habitat for maintaining GRSG for purposes of the suitability criteria as per 43 CFR Part 3461.5(o)(1). o ID, NV/CA, and OR: Did not address coal due to absence of the mineral.	• Coal – All States same as Alt 1, except UT: At time an application for a new coal lease or lease modification is submitted to the BLM, the BLM will determine whether the lease application area is "unsuitable" for all or certain coal mining methods pursuant to 43 CFR Part 3461.5. Coordination with the appropriate State of Utah agency and the determination of essential habitat for maintaining GRSG as per the suitability criteria at 43 CFR Part 3461.5(o)(1) will consider site-specific information associated with lease nomination areas as part of the unsuitability process identified above.	• Coal: o CO, MT/DK, UT and WY would include the same language as UT Alt 2, unless a suitability process has already been conducted that considered GRSG HMAs. o ID, NV/CA, and OR would not address coal due to absence of the mineral.	• Coal: Same as Alternative 3	• Coal: Same as Alternative 3.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Locatable minerals: ID, MT, NV, OR, UT, WY: SFAs were recommended for withdrawal from location and under the Mining Law of 1872. The BLM applied for a withdrawal pursuant to 204(a) of FLPMA and the Secretary initiated the withdrawal process for those lands. That process is currently underway. ○ MT: UMRBNM is already withdrawn.	• Locatable minerals: ○ MT/DK: Same as Alternative 1. ○ ID, NV/CA, OR, UT, and WY: Same as alternative 1, except removed the recommendation for withdrawal from location and entry under the Mining Law of 1872 associated with SFAs.	• Locatable minerals. The BLM recommends PHMA for withdrawal from location and entry under the Mining Law of 1872. The portion of the PHMA that is within the SFA boundaries from 2015 were recommended for withdrawal from location and under the Mining Law of 1872. The BLM applied for a withdrawal pursuant to 204(a) of FLPMA and the Secretary initiated the withdrawal process for those lands. That process is currently underway.	• Locatable minerals: ○ MT: UMRBNM is already withdrawn	• Locatable Minerals: Same as Alternative 4.
• Minor Rights-of-Way (ROW): ○ Except as noted below, PHMA in all states is avoidance for minor ROWs (<100 kV transmission lines and < 24" pipelines) ○ IHMA in ID is avoidance when consistent with screening criteria and subject to RDFs and buffers. ○ WY: Open to smaller ROWs, subject to buffers and mitigation.	• Minor ROW: Same as Alternative 1, except NV/CA added exception criteria to the Avoidance.	• Minor ROW: Exclusion (outside of designated corridors)	• Minor ROW: ○ Same as Alternative 1(including IHMA), except as noted below: ○ For minor ROWs, MT/DK exclusion within 1.2 miles of active leks and crucial winter range. Avoidance in designated corridors in those areas, and in the remainder of PHMA and RHMA. (See the CO state specific circumstances for additional details for ROW allocation decisions)	• Minor ROW: ○ Same as Alternative 1 (including IHMA), except as noted below: ○ For minor ROWs, MT/DK exclusion within 0.6 miles of active leks and crucial winter range. Avoidance in designated corridors in those areas, and in the remainder of PHMA. RHMA Avoidance within 1.2 miles of active leks and in crucial winter range. Remainder of RHMA open. (See the CO state specific circumstances for additional details for ROW allocation decisions)

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Travel and Transportation Management: ○ All states: Manage PHMA and IHMA as limited to existing roads and trails, with isolated areas open to cross-country use where suitable based on local conditions (e.g., sand dunes, rocky areas, etc.).	• Travel and Transportation Management: Same as Alternative 1.	• Travel and Transportation Management: Same as Alternative 1.	• Travel and Transportation Management – Same as Alternative 1.	• Travel and Transportation Management – Same as Alternative 1.
Summarized GHMA allocations: • Fluid minerals: ○ CO: closed within 1 mile of leks, NSO within 2 miles of leks, and seasonal limitations elsewhere. ○ ID: CSU (lek buffers) ○ MT/DK – varies by local office (see Table 2-28). ○ NV/CA: CSU (lek buffers and seasonal limitations) ○ OR: NSO within 1 mile of leks, and CSU (seasonal limitations) ○ UT: NSO near leks (varies by office) and CSU (seasonal limitations) based on allocations in plans that predated the 2015 amendment. ○ WY: NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks. open with standard terms and conditions outside of 2-mile lek buffer.	**Summarized GHMA allocations:** • Fluid minerals: Same as Alternative 1, except CO changed the closure within one mile of leks to be an NSO.	**Summarized GHMA allocations:** Not applicable to this alterative, as GHMA, IHMA, OHMA, and RHMA under Alternative 3 would be managed as PHMA.	**Summarized GHMA allocations:** • Fluid minerals: ○ CO: NSO w/in 2 miles of leks, TL elsewhere. ○ ID: CSU ○ MT/DK: NSO w/in 0.6 mile of leks and in crucial winter range; CSU elsewhere and in CHMA. ○ NV/CA, OR: open with minor stipulations (CSU – seasonal limitations) ○ UT: NSO near leks and seasonal limitations (varies by office) ○ WY: NSO w/in 0.25 mile of leks; seasonal limitations within 2 miles of leks; open with standard terms and conditions outside of 2-mile lek buffer. (See the CO and WY state specific circumstances for additional details for fluid mineral allocation decisions)	**Summarized GHMA allocations:** • Fluid minerals: ○ Same as Alternative 4 for all states except CO: CSU w/in 2 miles of leks, TL w/in rest of GHMA ○ CO Alternative 6: CSU w/in 1 mile of PHMA, TL w/in rest of GHMA. (See the CO and WY state specific circumstances for additional details for fluid mineral allocation decisions)

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Saleable minerals/Mineral Materials: o All states: no allocations for GHMA (meaning open), though most have minimization measures such as RDFss/BMPs and mitigation.	• Saleable minerals/Mineral Materials: Same as Alternative 1, except ID changed applying "RDFs and buffers" in GHMA to applying "BMPs."	—	• Saleable minerals/Mineral Materials: Same as Alternative 2.	• Saleable minerals/Mineral Materials: Same as Alternative 2.
• Non-energy minerals: o All states: no specific allocations for GHMA(meaning open) though most have minimization measures such as RDFs/BMPs and mitigation	• Non-energy minerals: Same as Alternative 1, except ID changed applying "RDFs and buffers" in GHMA to applying "BMPs."	—	• Non-Energy minerals – Same as Alternative 1.	• Non-Energy minerals – Same as Alternative 1.
• Coal: No states mentioned coal management in GHMA.	• Coal: Same as Alternative 1.	—	• Coal – Unsuitability evaluation approach same as applied in PHMA.	• Coal – Same as Alternative 4.
• Locatable minerals: SFAs were recommended for withdrawal from location and under the Mining Law of 1872. The BLM applied for a withdrawal pursuant to 204(a) of FLPMA and the Secretary initiated the withdrawal process for those lands. That process is currently underway.	• Locatable minerals: Same as Alternative 1.	—	• Locatable minerals – Same as Alternative 1.	• Locatable minerals – Same as Alternative 1.
• Minor Rights-of-Way: Substantial variation by state: o All states: open to minor ROWs with mitigation, except in WY.	• Minor Rights-of-Way: Same as Alternative 1, except ID changed applying "RDFs and buffers" in GHMA to applying "BMPs."	—	• Minor Rights-of-Way: o CO, MT/DK: Avoidance o OR: Avoidance within breeding, nesting, and/or seasonal habitats, otherwise open o ID, NV/CA, UT, WY: Open	• Minor Rights-of-Way: o CO: Avoidance o ID, UT, WY: Open o MT/DK: Avoidance w/in 1.2 miles of active leks and w/in crucial winter range, open elsewhere. CHMA: Avoidance o NV/CA, OR: Open with minimization measures

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Travel and Transportation Management: Limited to existing roads and trails, with isolated areas open to cross-country use where suitable based on local conditions (e.g., sand dunes, rocky areas, etc.).	• Travel and Transportation Management: Same as Alternative 1.	—	• Travel and Transportation Management: Same as Alternative 1.	• Travel and Transportation Management Same as Alternative 1.
Criteria-Based Management for Non-Habitat within GRSG Habitat Management Areas				
All states include language encouraging location of potential projects in areas of non-habitat before considering them in areas with habitat in GRSG habitat management areas. UT included management (MA-SSS-1) allowing managers to identify areas of GHMA that lack principal habitat components necessary for GRSG, including but not limited to rock outcrops, alkaline flats, and pinyon-juniper ecological sites. This non-habitat in GHMA could be identified when considering a project proposal and application of GHMA objectives and management actions could be excepted if: • the non-habitat does not provide important connectivity between areas with existing or potential habitat; • all direct and indirect impacts that impair the function of adjacent seasonal habitats or the life-history or behavioral needs of the GRSG population are eliminated through project design (e.g.,	All states include language encouraging location of potential projects in areas of non-habitat before considering them in areas with habitat in GRSG habitat management areas. UT adjusted MA-SSS-1 to apply to PHMA – allowing managers to identify areas of PHMA that lack principal habitat components necessary for GRSG, including but not limited to rock outcrops, alkaline flats, pinyon-juniper ecological sites, and areas that have crossed an ecological threshold to a different stable non-GRSG habitat vegetation community, such as cheatgrass monocultures or pinyon/juniper woodlands (phase 3, absent sagebrush understory) . This non-habitat in PHMA could be identified when considering a project proposal and application of PHMA objectives and management actions could be excepted if: • the non-habitat does not provide important connectivity between seasonal habitats; and	No similar action.	The GRSG habitat management areas include areas where goals, objectives, and management for conservation of GRSG are applied. The habitat management area boundaries are not intended to represent a survey-grade habitat boundary, may include results of large-scale modeling, and are not to be used exclusively for habitat determinations at a project or site-level scale. However, habitat use and occupancy, and vegetation communities are dynamic, and therefore careful consideration of areas within habitat management areas and field investigations are needed to apply GRSG management in a manner that meets GRSG plan goals and objectives. In accordance with existing law, regulation and policy, inventories will continue to be conducted to provide information on GRSG habitat and distribution (FLPMA, 43 USC 1701 Sec. 201 (a), BLM Manual 6840 .04 D 3; BLM-M-6840 .04 E 2). If during consideration of a proposed action (project level authorization) within GRSG PHMA, GHMA, IHMA (in ID), RHMA (in MT), SHMA (in WY) and OHMA (in NV/CA) potential non-habitat is identified, a field investigation should be conducted by a BLM biologist (or reviewed and accepted for confirmation). This investigation should use published, scientific methods (preferably more than 1) for identifying GRSG habitat (e.g., Stiver et. al. 2015 [as revised], NRCS ecological site descriptions (ESDs) and associated state and transition models) and be coordinated with the interdisciplinary team. Any discrepancies between the mapped GRSG habitat management areas and the site-specific conditions will be disclosed, with supporting data (e.g., vegetation monitoring, state and transition models, ecological site descriptions, etc.) and analyzed as a component of the NEPA process. In the mapped GRSG habitat management areas there may be areas of non-habitat – areas that lack the ecological potential to provide principal habitat components necessary to support GRSG and where conformance with the RMP would not support GRSG conservation (see definitions for existing habitat, potential habitat,	

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6

minimize sound, preclude tall structures, require perch deterrents), as demonstrated in the project's NEPA document.
 	
Any exception granted by the Authorized Officer based on above criteria would only apply to the specific project-level authorization. Excepting a site-specific project from compliance with GRSG management in an area of non-habitat would not change the boundaries of GHMA.
	• direct and indirect impacts on adjacent seasonal habitats (disturbance to or disruption of) that would impair their biological function of providing the life-history or behavioral needs of the GRSG population are eliminated through project design (e.g., minimize sound, preclude tall structures, require perch deterrents), as demonstrated in the project's NEPA document.
	
	Any exception granted by the Authorized Officer based on the above criteria would only apply to the specific project-level authorization. Excepting a site-specific project from compliance with GRSG management in an area of non-habitat would not change the boundaries of PHMA.
	
	NV/CA added management (MD SSS 5) that allowed the State Director to grant exceptions to allocations and stipulations in PHMA, GHMA, and OHMA if location of the proposed activity is determined to be unsuitable"(by a biologist with GRSG experience using methods such as Stiver et. al. 2015, as revised) and lacks the ecological potential to become marginal or suitable habitat; and will not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions will not apply to those areas determined
		(See above.)	and non-habitat in glossary). However indirect and direct impacts to adjacent GRSG populations and their habitats (including potential habitat) still need to be considered when planning and authorizing projects in these non-habitat areas.
			
			All management objectives and decisions associated with each management area type will apply unless all the following criteria are documented:
			• The project is proposed in verified non-habitat.
			• In addition to indirect impacts associated with distance (as established above), indirect impact consideration also includes: no direct or indirect impacts (considering impacts within distances described in applicable research) to adjacent habitat and potential habitat or individual or populations of GRSG occupying these adjacent areas due to project design and required design features (e.g., minimize noise, preclude tall structures, require perch deterrents, etc.), as demonstrated in the project's NEPA document. Indirect impact consideration includes the following:
			  ○ The project does not impact connectivity: (1) within or between populations, (2) between seasonal habitats (e.g., nesting, early brood rearing, winter, etc.), or (3) within or between existing habitat.
			  ○ Project related access through/across GRSG habitat (as verified through site-specific field checks) only occurs on existing routes, and the proposed action would not include new roads or upgrades to roads that would change the vehicle use, vehicle type, or traffic volume during the applicable season of GRSG use, subject to valid existing rights, throughout all stages of the proposed project.
			• Coordination with the appropriate state and federal agencies, including applicable biologists, has been documented. If coordination is not possible the reasons will be documented.
			
			Any proposed action approved through application of the above criteria would only apply to that specific project-level authorization. Any other proposed projects in the same area would need to undergo individual analysis to confirm the criteria are met prior to subsequent authorizations. Excepting a site-specific project from conformance with GRSG management in an area of non-habitat based on the above criteria would not change the GRSG habitat management area boundaries as identified in the RMP.	

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	to be unsuitable if the area has passed a threshold and lacks the ecological potential to become marginal or suitable habitat.	*(See above.)*	The determination to not apply GRSG management to a proposed project based on the above criteria may only be made by the Authorized Officer. However, if there is not concurrence between the coordinating federal and/or state biologists, then the conclusion will be at the discretion of the BLM State Director. Projects that do not meet the above criteria are not automatically denied by the Authorized Officer, but they must comply with the applicable habitat management area management. Further consideration of projects that don't meet the above criteria will be subject to the analysis and requirements (disturbance, RDFs, buffer distances, mitigation, etc.) outlined for GRSG.	

2.5.3 Mitigation

FLPMA provides the Secretary and the BLM broad authority to conserve and enhance public land values, including requiring mitigation. In all GRSG habitat management areas and consistent with valid existing rights and applicable law, BLM will apply the mitigation hierarchy (avoidance first, then minimization, compensation last) when authorizing actions resulting in GRSG habitat loss and degradation. For alternatives 3 through 6 the proposal is to achieve the at a minimum no net habitat loss (full restoration of functional habitats or enhancement of habitats such that it offsets the loss of capacity in impacted areas). The principles of HAF can be used to measure habitat sufficiency in implementing mitigation. The BLM is focusing on habitat mitigation, as sagebrush habitat fragmentation, loss and disturbance have been identified as the primary influences on GRSG population trends (Knick and Hanser, 2011). Compensatory mitigation should be durable, ensuring it will be resilient and persist as GRSG habitat (barring any natural disaster), and should be completed prior to associated actions occurring. Compensatory mitigation should also be prioritized to occur within the same area of the impact (within the same HAF fine scale area, or if not possible, within the same neighborhood cluster or HAF mid-scale area where practicable) so that it provides habitat for GRSG populations affected by the project.

Table 2-5, Comparison of Alternatives, Mitigation, presents management by alternative for this management issue.

Table 2-5. Comparison of Alternatives, Mitigation

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
CO, ID, MT/DK (most plans), NV/CA, OR, and UT: Requires and ensures mitigation provides a net conservation gain to GRSG. Mitigation will follow the regulations from the White House Council on Environmental Quality (CEQ) (40 CFR Part 1508.20), referred to as the mitigation hierarchy. Any compensatory mitigation will be durable, timely, and in addition to that which would have resulted without the compensatory mitigation. The BLM will develop a WAFWA Management Zone Regional Mitigation Strategy to guide the application of the mitigation hierarchy. The Regional Mitigation Strategy should include mitigation guidance on avoidance, minimization, and compensation, as follows: • Avoidance o Include avoidance areas; and, o Include any potential, additional avoidance actions with regard to GRSG conservation. • Minimization o Include minimization actions already included in laws, regulations, policies, land use plans, and/or land-use authorizations; and, o Include any potential, additional minimization	CO, ID, NV/CA, OR, UT and WY: Specify compensatory mitigation would be voluntary unless required by laws other than FLPMA or by the State. Other differences are described below.	In all GRSG habitat management areas and consistent with valid existing rights and applicable law, BLM will apply the mitigation hierarchy when authorizing third-party actions resulting in GRSG habitat loss and degradation (including indirect impacts) to achieve the minimum standard of no net habitat loss (see **Appendix 7**, Monitoring Framework for table of activities related to habitat loss and degradation). BLM will apply mitigation in accordance with the BLM mitigation handbook and other mitigation related BLM policy, as well as CEQ regulations (40 CFR Part 1508.20). Mitigation shall be durable and resilient ensuring GRSG habitat will persist (barring any natural disaster). Mitigation shall be prioritized to occur within the same area of the impact (within the same HAF fine scale area (Stiver et al., 2015, as revised), or if not possible, within the same neighborhood cluster (Coates et al. 2021) to the extent practicable or nearest equivalent HMA designated habitat so that it provides habitat for GRSG populations affected by the project. Compensatory mitigation will not be required for activities implemented to conserve species listed as threatened or endangered under the Endangered Species Act. Application of Mitigation Hierarchy: *Avoidance*: Avoiding impacts is defined by not taking certain action or parts of an action (CEQ regulations; 40 CFR Part 1508.20). Impact avoidance in GRSG habitats is the priority since restoration of most sagebrush systems can take decades. While the avoidance priority is reflected in many PHMA allocations, BLM may also determine on a case-by-case basis to avoid impacts by not issuing an authorization in areas open to development. *Minimization*: Where avoidance is not possible, impacts can be minimized through managing the severity of a project impact at a specific location. If impacts to GRSG habitats cannot be avoided, minimization measures will be applied (e.g., minimizing the disturbance footprint, lek buffers, BMPs, and RDFs). BLM can consider site-specific minimization measures beyond those listed in this plan, through site-specific environmental review to meet the no net habitat loss standard. Minimization does not eliminate project impacts and remaining residual impacts may require compensatory mitigation for habitat loss or degradation. *Compensation*: Any impacts that cannot be avoided or minimized to no net habitat loss would be compensated at a level and in a manner to fully offset both direct and indirect (e.g., disturbance, noise, changes in water availability) impacts to habitat function. Mitigation amounts should comply with State agency or regulatory requirements and consistent with BLM mitigation policy. In States without a mitigation requirement, mitigation should minimally meet no net habitat loss. Establishing no net loss will require full restoration of functional habitats or enhancement of habitats to minimally support the number of GRSG present prior to disturbance at the apex of the population cycle. The metrics identified in the HAF should be used to determine if restoration actions provide GRSG habitat. Where restoration is not possible, preservation (e.g., conservation easements, acquisition of inholdings) can be used to offset impacts and should be designed to protect uniquely important habitats (e.g., limiting winter habitats, connectivity corridors) or areas of GRSG habitats that are at a high risk of conversion. Compensatory mitigation should be completed prior to initiating the activity causing the need for compensation and monitored for retention and efficacy. Compensatory		

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
actions with regard to GRSG conservation. • Compensation ○ Include discussion of impact/project valuation, compensatory mitigation options, siting, compensatory project types and costs, monitoring, reporting, and program administration. No similar language for WY.	*(See above.)*	mitigation is not required by the BLM for operations conducted under the Mining Law of 1872, but operators may always voluntarily engage in compensatory mitigation. Minimization actions and compensation should be discussed with project proponents/operators and incorporated into alternatives when appropriate. Compensation may also be required by state regulations.		
• CO, ID, MT/DK, NV/CA, OR, UT: When authorizing actions that result in habitat loss and degradation, require and ensure mitigation achieves a net conservation gain in all HMA types. • In WY: Same as other states in PHMA. No mitigation required in GHMA. • UT: Includes exception for vegetation treatments to benefit Utah prairie dog. • ID and NV (not CA): Includes specific language regarding coordination with local GRSG teams to develop or implement compensatory mitigation programs. • CO, ID, MT/DK (most plans), NV/CA, OR, and UT: Includes an appendix with further details on how mitigation would be applied. • WY: Mitigation applied according to the Wyoming Strategy (EO2015-4).	• MT/DK and OR: Same as Alternative 1. • CO: Would work with the state to provide mitigation with outcomes that are "at least equal to the lost or degraded values." • ID: Similar to Alternative 1, except would manage for a no net loss standard. • NV/CA: Maintains net conservation gain standard, in coordination with State goals for GRSG. • UT and WY: Removed the net conservation gain requirement. • ID, NV/CA, UT, and WY: Reference mitigating to meet the BLM's overarching planning goals and objectives, as well as the BLM Manual 6840 to "minimize or eliminate threats affecting the status of [GRSG] or to improve the condition of [GRSG] habitat…"	The BLM will apply the mitigation hierarchy to address changes in existing development or new development as the result of valid existing rights. Where avoidance or minimization will not fully offset a project's impacts compensatory mitigation is required and will at minimum meet the requirements of the state wildlife agency or other appropriate state authority, and BLM/DOI mitigation policy. If the state agency does not require mitigation, BLM will require compensatory mitigation to achieve no net habitat loss.	The BLM will apply the mitigation hierarchy. Where avoidance or minimization will not fully offset a project's impacts compensatory mitigation is required and will at minimum meet the requirements of the state wildlife agency or other appropriate state authority, and BLM/DOI mitigation policy. If the state agency does not require mitigation, or state-sponsored mitigation is determined by BLM to be inconsistent with BLM/DOI policy, BLM will require compensatory mitigation to achieve no net habitat loss. Where habitat and/or population adaptive management thresholds have been met, compensatory mitigation beyond what is required by the States may be considered. BLM shall coordinate closely with the state wildlife management or other appropriate state agency in determining the amount and form of additional mitigation on	The BLM will apply the mitigation hierarchy. Where avoidance or minimization will not fully offset a project's impacts compensatory mitigation is required and will at minimum meet the requirements of the state wildlife agency or other appropriate state authority, and BLM/DOI mitigation policy. If the state agency does not require mitigation, or state-sponsored mitigation is determined by BLM to be inconsistent with BLM/DOI policy, BLM will require compensatory mitigation to achieve no net habitat loss.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• ID: Full reclamation bond required, consistent with regulations for minerals activities, in all HMA types.	• CO, ID, NV/CA, UT, and WY: Describe various processes for coordinating mitigation efforts with the state.	*(See above.)*	a case-by-case basis, considering project activity, direct and indirect impacts to GRSG habitats, and restoration success rates.	*(See above.)*

2.5.4 Application of Habitat Objectives

Habitat objectives identify the desired habitat outcome on BLM-administered lands in GRSG HMAs at multiple scales including seasonal habitats and connectivity within and between populations. Tables identifying indicators and benchmarks for use as guidelines at the site-scale will be retained in the Habitat Indicators appendix (**Appendix 8**) as a tool through which habitat suitability is informed based on location and ecological conditions.

The Habitat Assessment Framework (HAF/ BLM TR 6710-1; Stiver et al., 2015, as revised) provides a standardized, scientifically based methodology to assess GRSG habitat suitability at multiple scales (mid, fine, and site-scale, see Map 3.7 and 3.8). Using multi-scale evaluations considersthe entire suite of conditions contributing to high quality habitat, the success of past conservation actions, and prioritizing future land uses and conservation actions. Descriptions of habitat scales (broad-, mid-, fine-, and site-) and associated indicators for assessment at each scale are available in the HAF (BLM TR 6710-1). The Habitat Indicators Tables (**Appendix 8, Tables 8-1.A-G**) provide a list of indicators and benchmarks, derived from local and regional research on GRSG habitat selection, that collectively are used to inform habitat suitability. BLM offices will use **Appendix 8**, Greater Sage-grouse Habitat Indicators and Benchmarks, notably **Tables 8-1.A-G** to assess each monitoring location within seasonal habitats for site-scale suitability, with data collected during the appropriate corresponding seasonal use period, as applicable to address phenological changes.

The BLM will use terrestrial AIM methods (Herrick et al., 2017), additional monitoring approaches for wetland & riparian habitats, partner data as available, and supplemental guidelines (e.g., training, monitoring guidelines, sampling protocols, etc.) to collect data on site-scale habitat condition (**Appendix 8**). As research advances, new data could refine, or clarify GRSG selection for vegetation structure and composition in seasonal habitats. The Habitat Indicators Table(s) (**Appendix 8, Table 8-1.A-G**) will be periodically reviewed to consider, and as needed, incorporate the best available science in coordination with applicable federal, state, and tribal agencies. The addition or adjustment to indicators or benchmarks in the Habitat Indicators Table must include the reference or basis for which the changes are made. Revisions will only be made if warranted by scientific evidence. Use and inclusion of the HAF, including the relationship to Land Health Standards and monitoring is covered in more detail in the appendices (e.g., **Appendix 8, Table 8-2**).

Table 2-6, Comparison of Alternatives, Application of Habitat Objectives, presents management by alternative for this management issue.

Table 2-6. Comparison of Alternatives, Application of Habitat Objectives

<table>
<tr><th>Summary of Alternative 1</th><th>Summary of Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr>
<td>• CO, ID, MT/DK, NV/CA, UT: Include language noting indicators and values from habitat objectives table would be considered when authorizing activities in GRSG habitat.

• CO, ID, MT/DK, NV/CA, UT, and WY: Note the values in the table would be used during the land health evaluation process to help determine if the standard applicable to GRSG habitat is being met.

• ID, MT/DK, UT and WY: The values may not be obtainable on every acre, and/or should consider local ecological ability.

• MT/DK and UT: The values may be adjusted based on local factors, data, or updated science.

• NV/CA and OR: Land uses will be managed to meet the desired conditions identified in the tables.

• UT: Identifies a qualitative desired condition, with a note that the table is a summary of what science indicates may be needed to meet the qualitative objective.</td>
<td>• CO, ID, MT/DK, NV/CA, UT: Same language regarding considering indicators and values as Alternative 1.

• All States: Same language regarding using the habitat objectives table during the land health evaluation process as Alternative 1.

• ID, MT/DK, OR, UT and WY: Same language regarding values not being obtainable on every acre as Alternative 1.

• ID, MT/DK, NV/CA, OR, and UT: Same language regarding values being adjusted as Alternative 1.

• ID and UT: Identify a qualitative desired condition separate from the quantitative values in the table.</td>
<td colspan="3">The tables with the attributes, indicators, and values with associated text would be replaced in the action alternatives with the following new objectives and management actions:

Objective SSS [X]: Within GRSG habitat management areas provide suitable habitat by managing for connected mosaics of sagebrush and associated communities that provide for seasonal habitats, dispersal, and migration, while limiting widespread anthropogenic disturbances and fragmentation. This objective will be accomplished by applying RMP land use allocations and management actions among HMAs, proactive habitat treatments, and project-level application of mitigation (avoiding, minimizing, and compensating, per MS-1794 and H-1794) for internal and external project proposals.

Management Action SSS [X1]: Assess the suitability of GRSG habitat at HAF mid- and fine-scales (HAF Levels 2 and 3, respectively) based on the methods in the Sage-grouse Habitat Assessment Framework (HAF, Stiver et al. 2015, BLM TR 6710-1, as revised; see Appendix 8).

Management Action SSS [X2]: Design and implement projects that will maintain or improve habitat suitability, availability, and connectivity, based on site location, existing seasonal values, and habitat needs using the results of mid- and fine-scale habitat assessments and other complementary research, tools, or information and in coordination with partners across land management jurisdictions.

Objective SSS [Y]: Manage GRSG habitat management areas to provide seasonal habitats at the HAF Site Scale (Level 4) by providing for habitat characteristics that support seasonal habitat needs, including adequate protective cover and food needed to survive and reproduce. Seasonal habitats may include areas where sagebrush is the current dominant vegetation type, sagebrush is a primary shrub species within the various states of the ecological site, or dominated by other vegetation types but still provides GRSG habitats, such as mesic areas. This objective will be accomplished through the combination of RMP land use allocations and management actions and restoration – based on ecological potential, current vegetative condition, and existing seasonal values – and the project-level application of mitigation (avoiding, minimizing, and compensating, per MS-1794 and H-1794) for internal and external project proposals.

Management Action SSS [Y1]: Assess suitability of GRSG habitat at the HAF site-scale (Level 4) based on the methods in Sage-grouse HAF (Stiver et al. 2015, BLM TR 6710-1, as revised; Appendix 8) utilizing current geographically applicable research on seasonal habitat requisites of GRSG (see Appendix 8). Updates to seasonal habitat indicators and ESDs will be developed locally and coordinated with partners (see Appendix 8).

Management Action SSS [Y2]: Maintain, improve, or restore the suitability of GRSG seasonal habitats using the Habitat Indicators Table (see Appendix 8) to inform measurable project objectives during implementation-level planning for BLM-permitted and BLM-initiated site-specific actions in HMAs, in coordination with applicable partners. Use the results of site-scale habitat assessments and other best available information to inform management decisions and the design and implementation of habitat projects.</td>
</tr>
</table>

2.5.5 Disturbance Cap

Anthropogenic disturbance negatively impacts GRSG abundance and persistence (Knick et al., 2011, 2013). When authorizing disturbing activities within important GRSG habitats (PHMA and IHMA in Idaho) the BLM applies disturbance caps to limit habitat losses associated with discrete anthropogenic disturbances and their associated human activity. Other management tools consider effects from diffuse or non-anthropogenic disturbances such as wildfire, such as sagebrush availability objectives, GRSG habitat objectives, and adaptive management thresholds. Disturbance caps identify an upper limit (maximum disturbance permitted) above which no new development is generally permitted (subject to applicable laws and regulations and valid existing rights). A disturbance cap acts as a "backstop" to ensure that total disturbance does not exceed the level of GRSG tolerance for anthropogenic activities. Disturbance caps only address direct impacts and indirect impacts associated with anthropogenic disturbances may not be fully captured by use of this tool; other management tools consider indirect impacts, such as noise required design features/actions and mitigation requirements. Additional minimization measures may be necessary to reduce the full impact of a project on GRSG.

To conserve seasonal habitat requirements associated with a local GRSG populations disturbance caps will be applied to PHMA within the Habitat Assessment Framework (HAF) fine scale (Stiver et al. 2015, as revised)., as well as at the project scale. Previous application of a disturbance cap at a larger scale (e.g., biologically significant unit) did not limit the consideration to local populations and were often "diluted" by large amounts of non-habitat. Calculation of disturbance caps must consider all disturbances (existing and new) since GRSG are negatively impacted by the total disturbance. Within designated spatial analysis areas, disturbance on all surface ownerships should be considered to accurately capture potential impacts of new authorizations on GRSG.

With the exception of Wyoming and Montana, disturbance caps are currently set at 3% of the project and "biologically significant units" identified by the BLM at the state level, but do not include habitat loss from wildfire or agricultural conversion. The latter two factors will be quantified by separate calculations of sagebrush availability via the vegetation objectives, habitat objectives, and adaptive management thresholds, as tracked by approaches described in the Monitoring Framework (**Appendix 7**). Ninety-nine percent of active leks occurred within landscapes that were less than 3% developed in a landscape analysis of GRSG (Knick et al. 2013) and a follow-up study on disturbance from existing energy infrastructure and human activity supported those findings (Kirol et al. 2020). Similar results were observed for other species that use sagebrush for all or part of their life cycle, including mule deer (Sawyer et al. 2020, Lambert et al. 2022), pronghorn (Lambert et al. 2022) pygmy rabbits (Germaine et al. 2017), elk (Gigliotti et al. 2023), and sagebrush songbirds (Kirol and Fedy 2021). Wyoming and Montana use a 5% disturbance cap but include wildfire and agricultural conversion (the latter is not applicable on BLM lands) to their calculations. North Dakota and South Dakota apply a mix of the two approaches – with a 5% cap that includes wildfire and agriculture, but also limiting anthropogenic disturbances to 3%.

Table 2-7, Comparison of Alternatives, Disturbance Cap, presents management by alternative for this management issue.

Table 2-7. Comparison of Alternatives, Disturbance Cap

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Disturbance Cap Overview				
• CO, ID, NV/CA, OR, UT, ND, SD: 3% disturbance cap in PHMA (and IHMA in ID) on specific anthropogenic activities such as development of minerals and renewable energy, as well as ROWs. • CO, ID, NV/CA, OR, UT, ND, SD: disturbance cap applies at both BSU-scale and at proposed project analysis area (calculated similar to WY Disturbance Density Calculation Tool – DDCT) within PHMA. • MT, ND, SD, WY: 5% disturbance cap at the project DDCT area scale in PHMA. Includes wildfire and agriculture.	• CO, ID, NV/CA, OR, UT, ND, SD: 3% disturbance cap in PHMA (and IHMA in ID) on specific anthropogenic activities such as development of minerals and renewable energy, as well as ROWs. • CO, NV/CA, OR, UT, ND, SD: disturbance cap applies at both BSU-scale and at proposed project DDCT analysis area within PHMA. • ID cap applies at just the BSU scale. • MT, ND, SD, WY: Same as Alt 1.	Same as Alternative 4. However, the disturbance cap would not be applicable to new authorizations since all PHMA would be closed to new infrastructure projects. The disturbance cap would be applied to existing authorizations within the agencies' capacity to do so to the extent allowable under applicable law and while recognizing prior authorizations, lease terms, and valid existing rights.	In PHMA (and IHMA in ID), if direct habitat disturbance from existing and proposed infrastructure developments exceeds either 3% at the 1) project scale (see description below) or 2) Habitat Assessment Framework (HAF) Fine Scale habitat selection area (or CO management zones and populations – see **Section 2.7.1**), new infrastructure projects would be deferred to the extent allowable under applicable laws (such as the Mining Law of 1872), or valid existing rights: • until such time as the percentage of habitat disturbance in the areas has been reduced below the cap threshold through restoration of existing disturbance to meeting habitat objectives, or • redesigned to not result in additional surface disturbance (co-location), redesigned to move it outside of habitat in PHMA (and IHMA in Idaho) (see non-habitat criteria), or redesigned to move it outside PHMA (and IHMA in Idaho).	In PHMA (and IHMA in ID), if direct habitat disturbance from existing and proposed infrastructure developments exceeds either 1) 3% at the project scale (see description below) in all states except MT and WY, where it is 5% at the project scale, or 2) 3% at the Habitat Assessment Framework (HAF) Fine Scale habitat selection area for all states (or CO management zones and populations – see **Section 2.7.1**), new infrastructure projects would be deferred to the extent allowable under applicable laws (such as the Mining Law of 1872), or valid existing rights: • until such time as the percentage of habitat disturbance in the areas has been reduced below the cap threshold through restoration of existing disturbance to meeting habitat objectives or increasing the amount of suitable habitat through restoration, or • redesigned to not result in additional surface disturbance (co-location), redesigned to move it outside of habitat in PHMA (and IHMA in Idaho) (see non-habitat criteria), or redesigned to move it outside PHMA (and IHMA in Idaho).

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Disturbance Cap Numerator				
• CO, ID, NV/CA, OR, UT, ND, SD: infrastructure only - cap does not include wildfire or agriculture. • MT, WY, ND, SD: 5% cap includes infrastructure, wildfire and agriculture.	• CO, ID, NV/CA, OR, UT, ND, SD: same as Alt 1. • MT, WY: Same as Alt 1.	Same as Alternative 4, except wildfire is also included in the numerator as disturbance.	For all states, the disturbance cap calculation is limited to the following specific activities, whether existing projects or new proposals (see **Appendix 7** for additional details on how these items would be monitored): • Oil and gas wells and development facilities • Coal mines • Wind developments (e.g., towers, sub-stations, etc.) • Solar fields • Geothermal development facilities • Mining (active locatable, nonenergy leasable and saleable/mineral material developments) • Roads (transportation features with a maintenance intensity of level 3 or 5 – see BLM Technical Note 422 – Roads and Trails Terminology, 2006 or as updated (does not include two-tracks) • Railroads • Power lines • Communication towers • Other vertical infrastructure, as well as developed rights-of-way with habitat loss (e.g., pipelines) • Coal bed methane ponds (at the project scale) • Meteorological towers (e.g., wind energy testing) (at the project scale) • Nuclear energy facilities (at the project scale)	Same as Alternative 4 at the project scale for all states except for WY and MT which would include disturbances associated with their respective DDCT approaches (e.g., wildfire and agricultural, with Montana also including subdivisions and urban development) in the numerator (agriculture and subdivision disturbance data would be provided by the state, since no such activities are permitted on public lands). None of the states would include wildfire and agriculture (or Montana subdivisions and urban development) in the numerator at the HAF Fine Scale.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	• Airport facilities and infrastructure (at the project scale) • Military range facilities and infrastructure (at the project scale) • Hydroelectric plants/facilities (at the project scale) • Recreation areas facilities and infrastructure larger than 0.25 acres (e.g., parking lots, campgrounds, trail heads, etc.) (at the project scale) Where such data are available, this disturbance is measured by the footprint of direct disturbance of the PHMA (and IHMA in ID) area where habitat is removed (including staging areas, dispersed structures, parking lots, equipment storage areas, etc.), or by the distance between the outermost lines for transmission lines. When considering new project proposals, any project associated with the above list that has been approved/authorized but not yet constructed should be treated as though it were already constructed when calculating the disturbance cap to account for authorized but not yet constructed disturbance. No other activities or actions beyond those listed in the above list are included when calculating the cap (e.g., wildfire, agriculture, vegetation treatments, residences, barns, fencing or range improvements, etc.).	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	A disturbed area is included in the numerator until it has been restored to provide equal or improved habitat function as was provided by the area before the disturbance. Consistent with the BLM's responsibility to consider cumulative impacts when making decisions for activities on public lands, the disturbance percentage includes acres from the above disturbances regardless of land ownership, where such data are available. This will only inform decision-making on public lands and cannot impact private property rights.	*(See above.)*
		Disturbance Cap Denominator		
• CO, ID, NV/CA, OR, UT, ND, SD 3% cap applies at both BSU-scale and at proposed project DDCT analysis area within PHMA. • MT, ND, SD, WY: 5% cap applies at the project DDCT area scale in PHMA. Includes wildfire and agriculture. Using the DDCT approach to identify project level boundaries developed by the State of Wyoming is, in summary, as follows: 1) Determine potentially affected active leks by placing a 4-mile buffer around the proposed area of physical disturbance related to the proposed project. All active leks located within the 4-mile project buffer and within PHMA	• CO, NV/CA, OR, ND, SD same as Alt 1. • UT similar to Alternative 1, but allows project boundaries to be identified based on what areas of PHMA are used by the birds affected by the project. • ID removed the disturbance cap at the project scale, applying it only at the BSU scale. • MT, ND, SD, WY: Same as Alternative 1.	Same as Alternative 4.	At the <u>project scale</u>, the assessment area (denominator) is determined by identifying the extent of the GRSG PHMA (and IHMA in ID) that supports the GRSG population potentially affected by the proposed project that is also located in PHMA (and IHMA); it is not to be limited to the area where indirect impacts are anticipated. The project scale denominator should include the PHMA (and IHMA) used by the potentially affected local GRSG population, including the associated seasonal habitats and the transition zones between those habitats (only within PHMA) associated with where the project is proposed. If sufficient monitoring information is not available to	Same as Alternative 4, except as noted below: At <u>either scale</u>, all areas in PHMA (and IHMA in ID) would be included in the denominator unless specific information documents otherwise (i.e., seasonal habitat maps for the HAF Fine Scale assessment area). Any potential areas that are unsuitable at the HAF site scale are treated neither as habitat nor disturbance, which results in the area being removed from the denominator piece of the formula.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(and IHMA) will be considered affected by the project. 2) Next, place a 4-mile buffer around each of the affected active leks. 3) All PHMA (and IHMA) within the 4-mile project buffer, combined with the 4-mile lek buffer(s), creates the project analysis area for each individual project, absent other monitoring data. If there are no active leks within the 4-mile project buffer, the project scale analysis area will be that portion of the 4-mile project buffer within PHMA.	*(See above.)*	*(See above.)*	identify the portions of the PHMA used by the potentially affected local GRSG population, identify project level boundaries using an approach similar to the DDCT approach developed by the State of Wyoming: 1) Determine potentially affected active leks by placing a 4-mile buffer around the proposed area of physical disturbance related to the proposed project. All active leks located within the 4-mile project buffer and within PHMA (and IHMA) will be considered affected by the project. 2) Next, place a 4-mile buffer around each of the affected active leks. 3) All PHMA (and IHMA) within the 4-mile project buffer, combined with the 4-mile lek buffer(s), creates the project analysis area for each individual project, absent other monitoring data. If there are no active leks within the 4-mile project buffer, the project scale analysis area will be that portion of the 4-mile project buffer within PHMA. "Pending leks" and other similarly defined state-based lek categories can be considered as active leks based on inclusion from the state wildlife agency. In CO, BLM would use the state management zones (see **Section 2.7.1**). At the <u>HAF Fine Scale</u>, the assessment area (denominator) is the acres of PHMA (and IHMA in Idaho) within the boundaries of the HAF Fine Scale habitat delineation area. Calculation of	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	the 3 percent cap would include all acres of PHMA (and IHMA in Idaho) in the Fine Scale area as the denominator. In CO, BLM would use the state identified populations (see **Section 2.7.1**). At <u>either scale</u>, all areas in PHMA (and IHMA in ID) would be included in the denominator. Portions of PHMA that are potential or non-habitat (e.g., areas not currently supporting sagebrush cover due to wildfire) would still be included in the denominator piece of the formula. The denominator includes all lands (regardless of land ownership) to help the BLM consider the cumulative impacts of disturbances on GRSG when considering projects on public lands.	*(See above.)*
Disturbance Cap Exceptions				
• ID: 3% cap can be exceeded within existing designated utility corridors at the project scale only if there would be a net benefit to GRSG (multiple states have this in the Lands section, ID just has it specifically in the disturbance cap section) • NV: Disturbance can exceed 3% at the project or BSU scale except where a biological analysis indicates a net conservation to GRSG. Exceedance may be approved only with concurrence of the State Director, and unless	• ID: 3% cap can be exceeded within existing designated utility corridors at the project scale only if there would be a net benefit to GRSG (multiple states have this in the Lands section, ID just has it specifically in the disturbance cap section). • UT: 3% can be exceeded if will benefit GRSG. • NV: Disturbance can exceed 3% at the project or BSU scale except where a biological analysis indicates a net conservation to GRSG. The	Unless required by law, regulation, policy, or presence of valid existing rights, the BLM would not consider allowances for exceptions to the disturbance cap. All states: Apply the disturbance cap to the extent consistent with applicable law (such as the Mining Law of 1872) and valid existing rights.	All states: The Authorized Officer may consider projects on public lands that could result in exceeding the 3 percent disturbance cap across all ownerships at the <u>project scale</u> only if the following three criteria are met: 1) with concurrence from the State Director, 2) if the environmental review document(s) explains how the GRSG RMP goals and objectives will be met, including compliance with the RMP's GRSG mitigation strategy, documenting efforts to:	Same as Alternative 4, except in WY and MT where the project scale disturbance cap is 5%. All states would also replace bullet #4 under criteria #3 with the following: • Compensatory mitigation would not have to be completed and functioning prior to being able to grant the exception. To grant the activity based on compensatory mitigation, prior to construction, surface occupancy, or surface disturbing activities the compensation project must be

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
NDOW, USFWS, and BLM unanimously find the proposed action achieves a net conservation gain. • MT: Any proposals for deviations must demonstrate that the proposed activities will not cause declines in GRSG populations in core areas, with input from MT FWP and USFWS (see **Appendix 2** for specific text). • WY: 5% cap can be exceeded if the project, 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 GRSG. All states: Apply the disturbance cap to the extent consistent with applicable law (such as the Mining Law of 1872) and valid existing rights.	• requirement for unanimous concurrence was removed. • NV/CA: includes exception options if: ○ The area is non-habitat including through ground-truthing of areas mapped as habitat, and will not have direct, indirect, or cumulative effects, or ○ Compensatory mitigation is provided, or ○ The proposed activity addresses public health and safety concerns, or ○ The proposed activity is a renewal or re-authorization of existing infrastructure in previously disturbed sites and would not result in direct, indirect, or cumulative impacts, or ○ The proposed activity is determined to be a routine administrative function…and will have no adverse impacts on GRSG and its habitat • MT: Same as Alternative 1. • WY: Same as Alternative 1. All states: Apply the disturbance cap to the extent consistent with applicable law (such as the Mining Law of 1872) and valid existing rights.	*(See above.)*	• First avoid impacts by locating the proposed project in areas outside of PHMA, collocated within the footprint of existing disturbance, or in areas of non-habitat shall be documented. • Second to minimize impacts by applying project design features shall be documented (e.g., use of RDFs, buffer distances, seasonal limitations, etc.). • Third, only then to consider using compensatory mitigation. It is important to note compensatory mitigation may not be appropriate in some GRSG habitats/populations. Before using compensatory mitigation as an approach for this exception, the effectiveness of whether compensatory mitigation can offset impacts to the affected habitat and associated population without risking impacts to those GRSG habitats and populations shall consider local biological considerations, including, but not limited to population size, connectivity to other populations, availability of existing functional habitat, and the availability of mitigation projects that could benefit the impacted population. **and** 3) if one of the following circumstances can be documented: • The exceedance at the project scale is the result of	planned, funded, and approved by the operator, BLM, surface owner, and in coordination with the appropriate State agency. However, due to the uncertainty associated with whether the planned compensatory mitigation project would successfully become habitat in order to offset the impacts, one of the following would need to apply: ○ The area of habitat improvement associated with compensatory mitigation would need to increase to account for a level of risk that the compensatory mitigation action may fail or not persist for the full duration of the impact based on the type of specific compensatory project(s) and ecological conditions, or ○ The operator provides long-term assurances that the compensatory project would become functional (e.g. project maintenance or retreatment, easements, mitigation bonding – BLM H-1794-1, section 7.3, etc.). Compensatory mitigation rate would need to consider number of acres necessary to offset acres affected by direct and indirect effects (see Mitigation section), as well as likelihood that the mitigation project may not provide the

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	consolidating disturbance associated with the proposed project as a strategy to leave other undisturbed portions of the PHMA (and IHMA) undisturbed from new authorizations, and the third bullet below, addressing compensatory mitigation, is applied to any residual impacts. • Within RMP designated utility corridors, the 3 percent disturbance cap may be exceeded at the project scale if the site specific NEPA analysis indicates that doing so will decrease the impacts to GRSG habitat in comparison to siting a project outside the designated corridor in areas under the disturbance cap and requiring mitigation. This exception is limited to projects that fulfill the use for which the corridors were designated (ex., transmission lines, pipelines) and the designated width of a corridor will not be exceeded as a result of any project co-location. • If a technical team evaluates and recommends that site-specific GRSG habitat and population information, combined with project design elements – including compensatory mitigation, indicates the proposed project is expected to improve the condition of GRSG habitat within the proposed project	anticipated compensation for the duration of the impact. In addition, the compensation necessary to grant this exception must provide the offsetting benefit in the same HAF Fine Scale unit being impacted by the potential development.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	analysis area. Factors considered by the team will include GRSG abundance and trends, movement patterns – including impacts to connectivity, habitat amount and quality, extent and alignment of project disturbance, location and density of existing disturbance (e.g., potential for increased fragmentation), project design options, and other biological factors (e.g., potential for topographic screening, impacts from other threats such as predation, invasive species, drought, noise, etc.). The technical team should consist of, at a minimum, a BLM field biologist and a biologist from the appropriate State agency. The methods, rationale, and data used in developing recommendations shall be retained as part of the project record. • If the exception relies on compensatory mitigation, the mitigation must be completed prior to the disturbance that results in the exceedance of the disturbance cap so the value of the mitigation can be accurately compared to the value of the habitat to be affected by the proposed disturbance. In addition, the compensation necessary to grant this exception must provide the offsetting benefit in the same HAF Fine Scale unit being impacted by the	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	potential development. Consideration may be given to providing compensatory mitigation in adjacent fine-scale HAF areas if doing so will more effectively provide the offsetting benefit. • Disturbance associated with the renewal or re-authorization of existing infrastructure in previously disturbed sites or expansions of existing infrastructure that do not result in new direct, indirect, or cumulative impacts on GRSG and its habitat. There would be no exceptions to the 3 percent PHMA (and IHMA) disturbance cap at the HAF Fine Scale unless the disturbance is needed for the protection of human life and safety, as concurred by the State Director. If proposed disturbance cap exception is requested in an area (neighborhood cluster) that has met one of the adaptive management thresholds (hard or soft), no exceptions to the 3 percent disturbance cap at the project scale would be considered until the causal factor analysis is completed unless the disturbance is needed for the protection of human life and safety, as concurred by the State Director. To approve this exception, the Authorized Officer must document, in coordination with	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	the appropriate State agency, that the proposed action satisfies the three criteria listed above. All states: Apply the disturbance cap to the extent consistent with applicable law (such as the Mining Law of 1872) and valid existing rights.	*(See above.)*

2.5.6 Fluid Mineral Development and Leasing Objective

Research indicates fluid mineral development can negatively affect GRSG at multiple scales through direct impacts (habitat loss and fragmentation; Connelly et al. 2004, Lyon and Anderson 2003, Walker et al. 2007, Holloran et al. 2010, Knick et al. 2011, Green et al. 2017) and indirect impacts (increased noise and behavioral avoidance of human activity and infrastructure, including roads; Aldridge and Boyce 2007, Holloran et al. 2010, Kirol et al. 2015, Rice et al. 2016, Coates et al. 2023). Development can also contribute to cumulative impacts if it results in an increased distribution of invasive annual grasses or predator abundance.

This section addresses the RMP objective for GRSG habitat in relation to fluid minerals, RMP management actions providing guidance when considering leasing GRSG habitat management areas, and development associated with existing fluid mineral leases. Other aspects of fluid mineral leasing and development are addressed elsewhere in this amendment or existing RMP language, including specific fluid mineral allocations and associated stipulations (see **Section 2.5.2**), and waivers, exceptions, modifications (see **Section 2.5.7**). and application of RDFs (existing RMP decisions that are not being considered for amendment in this process).

Table 2-8, Comparison of Alternatives, Fluid Mineral Development and Leasing Objective, presents management by alternative for this management issue.

Table 2-8. Comparison of Alternatives, Fluid Mineral Development and Leasing Objective

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• CO, ID, ND, NV/CA, OR, UT, WY, parts of MT/DK (Dillon, Billings, HiLine, Miles City, ND, SD): Priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs, or within the least impactful areas within PHMA and GHMA if avoidance is not possible. • No similar objective in Lewistown or Butte.	• CO, ID, OR, and MT/DK offices: Same as Alternative 1. • UT, NV/CA: No similar objective (removed the objective). • WY: Clarified the objective to acknowledge that leasing is allowed in PHMA, and that if the BLM has a backlog of Expressions of Interest for leasing, the BLM would prioritize its work first in non-habitat management areas, followed by lower priority habitat management areas (e.g., GHMA) and then higher priority habitat management areas (i.e., PHMA). Clarified that for fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts on the extent compatible with lessees' rights to drill and produce fluid mineral resources.	All States: • No leasing strategy/objective is needed since PHMA would be closed to leasing. Leasing objective language would be removed. • New Management Action to address development in areas already leased: In PHMA (and IHMA), the BLM will work with lessees, operators, or other project proponents to avoid, minimize, and compensatorily mitigate for impacts to GRSG and their habitat (e.g., habitat loss, fragmentation, indirect impacts, etc.) from new oil and gas development on existing leases to the extent consistent with surface use rights as part of the environmental review process (e.g., 43 CFR Part 3101.1-2). If possible, place development outside of PHMA (and IHMA); if determined that such placement renders the recovery of fluid minerals on the lease infeasible, or where development of existing leases exceeds a disturbance density of 1 per 640, and/or 3 percent disturbance cap, seek to apply other measures to site the proposed lease activities to meet GRSG habitat objectives and require compensatory mitigation to replace direct and indirect habitat impacts. Locate infrastructure in areas that avoids or minimizes	Revised Fluid Mineral Objective for all states: • Manage fluid mineral leasing and development (including geothermal) in GRSG habitat management areas to avoid, minimize, and compensate for adverse impacts to GRSG habitat to the extent practical under the law and BLM jurisdiction. New management action: • Leasing is allowed in GRSG habitat management areas open to fluid mineral leasing (including geothermal), subject to the stipulations and RDFs included in the RMP. The BLM will evaluate parcels or those portions of parcels available for leasing associated with nominations (e.g., expressions of interest) and determine areas to continue analyzing for inclusion in a lease sale as part of the lease sale NEPA review or analysis. Where there is an existing evaluation process that considers at a minimum GRSG habitat and development proximity, the BLM will use that evaluation process. However, in the absence of an existing evaluation process or where informative to an existing process, the BLM will evaluate parcels with GRSG habitat management areas as part of the lease sale NEPA review or	Revised Fluid Mineral Objective for all states: • Objective is the same as Alternative 4. No specific objective or management action would specify a fluid mineral leasing strategy. However, not including specific leasing prioritization language or a leasing strategy does not remove the desired condition to manage public lands to provide suitable GRSG habitat at the HAF mid-, fine- and site-scales. Fluid mineral leasing would be considered in GRSG habitat management areas consistent with the Secretary's discretion under the Mineral Leasing Act (as amended), as well as applicable BLM regulations and policies, and in conformance with RMP goals, objectives, stipulations, and required design features to avoid, minimize, and compensate impacts to GRSG. • Management Action to address development in areas already leased: Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	habitat loss and impacts to breeding and nesting habitats. Work with lessees, operators, or other project proponents to place development at the most distal part of the lease from the lek or in areas least harmful to GRSG populations and habitat (e.g., where local terrain features such as ridges and ravines may shield nearby habitat from disruptive factors, or co-location with existing disturbance). For developments that cannot avoid impacts to GRSG, apply conservation measures that reduce impacts to GRSG through implementation decisions (e.g., approval of an application for permit to drill, geothermal drilling permit, Sundry Notice, Master Development Plans, etc.) and upon completion of the environmental record of review (43 CFR Part 3162.5). In this process, evaluate whether the conservation measures are "reasonable" (43 CFR Part 3101.1-2) and consistent with the valid existing rights. • If an existing lease terminates by operation of law, the reinstatement will not be authorized within PHMA (and IHMA).	• analysis by considering, at a minimum, the following: ○ Proximity to existing oil and gas developments, giving preference to lands upon which a prudent operator would seek to expand existing operations (e.g., existing leases, leases held by production, designated units, etc.). Such existing developments would not usually include areas with minimal existing infrastructure such as wildcat well locations. Areas with development in PHMA (and IHMA) that is at or approaching the density or disturbance caps at the project scale would indicate areas that would meet this criteria. Any nominated parcel subject to immediate drainage or within five miles of existing development would have a higher preference value for analysis in lease documents. ○ Potential impacts to important GRSG habitats or areas that provide important connectivity, giving preference to lands that would not result in impairing habitat suitability and proper function (see GRSG habitat objectives). This evaluation should consider impacts to GRSG habitat suitability at the	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	HAF mid-, fine- and site-scales, considering information including, but not limited to the presence and distance from leks; presence of nesting and brood rearing habitats, important winter habitat, or other limiting habitat types; the relationship between leks, nesting habitat and other seasonal habitats with topography; migration/movement corridors; adaptive management thresholds (hard and soft); amount and distribution of existing disturbances; the presence of degraded or non-habitat, and impacts to adjacent habitat that may affect the biological importance of the remaining intact habitat. Coordinate with the applicable State agencies to ensure the most current and applicable biological information is considered. Parcels where development would not decrease habitat suitability would have higher preference value for analysis in lease documents. If a parcel receives a low preference value for impacts to important GRSG habitats, it will receive an overall low preference value. An office may offer low preference	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	parcels in a lease sale if the Field Office resources (e.g., staff time) allow after all high preference parcels have been evaluated for inclusion in the sale. In such a scenario, the office will select one or more low preference parcels that present the least conflicts based on the evaluation criteria to analyze for inclusion in the sale. • Management Action to address development in areas already leased: When considering exploration and development on areas leased for fluid mineral resources in PHMAs (and IHMA in ID), including geothermal, application of measures to avoid, minimize, rectify, reduce and/or mitigate potential impacts will be considered through completion of the environmental record of review (43 CFR Part 3162.5 and 36 CFR Part 228.108), including appropriate documentation of compliance with NEPA. Such measures may include existing lease stipulations, project design, operator-committed measures, RMP required design features (RDFs), and local conditions of approval (COAs). The BLM will work with project proponents to promote measurable GRSG	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	conservation objectives such as, but not limited to, consolidation of project related infrastructure to reduce habitat fragmentation and loss and to promote effective conservation and connectivity of seasonal habitats and PHMAs (and IHMAs). The BLM will continue to work with project proponents and the state wildlife agency to site their projects in a manner that honors their lease rights but have been determined to contain the least sensitive habitats (based on vegetation, topography, or other habitat features) and resources whether inside or outside of PHMAs (and IHMA). Surface use rights associated with existing leases will be recognized and respected. For proposed operations in PHMAs (and IHMAs), the Surface Use Plan of Operations (see 43CFR Part 3162.3-1(f)) shall address, at a minimum, the applicable RDFs in the RMP. Seasonal habitats or project features related to potential GRSG impacts that are not addressed in the Surface Use Plan of Operations based on site-specific or project-specific considerations shall be noted in the project file, along with a rationale for not including them.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	In this process the BLM will evaluate whether each conservation measure is reasonable and consistent with surface use rights as part of the environmental review process (e.g., 43 CFR Part 3101.1-2).	*(See above.)*

2.5.7 Fluid Mineral Lease Stipulation Waivers, Exceptions, and Modifications

Federal regulations at 43 CFR Part 3171.24 provide the BLM direction for conditions under which variance from specific stipulations can be considered. This document presents the draft range of alternatives for waivers, exceptions, and modifications (WEMs) associated with the described stipulations on new fluid mineral leasing (e.g., oil, gas, and geothermal) in GRSG habitat management areas. Consideration of amending the WEM language in this planning effort is limited to future leases that have stipulations associated with no surface occupancy (NSO), disturbance cap – generally applied as a controlled surface use (CSU) stipulation, and seasonal timing limitations. This planning effort is not considering amendment of WEMs associated with other stipulations.

This section is limited to consideration of WEMs during the development phase. Other aspects of fluid mineral leasing and development are addressed elsewhere in this amendment or existing RMP language, including specific fluid mineral allocations and associated stipulations (see **Section 2.5.2**), the RMP objective for GRSG habitat in relation to fluid minerals (see **Section 2.5.6**), RMP management actions providing guidance when considering leasing GRSG habitat management areas (see **Section 2.5.6**), development associated with existing fluid mineral leases (see **Section 2.5.6**), and application of RDFs (existing RMP decisions that are not being considered for amendment in this process).

The WEMs in this document would apply to new fluid mineral leases and lease reinstatements on public lands, as well as existing leases if they do not specifically include WEMs associated with lease stipulations, and are limited to the stipulations described below. GRSG fluid mineral stipulations not mentioned in this document, as well as those program areas/stipulations not considered in this planning effort would continue where they apply. If there is a conflict between such stipulations and those presented in this document, the more restrictive would take precedence during implementation.

Description of Surface Stipulations

This planning process is considering an amendment to the language for WEMs associated with three general types of GRSG surface stipulations that would be applied to new fluid mineral leases.

<u>No Surface Occupancy (NSO)</u>
Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect GRSG and GRSG habitat. Generally considered a major constraint, in areas open to fluid mineral leasing with NSO stipulations, fluid mineral leasing activities are permitted, but activities with surface occupancy cannot be conducted unless an exception, modification, or waiver is granted. Absent the approval of a waiver, exception, or modification, access to fluid mineral deposits would require drilling from outside the boundaries of the NSO stipulation. In the 2015 not warranted determination for GRSG the USFWS cited application of regulatory tools, such as NSO stipulations, as an effective conservation tool in minimizing exposure of the species to fluid mineral development.

<u>Controlled Surface Use (CSU) – Disturbance Cap</u>
This planning effort is considering amendments to the GRSG disturbance cap, including clarifying that it will be applied to new fluid mineral leases as a CSU stipulation. A CSU stipulation is a category of moderate constraint that allows some use and occupancy of public land while protecting identified resources or values. A CSU stipulation allows the BLM to require additional conditions be met to protect a specified resource or value in addition to standard lease terms and conditions. A new lease with the disturbance cap CSU stipulation would not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing fluid minerals within GRSG designated PHMAs

(and IHMA in Idaho). The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on federal, state, or private lands within designated PHMAs/IHMAs or surface disturbance created by other land users.

Seasonal Timing Limitations (TL)
Areas identified for TLs, a moderate constraint, are closed to fluid mineral exploration and development during identified time frames to eliminate, to the degree possible, activities disruptive to GRSG during the associated seasons of use. Ground disturbing activities, drilling, stimulation, and plug and abandonment work should not be allowed during the identified periods. Production and maintenance activities on wells and well work required by another program to protect the environment (e.g. Underground Injection Control) and administrative activities may be exempt from the timing limitations at the discretion of the BLM Authorized Officer. GRSG seasonal timing limitations from prior planning efforts will not change, but waivers, exceptions, and modifications for seasonal timing limitations are being updated.

Project-specific Flexibility

For fluid minerals, surface stipulations could be excepted, modified, or waived by the Authorized Officer. An exception exempts the holder of the lease from the stipulation on a one-time basis. A modification changes the language or provisions of a stipulation due to changed conditions or new information either temporarily or for the term of the lease. A modification may or may not apply to all other sites within the leasehold. A waiver permanently exempts the surface stipulation for a specific lease, planning area, or resource based on absence of need.

An exception, modification, or waiver may be granted at the discretion of the BLM Authorized Officer if the specific criteria described below are met. WEMs specific to each stipulation are included in the leasing documents and are considered based on site-level conditions during implementation of the lease terms. The proponent must submit a written request for an exception, modification, or waiver and provide the data necessary to demonstrate that specific criteria have been met. The BLM would consider that information, in combination with all other information provided by State, County, and other local agencies; tribal governments; other federal agencies; or interested stakeholders as applicable, though decision to grant the WEM remains with the Authorized Officer.

In the event there are overlapping stipulations (e.g., NSO area overlapping a disturbance cap CSU overlapping a seasonal timing limitation), WEMs would need to be considered for each stipulation separately based on the processes identified below.

Table 2-9, Comparison of Alternatives, Fluid Mineral Leasing Waivers, Exceptions, and Modifications, presents management by alternative for this management issue.

Table 2-9. Comparison of Alternatives, Fluid Mineral Leasing Waivers, Exceptions, and Modifications

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
No Surface Occupancy Stipulations for GRSG within PHMA (and IHMA in Idaho and West Decker RHMA in MT):				
• ID, MT/DK, NV/CA, OR, UT: In SFA, there will be no waivers, exceptions, or modifications. • CO, ID, MT/DK, NV/CA, OR, UT: The Authorized Officer may grant an **exception** to a fluid mineral lease no-surface-occupancy stipulation only where the proposed action: i. Would not have direct, indirect, or cumulative effects on GRSG or its habitat; or, ii. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide a clear conservation gain to GRSG. Exceptions based on conservation gain (ii) may only be considered in (a) PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or (b) areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this ARMPA. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such	• MT/DK, OR, and WY: Same as Alternative 1. • CO: <u>NSO-1 – Within One mile of Active Leks:</u> ****Exceptions** or **modifications** may be considered if, in consultation with the State of Colorado, it can be demonstrated that there is no impact on Greater Sage-Grouse based on one of the following: ○ Topography/areas of non-habitat create an effective barrier to impacts. ○ No additional impacts would be realized above those created by existing major infrastructure (for example, State Highway 13). ○ The exception or modification precludes or offsets greater potential impacts if the action were proposed on adjacent parcels (for example, due to landownership patterns). ***In order to approve exceptions or modifications to this lease stipulation, the Authorized Officer must obtain: agreement, including written justification, between the BLM District Managers and CPW that the proposed action satisfies at least one of the criteria listed above.*	No new WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing so there would be no new leases with associated stipulations.	**Exception #1 – applicable to the NSO stipulation within 0.6 miles of active leks (WAFWA definition) in PHMA (and IHMA in Idaho)**: The Authorized Officer may consider and grant an **exception** to the NSO stipulation within 0.6 miles of active leks in PHMA (and IHMA in Idaho) if it can be demonstrated that development and surface occupancy would have no direct impacts to or disruption of GRSG or its habitat based on at least one of the following – after documenting the review of available information associated with the site proposed for the exception – both internally compiled and as provided by State, County and other local agencies, tribal governments, project proponents, other federal agencies, or interested stakeholders: • The location of the proposed authorization is determined to be non-habitat (see Glossary; as determined by a biologist with GRSG experience using methods such as the Habitat Assessment Framework), does not provide important connectivity between habitat areas, and the project includes design features to prevent indirect disturbance to or disruption of adjacent seasonal habitats (whether adjacent seasonal habitat are within 0.6	Same as Alternative 4, except in CO where the exception would apply in PHMA within 1 mile of active leks.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
benefits will endure for the duration of the proposed action's impacts. Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies (i) or (ii). Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publicly available at least quarterly. • WY: NSO 0.6 lek buffer in PHMA: **Exception**: The authorized officer may grant an exception if an environmental record of 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 Greater	• ID: The Authorized Officer may grant an exception to a fluid mineral lease NSO stipulation only where the proposed action: i. Will not have direct, indirect, or cumulative effects on GRSG or its habitat; or, ii. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide no net loss to GRSG. Exceptions based on no net loss (ii) may only be considered in (a) PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or (b) areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid Federal fluid mineral lease existing as of the date of this RMP amendment. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts. Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director and in coordination with the Technical and Policy	*(See above.)*	• miles of an active lek or greater than 0.6 miles from active leks) that would impair their biological function. • Topography/areas of non-habitat create an effective barrier to adverse impacts (e.g., protected from visual and audible disturbances to GRSG and its habitat). • By co-locating the proposed authorization with existing disturbance, no additional impacts would be realized above those already associated with the existing similarly-sized infrastructure, including indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function. Beyond considering an exception where no direct or indirect impacts on GRSG or its habitat would occur, an exception could also be considered if the proposed location on public lands would be undertaken as an alternative to a similar action occurring on a nearby non-public lands parcel (for example, due to landownership patterns), and development on the public parcel in question would eliminate impacts on more important and/or limited GRSG habitat (e.g., wet meadows, brood-rearing habitat, etc.) on the non-public nearby parcel; this exception must also include measures sufficient to allow the BLM to conclude in its documenting analysis that such	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected.	Team. Approved exceptions will be made publicly available at least quarterly. • NV/CA: An **exception** to stipulations associated with GRSG Habitat Management Areas (HMAs) may be granted by the authorized officer (State Director), in coordination with the appropriate state agency (NDOW, SETT, and/or CDFW), if one the following conditions are met: i. The location of the proposed authorization is determined to be unsuitable (by a biologist with GRSG experience using methods such as Stiver et al 2015) and lacks the ecological potential to become marginal or suitable habitat; and would not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions would not apply to those areas determined to be unsuitable because the area lacks the ecological potential to become marginal or suitable habitat, and/or ii. The proposed activity's impacts could be offset to result in no adverse impacts on GRSG or its habitat, through use of the mitigation hierarchy consistent with Federal law	*(See above.)*	benefits will endure for the duration of the proposed action's impacts on public lands (e.g., confirmation of an easement). To approve this exception based on any of the above criteria, after coordination with the appropriate State agency, the Authorized Officer must document, that the proposed action satisfies at least one of the criteria listed above. If the State agency does not concur with granting the exception, the Authorized Officer must provide rationale for how the criteria are met considering the information the State provides. Prior to granting an exception to an NSO stipulation, the potential exception shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process). If the area associated with the proposed development seeking the exception (e.g., well pad, compressor station, etc.) is in an area (neighborhood cluster) that has met one of the adaptive management thresholds (hard or soft) (see **Section 2.5.13**), no exceptions would be considered until the causal factor analysis is completed. If the causal factor analysis concludes that development associated with the type of activity seeking the exception is or could contribute to the threshold being met or not recovering, no exception would	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	and the state's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations developed to implement this order). In cases where exceptions may be granted for projects with a residual impact, voluntary compensatory mitigation consistent with the State's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations developed to implement this order) would be one mechanism by which a proponent achieves the Approved RMP Amendment goals, objectives, and exception criteria. When a proponent volunteers compensatory mitigation as their chosen approach to address residual impacts, the BLM can incorporate those actions into the rationale used to grant an exception. The final decision to grant a waiver, exception, or modification would be based, in part, on criteria consistent with the State's GRSG management plans and policies. • UT: Within PHMA, the Authorized Officer may grant an **exception** to a fluid mineral lease NSO	*(See above.)*	be granted. If the analysis is inconclusive on cause, exceptions could be considered.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	stipulation where the proposed action: ○ Occurs in non-habitat that does not provide important connectivity between habitat areas and the development would not cause indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function of providing the life-history or behavioral needs of the Greater Sage-Grouse population due to project design (e.g., minimize sound, preclude tall structures, require perch deterrents), as demonstrated in the project's NEPA document; or ○ Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and development on the parcel in question would have less of an impact on Greater Sage-Grouse or its habitat than on the nearby parcel; this exception must also include measures sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts. Approved exceptions will be made publicly available at least quarterly. In addition, any lease activities will apply the pertinent management for discretionary	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	activities in PHMA identified in MA-SSS-3 (e.g., mitigation, disturbance cap, minerals/energy density, seasonal restrictions, and RDFs), including if an exception to the NSO is granted.	*(See above.)*	*(See above.)*	*(See above.)*
Not applicable	A two-tiered NSO exception is not applicable for any state but CO. • CO: NSO-2 – One Mile from Active Leks to the Remainder of PHMA: ****Exception**: The BLM will grant an exception (any occupancy must be removed within 1 year of approval) to NSO-2 after consulting with the State of Colorado, consistent with MD-SSS-3 and based on the following factors: ○ It is determined by evaluating the proposed lease activities that adverse or undesirable impacts to Greater Sage-Grouse can be avoided based on site-specific terrain, topography and habitat type, or offset consistent with criterion #2 below. For example, in the vicinity of leks, local terrain features such as ridges and ravines may shield potential disruptive impacts from affecting nearby Greater Sage-Grouse habitat. or ○ It is determined, based on site-specific information (using tools such as the Habitat Assessment Framework, the Colorado Habitat Exchange Habitat	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Exception #2 – No Surface Occupancy Stipulation in the Remainder of PHMA (or IHMA in Idaho) beyond 0.6 miles from active leks – as applicable:** The Authorized Officer may consider and grant an **exception** to the NSO stipulation associated with the remainder of PHMA (and IHMA in Idaho) if one of the following criteria apply – after documenting the review of available information associated with the site proposed for the exception – both internally compiled and as provided by State, County and other local agencies, tribal governments, project proponents, other federal agencies, or interested stakeholders: 1) The criteria presented in Exception #1. 2) If it can be demonstrated by a biologist with GRSG experience, based on site-specific information (using tools such as the Habitat Assessment Framework, State mitigation programs, or others), where it has been demonstrated that the project cannot be avoided or minimized and granting the exception would not result in adverse effects to GRSG	**Exception #2 – No Surface Occupancy Stipulations in the Remainder of PHMA (or IHMA in Idaho) beyond 0.6 miles from active leks – as applicable:** Same as Alt 4, except under the #2 criteria, compensatory mitigation would not have to be completed and functioning prior to being able to grant the exception. To grant the activity based on compensatory mitigation, prior to construction, surface occupancy, or surface disturbing activities the compensation project must be planned, funded, and approved by the operator, BLM, surface owner, and in coordination with the appropriate State agency. However, due to the uncertainty associated with whether the planned compensatory mitigation project would successfully become habitat in order to offset the impacts, one of the following would need to apply: • The area of habitat improvement associated with compensatory mitigation would need to increase to account for a level of risk that the compensatory mitigation action may fail or not persist for the full duration of the impact based on the type of

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	Quantification Tool, or others), that the impacts anticipated by the proposed activity would be offset through compensatory mitigation developed in coordination with the State of Colorado (as a requirement of State policy or authorization or as offered voluntarily by leaseholder) that meets accepted principles of compensatory mitigation including: ➢ Achieving measurable outcomes for Greater Sage-Grouse habitat function that are at least equal to the lost or degraded values. **If, prior to development, the county in which the tract is located provides information indicating that an NSO stipulation can be excepted or modified based on a reasonable understanding of likely development because either of the criterion above would apply, the BLM would manage that lease accordingly unless the BLM determines, at the APD stage and in consultation with the State of Colorado, that neither of the criteria identified above is met. *In order to approve exceptions or modifications to this lease stipulation, the Authorized Officer must obtain agreement, including written justification, between the BLM District Manager and CPW*	*(See above.)*	seasonal habitats. Granting the exception must be in conformance with the RMP GRSG goal and habitat objectives, and the impacts anticipated by the proposed activity would be addressed through application of the mitigation hierarchy, including consideration of compensatory mitigation developed in coordination with the applicable state agency that meets the GRSG mitigation principles identified in the RMP, including providing for no net loss of habitat. To grant an exception based on the use of compensatory mitigation, the following must be followed and documented: a. As the first step in mitigating impacts to GRSG, efforts to avoid impacts by locating the proposed project in areas outside the NSO areas or in areas of non-habitat shall be documented. b. As the second step in mitigating impacts to GRSG, efforts to minimize impacts by applying project design features shall be documented (e.g., use of RDFs, buffer distances, seasonal limitations, etc.). c. Using compensatory mitigation may not be appropriate in some GRSG habitats/populations. Before using compensatory mitigation	the specific compensatory project(s) and local ecological conditions, or • The operator provides long-term assurances that the compensatory project would become functional for the duration of the impact (e.g. project maintenance or retreatment, easements, mitigation bonding – BLM H-1794-1, section 7.3, etc.). Compensatory mitigation rate would need to consider number of acres necessary to offset acres affected by direct and indirect effects (see Mitigation section), as well as likelihood that the mitigation project may not provide the anticipated compensation for the duration of the impact.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*that the proposed action satisfies at least one of the criteria listed above.*	*(See above.)*	as an approach for this exception, the effectiveness of whether compensatory mitigation can offset impacts to the impacted habitat and associated population without risking other impacts shall consider local biological considerations, including, but not limited to population size, connectivity to other populations, availability of existing functional habitat, and the availability of mitigation projects that could benefit the impacted population. d. The compensation project must be completed and habitat functionality documented before the exception is granted to ensure the offset in impacts will occur. e. The compensation necessary to grant this exception must provide the offsetting benefit to the population being impacted by the potential development. To approve this exception, the Authorized Officer must document, in coordination with the appropriate State authority, that the proposed action satisfies at least one of the criteria listed above. If the State agency does not concur with granting the exception, the Authorized Officer	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	must provide rationale for how the criteria are met considering the information the State provides. Prior to granting an exception to an NSO stipulation the potential exception shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process). If the area associated with the proposed development seeking the exception (e.g., well pad, compressor station, etc.) is in an area (neighborhood cluster) that has met one of the adaptive management thresholds (hard or soft) (see **Section 2.5.13**), no exceptions would be considered until the causal factor analysis is completed. If the causal factor analysis concludes that development associated with the type of activity seeking the exception is or could contribute to the threshold being met or not recovering, no exception would be granted. If the analysis is inconclusive on cause, exceptions could be considered.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• CO, ID, MT/DK, NV/CA, OR, UT: None • WY: NSO 0.6 lek buffer in PHMA: **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of 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 or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting.	• ID, MT/DK, OR and WY: Same as Alternative 1. • CO: NSO-1 – Within One mile of Active Leks: ****Exceptions** or **modifications** may be considered if, in consultation with the State of Colorado, it can be demonstrated that there is no impact on Greater Sage-Grouse based on one of the following: ○ Topography/areas of non-habitat create an effective barrier to impacts. ○ No additional impacts would be realized above those created by existing major infrastructure (for example, State Highway 13). ○ The exception or modification precludes or offsets greater potential impacts if the action were proposed on adjacent parcels (for example, due to landownership patterns). ***In order to approve exceptions or modifications to this lease stipulation, the Authorized Officer must obtain: agreement, including written justification, between the BLM District Managers and CPW that the proposed action satisfies at least one of the criteria listed above.*	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Modification**: The Authorized Officer may consider and grant a **modification** to the fluid mineral lease NSO stipulation, allowing for surface occupancy only where: • an exception is granted, as described above, for the primary disturbance (e.g., well pad, compressor station), and • the potential associated infrastructure related to the development is not individually precluded by other GRSG actions (e.g., roads, pipelines, power lines that could otherwise be considered through a ROW). While the NSO stipulation could be modified for these additional developments, they must still comply with other GRSG management actions (e.g., mitigation, disturbance cap, minerals/energy density, seasonal restrictions, RDFs, etc.) if an exception to the NSO is granted. Prior to modifying the area subject to the NSO stipulation, the potential modification shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process). If the area (neighborhood cluster) associated with the proposed exception has met one of the adaptive management thresholds (hard or soft) (see **Section 2.5.13**), no exceptions would be considered until the causal factor	Same as Alternative 4, except for the addition of the following: Specifically for Wyoming: In addition to the above, the Authorized Officer may consider and grant a **modification** if after documenting the review of available information, in coordination with the appropriate State agency, that a portion of the NSO area is nonessential (e.g., the lek upon which the NSO is centered is not active), or it is identified through scientific research or monitoring that the existing area (i.e., the active lek and associated buffer) is inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the GRSG, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	• CO: <u>NSO-2 – One Mile from Active Leks to the Remainder of PHMA:</u> ****Modification**: The BLM will grant modifications (changes to the stipulation either temporarily or for the term of either part of the entire lease) to NSO-2 after consultation with the State of Colorado, consistent with MD-SSS-3 and based on the following factors: ○ It is determined by evaluating the proposed lease activities that adverse or undesirable impacts to Greater Sage-Grouse can be avoided based on site-specific terrain, topography and habitat type, or offset consistent with criterion #2 below. For example, in the vicinity of leks, local terrain features such as ridges and ravines may shield potential disruptive impacts from affecting nearby Greater Sage-Grouse habitat. or ○ It is determined, based on site-specific information (using tools such as the Habitat Assessment Framework, the Colorado Habitat Exchange Habitat Quantification Tool, or others), that the impacts anticipated by the proposed activity would be with the State of Colorado (as a requirement of State	*(See above.)*	analysis is completed. If the causal factor analysis concludes that development associated with the type of activity seeking the exception is or could contribute to the threshold being met or not recovering, no modification would be granted. If the analysis is inconclusive on cause, modifications could be considered.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	offset through compensatory mitigation developed in coordination policy or authorization or as offered voluntarily by leaseholder) that meets accepted principles of compensatory mitigation including: ➢ Achieving measurable outcomes for Greater Sage-Grouse habitat function that are at least equal to the lost or degraded values; ➢ Accounting for a level of risk that the mitigation action may fail or not persist for the full duration of the impact. **If, prior to development, the county in which the tract is located provides information indicating that an NSO stipulation can be excepted or modified based on a reasonable understanding of likely development because either of the criterion above would apply, the BLM would manage that lease accordingly unless the BLM determines, at the APD stage and in consultation with the State of Colorado, that neither of the criteria identified above is met. *In order to approve exceptions or modifications to this lease stipulation, the Authorized Officer must obtain agreement, including*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*written justification, between the BLM District Manager and CPW that the proposed action satisfies at least one of the criteria listed above.* • NV/CA: The only language for modifications and waivers related to timing stipulations. The language from the NV/CA 2019 ARMPA is located in that section. • UT: The BLM Authorized Officer may grant a **modification** to a fluid mineral lease no surface occupancy stipulation only where an exception is granted, as described above, for the primary disturbance (e.g., well pad, compressor station). A modification to the no surface occupancy stipulation could be considered for the associated infrastructure related to the development that are not individually precluded by other Greater Sage-Grouse actions (e.g., roads, pipelines, power lines). While the no surface occupancy stipulation could be modified for this infrastructure, it must still comply with other Greater Sage-Grouse management contained in MA-SSS-3.	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• CO, ID, MT/DK, NV/CA, OR, UT: None • WY: NSO 0.6 lek buffer in PHMA: **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the state wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unactive as determined by the state wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)	• ID, MT/DK, OR, WY: Same as Alternative 1. • CO: <u>NSO-1 (Within One mile of Active Leks) and NSO-2 (One Mile from Active Leks to the Remainder of PHMA):</u> No waivers are authorized unless the area or resource mapped as possessing the attributes protected by the stipulation is determined during collaboration with the State of Colorado to lack those attributes or potential attributes. A 30-day public notice and comment period is required before waiver of a stipulation. Waivers would require BLM State Director approval. • NV/CA: **Waiver**: The stipulation may be waived if the authorized officer, in consultation with the appropriate state agency (NDOW, SETT, and/or CDFW), determines that the entire leasehold is within unsuitable habitat (see exceptions above) and would not result in direct, indirect, or cumulative impacts to GRSG and/or its habitat. • UT: The BLM Authorized Officer may grant a **waiver** to a fluid mineral lease no surface occupancy stipulation if, through the appropriate planning process (i.e., plan maintenance, amendment) the area is no longer within PHMA.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Waiver**: The Authorized Officer may consider and grant a **waiver** of the NSO stipulation on an existing lease after documenting, in coordination with the appropriate State agency, that the lease with the GRSG NSO stipulation is no longer in PHMA (and IHMA in Idaho). This would only be applicable on leases that were issued when the parcel was in PHMA, then the PHMA boundaries were subsequently adjusted through the appropriate planning process (i.e., plan maintenance or amendment). Prior to waiving the NSO stipulation for a given area, the potential waiver shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process).	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
No Surface Occupancy Stipulations Associated with Active Leks in GHMA (applicable in MT/DK, WY, CO, OR, and UT), and Musselshell RHMA in MT:				
• ID, NV/CA do not have NSO for GRSG in GHMA. • While UT has NSO on leks in GHMA, they are associated with RMP decisions that pre-date the 2015 amendment. As such, no new stipulations or WEMs were considered in the 2015 ARMPA. • CO: w/in 2 miles of active leks: **Exception**: In consultation with the State of Colorado, an exception to occupancy of the surface associated with GRSG NSO-46e(2) in GHMA could be granted on a one-time basis (any occupancy must be removed within 1 year of approval) based on an analysis of the following factors: ○ Location of proposed lease activities in relation to critical GRSG habitat areas as identified by factors including, but not limited to, average male lek attendance and/or important seasonal habitat ○ An evaluation of the potential threats from proposed lease activities that may affect the local population as compared to benefits that could be accomplished through compensatory or off-site mitigation (see Chapter 2, Section 2.6.3 of the Proposed LUPA/Final EIS, Regional Mitigation)	• CO, ID, MT/DK, NV/CA, OR, UT, WY: Same as Alternative 1.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Exception**: The Authorized Officer may grant an exception if an environmental record of 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 GRSG due to site-specific terrain and habitat features, such as topographic features that would reduce the habitat impacts by shielding nearby habitat from disruptive factors. An exception could also be granted if it can be demonstrated by a biologist with GRSG experience, based on site-specific information (using State mitigation tools such as Habitat Equivalency Analysis or Habitat Quantification Tool, or other State mitigation programs), that the impacts anticipated by the proposed activity would be offset through compensatory mitigation developed in coordination with the appropriate State agency that meets principles of GRSG compensatory mitigation identified in the RMP, including providing for no net loss of habitat.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
o An evaluation of the proposed lease activities in relation to the site-specific terrain and habitat features. For example, in the vicinity of leks, local terrain features such as ridges and ravines may reduce the habitat importance and shield nearby habitat from disruptive factors. • MT/DK: Miles City (w/in 0.6 miles of a lek in GHMA: The AO, may grant an **Exception** if the action will not result in sage-grouse lek abandonment. South Dakota (w/in .06 miles of leks in GHMA and in winter habitat): The AO may grant an **Exception** only where the proposed action: i. Will not have direct, indirect, or cumulative effects on GRSG or its habitat; or ii. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel and will provide a clear conservation gain to GRSG. Exceptions based on conservation gain (ii) may only be considered in: a) PHMAs of mixed ownership where Federal minerals underlie less than fifty percent (50%) of the total surface, or	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
b) Areas of the public lands where the proposed Exception is an alternative to an action occurring on a nearby parcel subject to a valid Federal fluid mineral lease existing as of the date of this RMP. (See further requirements in the WEMs preamble near the beginning of the Appendix G.1.) Billings (w/in .06 miles of leks in GHMA): A **Modification** or **Exception** may only be considered where the proposed action is determined to be non-habitat, the area is not used by GRSG, and the proposed action would not have direct, indirect, or cumulative effects to GRSG or its habitat. The determination would be made by the BLM in consultation with a team of agency GRSG experts, including an expert from the state wildlife agency, USFWS, and BLM/USFS. The State Director must have received a determination before approving any Modification or Exception. All Modifications or Exceptions must be approved by the State Director. Billings: winter habitat: The AO, after coordination with the state wildlife management agency, may grant an Exception if the action will not result impair the function or suitability of the winter range habitat. HiLine (w/in 0.6 miles of leks in GHMA): The AO, in consultation with Montana Fish, Wildlife and Parks (MFWP), may grant an	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Exception if portions of the area can be occupied without adversely affecting Greater Sage-Grouse leks. Lewistown (winter habitat): The Authorized Officer, after coordination with the state wildlife management agency, may grant an Exception if the action will not impair the function or suitability of the crucial winter range habitat. Lewistown (w/in 0.6 miles of leks in GHMA): The Authorized Officer may grant Exception if the action will not result in Greater Sage-Grouse lek abandonment. • OR: NSO within 1 mile of pending or occupied lek in GHMA: **Exception**: The BLM authorized Officer may grant an exception, in coordination with the ODFW, during project implementation and if BMPs (e.g., anti-perch devices for raptors) are implemented. • WY: NSO 0.25 lek buffer outside PHMA: **Exception**: The authorized officer may grant an exception if an environmental record of 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 Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD,	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
determines that granting an exception would not adversely impact the population being protected.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*
• ID: None • CO: w/in 2 miles of active leks: In consultation with the State of Colorado, a **modification** (changes to the stipulation either temporarily or for the term of either part of or the entire lease) to GRSG NSO-46e(2) could be granted based on an analysis of the following factors: ○ Location of proposed lease activities in relation to critical GRSG habitat areas as identified by factors including, but not limited to, average male lek attendance and/or important seasonal habitat ○ An evaluation of the potential threats from proposed lease activities that may affect the local population as compared to benefits that could be accomplished through compensatory or off-site mitigation (see Chapter 2, Section 2.6.3 of the Proposed LUPA/Final EIS, Regional Mitigation) ○ An evaluation of the proposed lease activities in relation to the site-specific terrain and habitat features. For example, in the vicinity of leks, local terrain features such as ridges and ravines may	• CO, ID, MT/DK, NV/CA, OR, UT, WY: Same as Alternative 1.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Modification**: The Authorized Officer may grant a modification after a review of available information, and in coordination with the applicable state agency, documents that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing area is inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the GRSG, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting, considering both direct and indirect impacts from a potential modification.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
reduce the habitat importance and shield nearby habitat from disruptive factors. • MT/DK: NSO 0.6 lek buffer in GHMA: Miles City: The AO, may **modify** the boundaries of the stipulated area if portions of the leasehold are no longer within 6/10 mile of the perimeter of an active lek, or a portion of the habitat has been altered to the point sage-grouse no longer occupy the site and there is no likelihood of habitat capable of supporting sage-grouse being restored. South Dakota: No modifications. Billings: Modification included in the exception language. Billings: winter habitat: The AO, after coordination with the state wildlife management agency, may modify the boundaries of the stipulated area if portions of the leasehold no longer support wintering wildlife HiLine (w/in 0.6 miles of leks in GHMA): The boundaries of the stipulated area may be modified if the AO, in consultation with MFWP, determines that portions of the area can be occupied without adversely affecting Greater Sage-Grouse leks. The AO, in consultation with MFWP, may also modify the size and shape of the area based on studies documenting actual habitat suitability and/or local periods of actual use	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Lewistown (winter habitat): The Authorized Officer, after coordination with the state wildlife management agency, may modify the boundaries of the stipulated area if portions of the leasehold no longer support wintering wildlife. Lewistown (w/in 0.6 miles of leks in GHMA): The Authorized Officer may modify the boundaries of the stipulation area if portions of the leasehold are no longer within 0.6 miles of the perimeter of an active lek, or a portion of the habitat has been altered to the point Greater Sage-Grouse no longer occupy the site and there is no likelihood of habitat capable of supporting Greater Sage-Grouse being restored. • OR: NSO within 1 mile of pending or occupied lek in GHMA: **Modification**: None. • WY: NSO 0.25 lek buffer outside PHMA: **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of 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 or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*
• ID: None • CO: w/in 2 miles of active leks: No **waivers** are authorized unless the area or resource mapped as possessing the attributes protected by the stipulation is determined during collaboration with the State of Colorado to lack those attributes or potential attributes. A 30-day public notice and comment period is required before waiver of a stipulation. Waivers would require BLM State Director approval. • MT/DK: NSO 0.6 lek buffer in GHMA: Miles City: The AO, may **waive** this stipulation if no portion of the leasehold is within 6/10 mile of the perimeter of an active lek. South Dakota: The AO, may waive this stipulation if no portion of the leasehold is within 6/10 mile of the perimeter of an active lek. Billings: The AO may waive this stipulation if: ○ The entire leasehold is no longer within 0.6 mile of the perimeter of a lek; ○ It is determined sage-grouse are no longer a BLM special status species or federally threatened or endangered;	• CO, ID, MT/DK, NV/CA, OR, UT, WY: Same as Alternative 1.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Waiver**: This stipulation may be waived for a specific lek if, in coordination with the appropriate State agency, it is determined that the GRSG lek that was active has been classified as inactive as determined by the WAFWA definitions and confirmed by the appropriate State agency. Prior to waiving the stipulations, surveys should confirm that the lek is inactive and not moved to another location in the vicinity. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
○ No reasonable alternative development scenario exists; or ○ The habitat has been altered to the point sage-grouse no longer use the site and there is little likelihood of habitat capable of supporting sage-grouse being restored. Billings: winter habitat: The AO, after coordination with the state wildlife management agency, may waive this stipulation if the entire leasehold has been altered to an extent that future use by wintering wildlife is unlikely. HiLine (w/in 0.6 miles of leks in GHMA): The stipulation may be waived if the AO, in consultation with MFWP, determines that no portion of the leasehold is within 0.6 mile of the perimeter of an active lek. Lewistown (winter habitat): The Authorized Officer, after coordination with the state wildlife management agency, may waive this stipulation if the entire leasehold has been altered to an extent, future use by wintering wildlife is unlikely. Lewistown (w/in 0.6 miles of leks in GHMA): The Authorized Officer may waive this stipulation if no portion of the leasehold is within 0.6 miles of the perimeter of an active lek • OR: NSO within 1 mile of pending or occupied lek in GHMA:	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Waiver: The BLM Field Manager may waive application of the above use restrictions and meeting objectives within general habitat if off-site mitigation were successfully completed in priority habitat or opportunity areas, following discussions with the BLM and ODFW. Even in situations where use restrictions are waived in general habitat, to avoid direct disturbance or mortality of GRSG, disturbances would not be approved during the sensitive seasons. • WY: NSO 0.25 lek buffer outside PHMA: **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the state wildlife agency, it is determined that the Greater Sage-Grouse lek has been classified as unactive as determined by the state wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Controlled Surface Use: Disturbance Cap				
• CO, ID, MT/DK and OR did not include the disturbance cap as a stipulation. As such, there were no WEMs. • CA: No exceptions. • NV: Nevada lands only—Any **exceptions** to the disturbance cap may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the NDOW, the USFWS, and the BLM unanimously find that the proposed action satisfies the conditions stated in the stipulation. Initially, the technical team would make such finding; the team consists of a field biologist or other GRSG expert from each respective agency. In the event the initial finding were not unanimous, the finding may be elevated to the BLM State Director, USFWS State Ecological Services Director, and NDOW Director for final resolution. In the event their recommendation were not unanimous to grant the exception, the exception would not be granted. • UT: No exceptions. • WY (Core only): **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site	• CO, ID, MT/DK, OR, WY: Same as Alternative 1. • CA: New development/activity would not exceed the 3% disturbance cap protocol at the project scale in PHMA, except in situations where a net conservation gain to the species is achieved as a component of compliance with a state mitigation plan, program, or authority. • NV: Nevada lands only— New development/activity would not exceed the 3% disturbance cap protocol at the project scale in PHMA, except in situations where a net conservation gain to the species is achieved as a component of compliance with a state mitigation plan, program, or authority, such as required by the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of Nevada regarding compensatory mitigation, consistent with federal law). • UT: The 3 percent cap may be exceeded at the proposed project analysis scale if a technical team determines that site-specific Greater Sage-Grouse habitat and population information, combined with project design elements indicates the project will improve the condition of Greater Sage-Grouse habitat within the	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	All States: **Exception**: The Authorized Officer may consider fluid mineral infrastructure on public lands that could result in exceeding the 3 percent disturbance cap at the project scale only if the following three criteria are met: 1) with concurrence from the State Director, 2) if the environmental review document(s) explains how the RMP GRSG goals and objectives will be met, including compliance with the RMP's GRSG mitigation strategy, documenting efforts to: • First avoid impacts by locating the proposed project in areas outside of PHMA, collocated within the footprint of existing disturbance, or in areas of non-habitat shall be documented. • Second to minimize impacts by applying project design features shall be documented (e.g., use of RDFs, buffer distances, seasonal limitations, etc.). • Third, only then to consider using compensatory mitigation. It is important to note compensatory mitigation may not be appropriate in some GRSG habitats/populations. Before using compensatory mitigation as an approach for this exception, the effectiveness of whether compensatory mitigation can offset impacts to the affected habitat and associated population without risking impacts to those GRSG	Same as Alternative 4, except in WY and MT where the project scale disturbance cap is 5%. All states would also include the following additional exceptions included under criteria #3: Compensatory mitigation would not have to be completed and functioning prior to being able to grant the exception. To grant the activity based on compensatory mitigation, prior to construction, surface occupancy, or surface disturbing activities the compensation project must be planned, funded, and approved by the operator, BLM, surface owner, and in coordination with the appropriate State agency. However, due to the uncertainty associated with whether the compensatory mitigation project would successfully offset the impacts, one of the following would need to apply: • the area of habitat improvement associated with compensatory mitigation would need to increase to account for a level of risk that the compensatory mitigation action may fail or not persist for the full duration of the impact based on the type of specific compensatory project(s) and ecological conditions, or • The operator provides long-term assurances that the compensatory project would become functional (e.g., project maintenance or

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. • WY (Connectivity only): **Exception**: The authorized officer may grant an exception if an environmental record of 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 Greater Sage-Grouse. An exception to the stated limits may be granted when compensatory mitigation is determined to provide an overall beneficial effect to sage-grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected.	proposed project analysis area. Factors considered by the team are in Appendix E and in MA-SSS-3B (of the 2019 Utah GRSG ARMPA). Such exceptions to the 3 percent disturbance cap may be approved by the Authorized Officer only with the concurrence of the State Director. The finding and recommendation shall be made by the technical team, which should consist of a BLM field biologist, other local Greater Sage-Grouse experts, and biologists and other representatives from the appropriate State of Utah agency. *This would only be applicable to new fluid minerals leases if the exception criteria identified for the NSO stipulation above were granted.	*(See above.)*	habitats and populations shall consider local biological considerations, including, but not limited to population size, connectivity to other populations, availability of existing functional habitat, and the availability of mitigation projects that could benefit the impacted population. <u>**and**</u> 3) if one of the following circumstances can be documented: • The exceedance at the project scale is the result of consolidating disturbance associated with the proposed project as a strategy to leave other portions of the PHMA (and IHMA) undisturbed from new authorizations, and the third bullet below, addressing compensatory mitigation, is applied to any residual impacts. No exceedances would be allowed at the HAF Fine Scale. • If a technical team evaluates and recommends that site-specific GRSG habitat and population information, combined with project design elements – including compensatory mitigation, indicates the proposed project is expected to improve the condition of GRSG habitat within the proposed project analysis area. Factors considered by the team will include GRSG abundance and trends, movement patterns – including impacts to connectivity, habitat amount	retreatment, easements, mitigation bonding – BLM H-1794-1, section 7.3, etc.). Compensatory mitigation rate would need to consider number of acres necessary to offset acres affected by direct and indirect effects (see Mitigation section), as well as likelihood that the mitigation project may not provide the anticipated compensation for the duration of the impact. In addition, the compensation necessary to grant this exception must provide the offsetting benefit in the same HAF Fine Scale unit being impacted by the potential development.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	and quality, extent and alignment of project disturbance, location and density of existing disturbance (e.g., potential for increased fragmentation), project design options, and other biological factors (e.g., potential for topographic screening, impacts from other threats such as predation, invasive species, drought, noise, etc.). The technical team should consist of, at a minimum, a BLM field biologist and a biologist and other representatives from the appropriate State agency. • Disturbance associated with the renewal or re-authorization of existing infrastructure in previously disturbed sites or expansions of existing infrastructure that do not result in new direct, indirect, or cumulative impacts on GRSG and its habitat. To approve this exception, the Authorized Officer must document, in coordination with the appropriate State agency, that the proposed action satisfies the three criteria listed above. For this exception to apply, the compensatory mitigation must be completed prior to the disturbance that results in the exceedance of the disturbance cap so the value of the mitigation can be accurately compared to the value of the habitat to be affected by the proposed disturbance. In	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	addition, the compensation necessary to grant this exception must provide the offsetting benefit to the population being impacted by the potential development. Prior to granting an exception to the disturbance cap stipulation the potential exception shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process). If the area associated with the proposed development seeking the exception (e.g., well pad, compressor station, etc.) is in an area (neighborhood cluster) that has met one of the adaptive management thresholds (hard or soft) (see **Section 2.5.13**), no exceptions would be considered until the causal factor analysis is completed. If the causal factor analysis concludes that development associated with the type of activity seeking the exception is or could contribute to the threshold being met or not recovering, no exception would be granted. If the analysis is inconclusive on cause, exceptions could be considered.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• NV/CA, and UT: No modifications. • WY (Core only): **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. • WY (Connectivity only): **Exception**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting.	• CO, ID, MT/DK, NV/CA, OR, WY: Same as Alternative 1. • UT: The stipulation can be modified to allow disturbance to exceed 3 percent on the lease if disturbance in the project analysis area and PHMA associated with a Greater Sage-Grouse population area remains under 3 percent. *This would only be applicable to new fluid minerals leases if the exception criteria identified for the NSO stipulation above were granted.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Modification:** None.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• NV/CA, and UT: No waivers. • WY (Core only): **Waiver**: No waiver. • WY (Connectivity only): **Waiver**: No waiver.	• CO, ID, MT/DK, NV/CA, OR, WY: Same as Alternative 1. • UT: The Authorized Officer may grant a waiver to a fluid mineral lease NSO stipulation if, through the appropriate planning process (i.e., maintenance, amendment), the area is no longer within PHMA. *This would only be applicable to new fluid minerals leases if the exception criteria identified for the NSO stipulation above were granted.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Waiver**: The Authorized Officer may consider and grant a **waiver** of the stipulation on an existing lease if the area mapped as PHMA (and IHMA in Idaho) when the lease was issued is no longer mapped as such through the appropriate planning process (i.e., plan maintenance or amendment). Prior to waiving the disturbance cap stipulation for a given area, the potential waiver shall be subject to public review for at least a 30-day period (e.g., could be part of the APD NEPA process).	Same as Alternative 4.
Seasonal Constraints/Stipulations (WEMs associated with such GRSG stipulations in all applicable habitat management area types)				
• ID: No timing/seasonal stipulations were included in the stipulations appendix. • CO: In consultation with the State of Colorado, a **modification** or an **exception** to GRSG TL-46 could be granted based on an analysis of the following factors: ○ Location of proposed lease activities in relation to critical GRSG habitat areas as identified by factors including, but not limited to, average male lek attendance and/or important seasonal habitat ○ An evaluation of the potential threats from proposed lease activities that may affect the local population as compared to benefits that could be accomplished through compensatory or off-site	• CO, ID, OR, UT, WY: Same as Alternative 1. • NV/CA: In the 2019 ARMPA, WEMs for all the seasonal/timing stipulations refer the reader back to the same WEMs for the NSO.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Exception**: The Authorized Officer may consider and provide temporary relief from seasonal constraints by granting an **exception** after documenting the review of available information associated with the site proposed for the exception. While the BLM considers information from all sources, the State wildlife agency can provide information directly associated with bird use, including whether GRSG populations are not using the seasonal habitat during that year's seasonal life cycle period. Based on this information and recommendation, and documented variability in climatic conditions (e.g., early/late spring, long/heavy winter), use patterns, or other applicable information the Authorized Officer may consider a one-time exception if development associated with it will not affect GRSG habitat use, movement or	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
mitigation (see Chapter 2, Section 2.6.3 of the Proposed LUPA/Final EIS, Regional Mitigation) o An evaluation of the proposed lease activities in relation to the site-specific terrain and habitat features. For example, within 4 miles of a lek, local terrain features such as ridges and ravines may reduce the habitat importance and shield nearby habitat from disruptive factors. • MT/DK: Dillon: An Exception to this stipulation may be granted by the authorized officer if the operator submits a plan that demonstrates that impacts from the proposed action are minimal or can be adequately mitigated. Butte and Dillon: An Exception to this stipulation may be granted by the authorized officer, in consultation with the Montana Fish, Wildlife and Parks (FWP) and the U.S. Fish and Wildlife Service (FWS), if the operator submits a plan that demonstrates that impacts from the proposed action are minimal or can be adequately mitigated. North Dakota: This stipulation may be waived or reduced if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts. Exceptions to this	*(See above.)*	*(See above.)*	reproduction, including seasonal reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success or otherwise impair the seasonal function, suitability, and use of winter concentration areas.	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
limitation in any particular year may be specifically approved in writing by the authorized officer. In all cases, the stipulation (including any Modification) will be designed to present the least restrictive measure for avoiding unacceptable adverse impacts. Butte: An Exception to this stipulation may be granted by the authorized officer if the operator submits a plan that demonstrates that impacts from the proposed action are minimal or can be adequately mitigated. Billings: An Exception to this stipulation may be granted by the AO, in consultation with Montana FWP, if the operator submits a plan which demonstrates that the proposed action will not affect sage grouse or their habitat. Refer to "Requirements and/or Guidelines for Wildlife Controlled Surface Use (CSU) and Exceptions to No Surface Occupancy (NSO) and Timing Limitation Stipulations", Appendix H or portions of the area no longer have sage grouse or their habitat, or the lek is confirmed inactive (10 years with no males or sign of lek activity). Activities would be allowed, if they are consistent with the goals and objectives for the Restoration Area (RA) or General habitat. HiLine: The AO may grant an Exception if the operator submits a plan that demonstrates the impacts from the proposed action are acceptable or can be adequately mitigated.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• NV/CA: (w/in 4 miles of active or pending leks in GHMA, winter habitat, early and late brood rearing habitat): The Authorized Officer may grant an **exception** where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. An exception may also be granted if the proponent, the BLM, and the appropriate state agency negotiate mitigation that would provide a clear net conservation gain to GRSG and its habitat. • OR GHMA (Winter habitat): The BLM Field Manager could grant **exceptions** to the seasonal restrictions and use restrictions if the project plan and NEPA document demonstrate that impacts from the proposed action can be adequately mitigated. • OR GHMA (Breeding, Nesting, Early and late brood rearing habitat): The BLM Field Manager could grant exceptions to the seasonal and use restrictions under the following conditions: o If surveys determine there are no active or occupied	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
leks within 4 miles of the proposed project during the year (based on ODFW lek survey protocol) and the proposed activity would not take place beyond the season being excepted o If the project plan and NEPA document demonstrate that impacts from the proposed action could be adequately mitigated • UT (breeding, nesting, early and late brood rearing, and winter habitat): No exceptions. • WY PHMA (Core and Connectivity) and GHMA: **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• WY Winter Concentration Areas: **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not active by concentrated populations of Greater Sage-Grouse during the period of concern. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• CO: Modification language included in the exception language above. • MT/DK: Dillon: The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting sage grouse leks. Butte and Dillon: The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area no longer contain Sage Grouse winter/spring range. The dates for the timing restriction may be modified if new information indicates that the December 1 through May 15 dates are not valid for the leasehold. North Dakota: This stipulation may be waived or reduced if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts. Exceptions to this limitation in any particular year may be specifically approved in writing by the authorized officer. In all cases, the stipulation (including any Modification) will be designed to present the least restrictive measure for avoiding unacceptable adverse impacts. Butte: The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area can be occupied without adversely affecting sage grouse leks.	• CO, ID, MT/DK, OR, UT, WY: Same as Alternative 1. • NV/CA: The authorized officer, in coordination with the appropriate state wildlife agency (NDOW, and/or CDFW), can **modify** and/or **waive** dates for seasonal timing restrictions based on the criteria described below, based on site-specific information that indicates: i. A project proposal's NEPA analysis and/or project record, and correspondence from NDOW and/or CDFW, demonstrates that any modification (shortening/extending seasonal timeframes or waiving the seasonal timing restrictions all together) is justified on the basis that it serves to better protect or enhance GRSG and its habitat than if the strict application of seasonal timing restrictions are implemented. Under this scenario modifications can occur if: a. A proposed authorization would have beneficial or neutral impacts on GRSG and its habitat. b. Topography or other factors eliminate direct and indirect impacts from visibility and audibility to GRSG and its habitat.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Modification:** The BLM can and does grant modifications to seasonal restrictions if the BLM, in coordination with the state wildlife agency on a case-by-case basis, determines that granting the modification would not adversely impact the population being protected. The authorized officer may consider and grant a **modification** to the dates and areas associated with seasonal timing restrictions based on the criteria described below – after documenting the review of available information associated with the site proposed for the modification, if: i. The geographic and temporal conditions demonstrate that any modification (shortening/extending seasonal timeframes) is justified on the basis that it serves to better protect or enhance GRSG and its habitat than if the strict application of seasonal timing restrictions are implemented. Under this scenario modifications can occur if one or more of the following conditions can be documented: a. A proposed authorization is expected to have beneficial or neutral impacts on GRSG and its habitat. b. Topography or other factors eliminate direct and indirect impacts	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Billings: The boundaries of the stipulated area may be modified if the AO determines that portions of the area can be occupied without adversely affecting sage grouse leks or portions of the area no longer have sage grouse or their habitat. The timing restriction dates may be modified if new information indicates that the dates are not valid for the leasehold. HiLine: The boundaries of the stipulated area may be modified if the AO determines that portions of the area no longer contain viable winter range. The dates for the timing restriction may be modified if new wildlife use information indicates that the dates are not valid for the leasehold. The AO may also modify the size and shape of the area based on studies documenting actual habitat suitability and/or local periods of actual use • NV/CA: (w/in 4 miles of active or pending leks in GHMA, winter habitat, early and late brood rearing habitat): The Authorized Officer may **modify** the size and shape of the restricted area or the period of limitation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that	c. There are documented local variations (e.g., higher/lower elevations) and/or annual climatic fluctuations (e.g., early/late spring, long/heavy winter) that indicate the seasonal life cycle periods are different than presented, or that GRSG are not using the area during a given seasonal life cycle period. ii. Modifications are needed to address an immediate public health and safety concern in a timely manner (e.g., maintaining a road impacted by flooding).	*(See above.)*	from visibility and audibility to GRSG and its habitat. c. There are documented local variations that indicate the seasonal life cycle periods are different than presented. ii. Modifications are needed to address an immediate public health and safety concern in a timely manner (e.g., maintaining a road impacted by flooding).	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
the action, as proposed or otherwise restricted, does not adversely affect GRSG or its habitat. • OR GHMA (Winter and breeding, nesting, and early and late brood-rearing habitat): Additionally, the BLM Field Manager may modify the seasonal restrictions and use restrictions under the following conditions: ○ If portions of the area do not include winter habitat (lacking the principle habitat components of winter GRSG habitat, as defined in GRSG habitat indicators Table 2-2) or are outside the current defined winter habitat area, as determined by the BLM in discussion with the ODFW, and indirect impacts would be mitigated ○ If documented local variations (e.g., higher or lower elevations) or annual climate fluctuations (e.g., early or late spring, long or heavy winter) reflect a need to change the given dates to better protect GRSG in a given area and the proposed activity would not take place beyond the season being excepted	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• UT (breeding, nesting, early and late brood rearing, and winter habitat): Specific time and distance determinations would be based on site-specific conditions and may be modified due to documented local variations (e.g., higher/lower elevations) or annual climactic fluctuations (e.g., early/late spring, long and/or heavy winter) in order to better protect GRSG, in coordination with UDWR biologists. • WY PHMA (Core and Connectivity) and GHMA **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. • WY Winter Concentration Areas: **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*
• CO: No **waivers** are authorized unless the area or resource mapped as possessing the attributes protected by the stipulation are determined during collaboration with Colorado Parks and Wildlife to lack those attributes or potential attributes. A 30-day public notice and comment period is required before waiver of a stipulation. Waivers would require BLM State Director approval. • MT/DK: Dillon: This stipulation may be waived if the authorized officer, in consultation with the Montana Fish, Wildlife and Parks, determines that the entire leasehold can be occupied without adversely affecting Sage Grouse Leks or the surrounding breeding habitat. Butte and Dillon: This stipulation may be waived if the authorized officer determines that the entire leasehold no longer contains sage	• CO, ID, MT/DK, OR, UT, WY: Same as Alternative 1. • NV/CA: In the 2019 ARMPA, WEMs for all the seasonal/timing stipulations refer the reader back to the same WEMs for the NSO.	No WEMs would be necessary, since all GRSG habitat management areas would be closed to new fluid mineral leasing.	**Waiver**: The Authorized Officer may consider and grant a **waiver** of the stipulation on an existing lease if the area that was mapped as a GRSG habitat management area (regardless of type) when the lease was issued is no longer mapped as such through the appropriate planning process (i.e., plan maintenance or amendment).	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
grouse winter/spring range or, if in coordination with the FWP and FWS, determines that the area is not critical for Sage Grouse. Butte: This stipulation may be waived if the authorized officer, in consultation with the Montana Fish, Wildlife and Parks and U.S. Fish and Wildlife Service, determines that the entire leasehold can be occupied without adversely affecting Sage Grouse Leks or the surrounding breeding habitat. North Dakota: This stipulation may be waived or reduced if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts. Exceptions to this limitation in any particular year may be specifically approved in writing by the authorized officer. In all cases, the stipulation (including any Modification) will be designed to present the least restrictive measure for avoiding unacceptable adverse impacts. Billings: This stipulation may be waived if the AO, in consultation with Montana FWP and the USFWS, determines that the entire leasehold can be occupied without adversely affecting sage grouse leks or the surrounding breeding habitat, the lek is confirmed inactive (10 years with no males or sign of lek activity), or sage grouse are no longer considered BLM special status species and not listed by USFWS.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
HiLine: This stipulation may be waived if the AO determines that the entire leasehold no longer contains viable winter range. • NV/CA: (w/in 4 miles of active or pending leks in GHMA, winter habitat, early and late brood rearing habitat): The Authorized Officer may waive the stipulation where an environmental review and consultation with the appropriate state agency (Nevada Department of Wildlife, Sagebrush Ecosystem Technical Team, California Department of Fish and Wildlife) determines that the described lands do not contain GRSG or suitable habitat or are otherwise incapable of serving the requirements of GRSG and therefore no longer warrant consideration as a component necessary for their protection. • OR GHMA (Winter and breeding, nesting, and early and late brood-rearing habitat): No waivers. • UT (breeding, nesting, early and late brood rearing, and winter habitat): No waivers. • WY PHMA (Core only): **Waiver**: No waiver. • WY PHMA (Connectivity only), and GHMA: **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the state wildlife agency, it is determined that the Greater Sage-Grouse lek	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
has been classified as unactive as determined by the state wildlife agency. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) • WY Winter Concentration Areas: **Waiver**: No waiver.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

2.5.8 Renewable Energy Development and Associated Transmission

There have been very few published scientific studies on the impacts of wind development on GRSG (Lloyd et al., 2022), direct habitat loss and degradation from facilities and human disturbance are known impacts, and are similar to impacts from development of non-renewable energy resources. Roads account for most of the direct, permanent ground disturbance at wind facilities (Lloyd et al., 2022). Mortality from collision with turbine blades is infrequent (Lloyd et al. 2022). Indirect impacts include potential avoidance of tall structures (Pruett et al., 2009), disturbance due to noise (Blickley et al., 2012) and changes in habitat use by female GRSG (LeBeau et al., 2020). Habitat avoidance and changing habitat use may have compounding effects for extremely philopatric (species that return or stay at a particular location) species, such as GRSG. Increased numbers of known and novel predators may also be a concern, although research on changes in predator abundance at wind facilities is limited. Indirect impacts from solar energy development are anecdotal (Gerringer et al., 2022) and mostly unknown. Loss of habitat from clearing sites for solar panel installation is a direct impact, and can include hundreds to thousands of acres, depending on the scale of the solar development. Such direct habitat loss can also increase habitat fragmentation.

Impacts of transmission lines on GRSG vary with topography and habitat suitability. In general, the presence of transmission lines negatively impacted GRSG habitat selection (Gibson et al., 2018, Kohl et al., 2019, Lebeau et al., 2019, Kirol and Fedy 2023), demographic rates (Gibson et al., 2018) and survival rates (Lebeau et al., 2019). Long-term impacts to GRSG or their demographics are unknown. Ravens using powerline poles for perching and nesting significantly affected habitat use in proximity to powerlines out to a distance of 12.5 km in Nevada (Gibson et al. 2018), but lesser distances were reported in other studies (e.g., Boarman and Heinrich 1999, Bui et al. 2010).

The BLM is currently updating the BLM RMPs for solar energy development in the Solar Programmatic Environmental Impact Statement (PEIS). The is updating the BLM's RMPs related to solar energy development In that analysis of impacts the Solar PEIS considers existing management associated with the 2015 GRSG amendments as those direct current GRSG habitat management on BLM- administered lands. However, the Solar PEIS update defers to this GRSG planning effort to decide how solar energy development is conducted in GRSG habitat management areas.

The following range of alternatives allow for renewable energy development that will contribute to meeting administrative objectives while conserving GRSG habitats from known impacts and addressing potential indirect impacts.

Table 2-10, Comparison of Alternatives, Renewable Energy Development and Associated Transmission, presents management by alternative for this management issue.

Table 2-10. Comparison of Alternatives, Renewable Energy Development and Associated Transmission

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Wind and Solar				
• PHMA/IHMA (ID): ○ Except as noted below, PHMA in all states are Exclusion for wind and solar. ○ ID, NV/CA, and OR specify that the exclusion applies to utility scale wind and solar development. ○ WY is Avoidance for wind unless sufficiently demonstrated that development would not result in population declines. ○ WY does not specifically address solar but general surface disturbance limits would exclude solar near leks (0.6 miles) and minimize (e.g., disturbance cap, mitigation) elsewhere in PHMA. ○ ID IHMA is Avoidance for wind and solar. ○ OR is Avoidance for wind and solar in Lake, Harney, and Malheur Counties outside of SFAs. ○ UT includes an Exception for wind outside PHMA but w/in 5 miles of leks inside PHMA.	• PHMA/IHMA (ID): ○ Same as Alt 1, except NV/CA added exception criteria to the closure and UT changed to Avoidance for wind outside PHMA but w/in 5 miles of leks inside PHMA.	• PHMA: ○ All states: Exclusion.	• PHMA: ○ All states: Manage PHMA as exclusion areas for utility scale wind and solar, including testing and development (including all associated infrastructure [e.g., met towers, powerlines]). ○ Manage ID IHMA as exclusion areas within 3.1 miles from active leks (Cook et al., 2023; unless there are justifiable departures – see buffer appendix) and avoidance in the remainder of the IHMA. Infrastructure could be considered only if it can be demonstrated that as proposed or conditioned it would not impair habitat use by GRSG and will meet that the RMP GRSG goal and habitat objective. Additionally, do not allow surface use, occupancy, or placement of utility scale wind and solar facilities and associated infrastructure within one-half mile of PHMA to protect adjacent PHMA from indirect impacts from development in IHMA. Renewable energy decisions in MT/DK include state specific differences. See **Section 2.6.3** for allocations in those offices.	• PHMA: ○ All states except MT/DK: PHMA and IHMA (ID) would be avoidance areas for utility scale wind and solar energy testing and development (including met towers). Development in all states but ID would not be allowed in breeding and nesting habitats, or in limited/high value (e.g., winter, limited mesic) seasonal habitats unless one of the criteria below is met. In ID, development would not be allowed inside lek buffers (ID Buffers Appendix). ▪ The area is determined to be non-habitat or unsuitable, lacks the ecological potential to become marginal or suitable habitat, and does not provide important connectivity between habitat areas (as determined by a GRSG biologist using criteria such as the Habitat Assessment Framework and coordinated with appropriate state authority). The project should be designed to prevent indirect disturbance to or

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	*(See above.)*	disruption of adjacent seasonal habitats. ▪ Topography/areas of non-habitat create an effective barrier to impacts. ▪ Co-location of the proposed authorization with existing disturbance will result in no additional impacts to those already associated with the existing major infrastructure, including indirect disturbance to or disruption of adjacent seasonal habitats. o The remainder of PHMA/IHMA would be avoidance areas for utility scale wind and solar testing and development. Infrastructure could be considered only if it can be demonstrated that as proposed or conditioned (including disturbance cap and mitigation requirements) it would not impair habitat use by GRSG (as determined in coordination with state wildlife agency) and will meet that the RMP GRSG goal and habitat objective. Renewable energy decisions in MT/DK include state specific differences. See **Section 2.6.3** for allocations in those offices.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• GHMA: o CO, MT, ND and OR are Avoidance for wind and solar. o SD is Exclusion for solar in winter habitat and within 1 mile of leks. o SD and NV/CA are Avoidance for wind. o NV/CA and UT are Exclusion for solar but can co-locate with existing disturbances in CA. o ID and WY are open for wind and solar. o UT is open for wind.	• GHMA: o Same as Alt 1, except ID changed applying "RDFs and buffers" in GHMA to applying BMPs and NV/CA added exception criteria to the Avoidance for wind.	Other HMA types are not applicable to this alterative.	• GHMA: o All states: Manage GHMA in all states as avoidance areas for utility scale wind and solar testing and development. : ▪ Do not allow surface use, occupancy, or placement of utility scale wind and solar facilities including transmission facilities within one-half mile of PHMA (or 2 miles in CO) unless adjacent PHMA is protected from indirect impacts from development in GHMA. ▪ Surface use, occupancy, or placement of utility scale wind and solar facilities should be avoided in accordance with the lek buffer recommendations for tall structures in the lek buffer appendix (contained in the 2015 ARMP/ARMPAs) to minimize impacts to breeding birds unless local data suggest a larger buffer is needed. ▪ Surface use, occupancy or placement of utility scale wind and solar facilities should be avoided in limited/high value seasonal habitats and movement corridors between those areas to protect birds moving from	• GHMA (and SHMA in WY): Open with minimization measures and compensatory mitigation, to maintain habitat supporting GRSG populations consistent and concurrent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to any adjacent PHMA habitats. Renewable energy decisions in MT/DK include state specific differences. See **Section 2.6.3** for allocations in those offices.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	▪ PHMA to use GHMA seasonal habitats. ▪ Work with State and County governments to locate developments in areas of prior disturbance, including areas where invasive vegetation populations are dominant and areas of non-habitat. • Apply compensatory mitigation to offset habitat losses due to direct and indirect impacts (see mitigation section). Renewable energy decisions in MT/DK include state specific differences. See **Section 2.6.3** for allocations in those offices.	*(See above.)*
Major Rights-of-Way (ROWs)				
• PHMA/IHMA (ID): o All states are Avoidance for major ROWs (≥100 kV transmission and ≥24" pipeline). o OR, UT and WY encourage placement of new lines in designated corridors, or collocated with existing disturbance. o Except as noted below, all states are avoidance for smaller ROWs	• PHMA/IHMA (ID): o Same as Alternative 1, except NV/CA added exception criteria to the Avoidance.	• PHMA: o All states: Exclusion for major rights-of-way (≥100 kV transmission and ≥24" pipeline) outside of RMP designated corridors. o Within designated corridors, avoid PHMA, if possible. If not possible, locate major ROWs within designated corridors and compensate for impacts according to the mitigation strategy.	• PHMA/IHMA (ID): o All states (except MT/DK) are Avoidance for major ROWs (≥100 kV transmission and ≥24" pipeline). o Where development cannot be avoided it would not be allowed in breeding and nesting habitats, or in other limiting/high value seasonal habitats unless one of the following criteria is met: ▪ The ROW can be routed through non-habitat/unsuitable (as determined by a GRSG biologist using criteria such as the Habitat Assessment Framework	• PHMA/IHMA (ID): o All states (except MT/DK) are Avoidance for major ROWs (≥100 kV transmission and ≥24" pipeline). o Micro-siting (siting based on local data) is required to avoid placement near active leks or in connectivity corridors between seasonal habitats. o Areas where major ROWs cannot be avoided apply minimization measures (e.g., disturbance cap, seasonal constraints, tall structure limitations, RDFs, nest and perch deterrents, etc.). Residual direct and indirect impacts

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	and coordinated with State wildlife agencies) and lacks the ecological potential to become suitable habitat. ROWS shall not disrupt connectivity between habitat areas and should be designed to prevent indirect disturbance to or disruption of adjacent seasonal habitats (as disclosed in the environmental analysis). ▪ Co-location of the proposed authorization with existing ROW disturbance results in no additional impacts to those already associated with the existing major infrastructure, including construction, indirect disturbance to or disruption of adjacent seasonal habitats. o Additionally, where major ROWs cannot be avoided apply minimization measures (e.g., disturbance cap, seasonal constraints, tall structure limitations, RDFs, nest and perch deterrents, etc.). Residual direct and indirect impacts would be mitigated through compensatory mitigation. o Micro-siting is required to avoid disrupting connectivity corridors between seasonal habitats.	would be mitigated through compensatory mitigation. o Major ROWs that are located inside RMP designated utility/ROW corridors would not need to comply with disturbance cap (at either the HAF fine scale or project level) or compensatory mitigation requirements unless required by State regulations.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
GHMA – substantial variation by state: ○ CO, NV/CA, and OR GHMA are Avoidance for major ROWs. ○ ID and UT GHMA are open to major ROWs subject to minimization measures such as RDFs, and mitigation. ○ WY is open to major ROWs.	GHMA: • Same as Alt 1, except ID changed applying "RDFs and buffers" in GHMA to applying BMPs.	• Other HMA types are not applicable to this alterative.	GHMA: All states except MT/DK: Avoidance within breeding and nesting habitats and other limited seasonal habitats to meet the RMP GRSG goal and habitat objective. Additionally, any ROW should not be placed within one-half mile of PHMA or IHMA unless adjacent PHMA and IHMA are protected from indirect impacts. Outside those areas, open with compensatory mitigation requirements. Major ROW decisions in MT/DK include state specific differences. See **Section 2.6.3** for allocations in those offices.	GHMA (and SHMA in WY): All States except MT/DK: Open with minimization measures and compensatory mitigation, to maintain habitat supporting GRSG populations consistent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to adjacent PHMA habitats. Major ROW decisions in MT/DK include state specific differences. See Section 2.6.3 for allocations in those offices.

2.5.9 Minimizing Threats from Predation

GRSG are a prey species and face a suite of non-specialist predators across their range (Hagen 2011, USFWS 2023). Where sagebrush habitats are intact nest success and adult survival rates are high (Hagen 2011), indicating that predators generally do not limit GRSG populations. However, highly fragmented sagebrush landscapes reduce protective cover and often provide subsidies for sustaining abnormally large populations of predators, and the establishment of novel predators (predators not typically found in sagebrush, Coates et al., 2020). One example is the common raven which has experienced population growth across sagebrush ecosystems due to anthropogenic development (Coates et al., 2020, Dinkins et al. 2021, USFWS 2023). Reduction, isolation, and fragmentation of native shrublands increase GRSG nest exposure to ravens (Lyon and Anderson 2003, Bui et al., 2010, Coates and Delehanty 2010), although research has not been able to determine if raven predation contributes to compensatory or additive GRSG mortality (Taylor et al., 2017) in some areas of the GRSG range ravens are now considered a hyperpredator – having an increased population and therefore increased predation impacts due to the availability of multiple anthropogenic subsidies (e.g., food, nesting substrates) within previously undisturbed sagebrush (Coates et al., 2020).

Where sagebrush habitats are diminished by anthropogenic subsidies and disturbances or other ecological disturbance (i.e., wildfire) predator management may be necessary to conserve local at-risk GRSG populations (Hagen 2011, USFWS 2023). The BLM has committed to work with APHIS and local predator management groups as needed. To address habitat concerns associated with increasing predator abundance, the BLM will minimize new infrastructure and other human subsidies associated with permitted activities to conserve intact landscapes and implement RDFs and BMPs to reduce risk where infrastructure is unavoidable. New anthropogenic developments shall consider their influence on increasing predator abundance, and subsequent impacts on GRSG and make appropriate design modifications. Where ravens have been documented as a concern (e.g., densities greater than 0.4 ravens/km^2; Coates et al., 2022), the BLM supports implementation of the strategy outlined by Dettenmaier et al. (2021) and adopted by the U.S. Fish and Wildlife Service (2023).

Table 2-11, Comparison of Alternatives, Minimizing Threats from Predation, presents management by alternative for this management issue.

Table 2-11. Comparison of Alternatives, Minimizing Threats from Predation

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states include some language related to reducing opportunities for avian predators (e.g., nest and perch deterrents, considering burying powerlines, etc.), though the location and except varies substantially between states (e.g., some include references in an objective, some in a management action, some in a Required Design Feature or Best Management Practice). NV/CA, UT, and WY include language encouraging coordinating with other partners on predator management issues. NV/CA, OR, UT, and WY include management precluding and/or minimizing subsidies for predators. CO, NV/CA, and UT include language related to habitat management to provide GRSG concealment from predators. UT includes a header section with management that addresses the threats from predation. WY includes management for monitoring predator populations.	Same as Alternative 1, except UT added language addressing corvid nests discovered during habitat treatments.	All states: Manage habitats to maintain, and as needed, restore healthy native vegetation conditions, especially with respect to providing adequate sagebrush, other shrub, and herbaceous vegetation cover on the landscape, to minimize occurrence and effectiveness of predators. The BLM will collaborate with appropriate state agencies, other landowners, federal agencies (e.g., USFWS, APHIS), and tribal governments in their efforts to minimize impacts from predators on GRSG where needs have been documented (e.g., reduced recruitment of GRSG from predation) , including providing needed authorizations, to support predator management actions. Prior to implementation of control actions, data must be presented that demonstrates the targeted predators are limiting GRSG populations in a specified area. A strategy for monitoring removal efficacy shall be developed. Where infrastructure associated authorizations and activities in PHMA (and IHMA in Idaho) are not avoidable, apply or request, consistent with applicable law, minimization measures and BMPs to minimize threats from predators shown to pose a threat to GRSG. This includes, but is not	All states: Same as Alternative 3. Apply minimization measures and BMPs to new authorizations and activities in PHMA (and IHMA in Idaho) and GHMA to minimize threats from predators shown to pose a threat to GRSG, consistent with applicable law. This includes, but is not limited to stopping, slowing, and/or discouraging the incursion of new predators, increased levels of predators, or predators expanding into new areas and can be accomplished by including the following: • Avoiding new anthropogenic infrastructure into undisturbed habitats, • Eliminating or minimizing external food resources from anthropogenic sources (e.g., road killed animals, carcass dumps, trash resources from human activities associated with development or recreation). Where avoidance of new infrastructure is not feasible the project proponent shall develop a predator management plan that: ○ Outlines how the project will be designed to minimize increasing predator abundance, ○ Details structure design to reduce or eliminate opportunities for raven	Same as Alternative 4, except no restrictions applied to GHMA and except as noted below: Where avoidance of new infrastructure is not feasible in undisturbed habitat, the AO could require the project proponent to develop a predator management plan.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	limited to stopping, slowing, and/or discouraging the incursion of new predators, increased levels of predators, or predators expanding into new areas and is accomplished : • Precluding new anthropogenic infrastructure if consistent with applicable law and subject to existing authorizations and valid existing rights. Where preclusion is not possible, avoid new anthropogenic infrastructure into undisturbed habitats, • Eliminating or minimizing external food resources from anthropogenic sources (e.g., road killed animals ASAP, carcass dumps, trash resources from human activities associated with development or recreation). Where avoidance of new infrastructure is not feasible the project proponent shall develop a predator management plan that: o Outlines how the project will be designed to minimize increasing predator abundance, o Details structure design to reduce or eliminate opportunities for raven and raptor perching and nesting (e.g., burying powerlines, locating structures out of line of site of breeding and nesting habitat, using tubular non-branching	and raptor perching and nesting (e.g., burying powerlines, locating structures out of line of site of breeding and nesting habitat, using tubular non-branching material for structures, etc.), o Identifies predators to remove, with an estimate of predator abundance, • Includes a monitoring strategy to assess efficacy of the predator removal (e.g., number and location of removal) and GRSG population response. and o Explains how predator control programs will be developed and coordinated if they become necessary. o Is coordinated with the appropriate state agency and other federal agencies (e.g., USFWS, APHIS) as appropriate. • For existing development, reduce opportunities for raven and raptor perching and nesting through measures such as nest/perch deterrents (including regular maintenance).	*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	○ material for structures, etc.), ○ Identifies predators to remove, with an estimate of predator abundance, • Includes a monitoring strategy to assess efficacy of the predator removal (e.g., number and location of removal) and GRSG population response. and • Explains how predator control programs will be developed and coordinated if they become necessary. • Is coordinated with the appropriate state agency and other federal agencies (e.g., USFWS, APHIS) as appropriate. • For existing development, reduce or prevent opportunities for raven and raptor perching and nesting through measures such as nest/perch deterrents (including a regular maintenance).	*(See above.)*	*(See above.)*

2.5.10 Livestock Grazing

Livestock grazing is the most widespread land use in the sagebrush ecosystem (Knick et al. 2011, Boyd et al. 2014). Well-managed public lands grazing done in accordance with the laws that guide livestock grazing management, (including but not limited to 43 CFR Part 4100, Taylor Grazing Act of 1934, FLPMA, and the Public Rangelands Improvement Act of 1978) and with consideration of local climatic conditions (e.g., drought) can be compatible with GRSG persistence (FWS 2015). In the 2015 USFWS not-warranted determination on GRSG, the agency determined that meeting Land Health Standards, including proper management of livestock numbers, season of grazing and application of adaptive management strategies minimized population level effects on the species (FWS 2015).

On BLM grazing allotments, grazing activities are managed through several mechanisms (permit terms and conditions, allotment management plans, annual pre-turnout authorization meetings, and ongoing monitoring) to ensure that grazing meets or move towards meeting Land Health Standards. Management for meeting land health standards avoids long-term and wide-spread improper grazing will be avoided. Table 3-7 shows that of the allotments with at least 15% PHMA, 5,140 allotments (53% of all allotments) are in Category A, meeting all standards or making significant progress toward meeting the standard, while 1,887 allotments (19% of all allotments) are in Categories B through F, representing different categories of not meeting land health standards. The remainder of the allotments do not have information on evaluations.

In some instances grazing activities may not meet or make significant progress toward meeting Land Health Standards. In such cases, improper grazing (defined as grazing at an intensity or in ways that impair ecosystem functions of the sagebrush ecosystem) can have localized adverse effects to GRSG habitats by altering the composition, productivity and structure of plants resulting in the loss of abundance or quality of GRSG food and cover (Boyd et al., 2014, Fleischner 1994). Improper grazing may also work synergistically with other threats, such as invasive plants and wildfire, increasing impacts from those sources. The USFWS found improper grazing by domestic livestock and free-roaming horses and burros can have negative impacts to sagebrush and GRSG at local scales (USFWS 2015) but previously did not find it was a principal factor affecting the status of the species (USFWS 2010).

Impacts from improper grazing associated with not meeting Land Health Standards are analyzed in Chapter 4. Areas experiencing these effects are generally spatially and temporally distinct, and are addressed through implementation-level corrective actions.

Livestock/range management actions were reviewed to determine if they address potential threats to GRSG at the RMP-level of decision-making. Alternatives 1 and 2 include many livestock grazing actions addressed by regulation, policy, or that duplicate actions already in the RMPs. As these actions would be implemented whether included in this amendment or not they are being considered for removal in Alternatives 4, 5, and 6. The actions from Alternatives 1 and 2 are summarized in the table below with the full text included in **Appendix 15**. Alternatives 4, 5, and 6 would focus on the threat to GRSG from improper livestock grazing and relocating or removing actions that are not needed in the RMP to implement.

Table 2-12, Comparison of Alternatives, Livestock Grazing, presents management by alternative for this management issue.

Table 2-12. Comparison of Alternatives, Livestock Grazing

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
There is substantial variation between the various states in the language and actions that address how domestic livestock grazing would be administered in GRSG HMAs. There are some consistent concepts across GRSG range, but there is substantial variability beyond these main concepts, and even in details associated with those main concepts. There are a number of other management actions that some states include that others don't, including addressing issues such as livestock trailing, placement of feed or mineral supplements, language encouraging coordination, prioritization of various other grazing-related actions, or suggestions of what could be considered during implementation of the grazing program in GRSG HMAs. See **Appendix 2** or **Appendix 15** for specific language by state.	All States: Same as Alt 1, except: • UT: all actions addressing prioritization, or issues addressed through law, regulation or policy were removed, since they are addressed outside the RMP. • WY: clarifications were provided regarding grazing in riparian areas, management of range improvements, and prioritization (removed SFAs). Additionally, clarifications to applying GRSG objectives to land health standards and applying thresholds and responses were made. • ID: areas that met an adaptive management hard trigger would be prioritized for monitoring. Additionally, clarifications to applying the habitat objectives to land health standards were made. • NV/CA: prioritization in SFAs was removed. Additionally, clarifications to applying the habitat objectives to land health standards were made. • OR: Livestock grazing in the 13 key RNAs was returned to language that pre-dated the 2015 amendments. See **Appendix 2** or **Appendix 15** for specific language by state.	All states: Because PHMA would be unavailable for livestock grazing, no overarching livestock grazing objective would be needed.	All states: **Objective RM-1**: Specific to GRSG habitat, manage livestock grazing in a manner that 1) meets or makes progress toward meeting the Land Health Standard for special status species; 2) avoid direct adverse impacts to limiting GRSG habitats from livestock management range improvements; and 3) applies the guideline for grazing administration that addresses "restoring, maintaining, or enhancing habitats of...special status species to promote their conservation" (43 CFR Part 4180.2(e)(9).	All states: **Objective RM-1**: Specific to GRSG habitat, manage livestock grazing in a manner that 1) meets or makes progress toward meeting the Land Health Standard for special status species, and applies the guideline that addresses "restoring, maintaining, or enhancing habitats of...special status species to promote their conservation" (43 CFR Part 4180.2(e)(9) or subsequent changes to regulations or policy).

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
There is substantial variation between the various states in the language and actions that address how domestic livestock grazing would be administered in GRSG HMAs. There are some consistent concepts across GRSG range, including the following concepts in all states, unless noted otherwise: • GRSG management areas are available for livestock grazing, except in OR, where all or portions of 13 key Research Natural Areas (RNAs) would be unavailable, though not every state has a management action that explicitly states that. • Include/adjust permit terms and conditions needed to meet land health standards and GRSG habitat objectives, including suggestions for what the BLM could do on specific allotments if problems were identified. See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1, except as summarized under the row for Objective RM-1 above. See **Appendix 2** or **Appendix 15** for specific language by state.	All states: PHMA would be unavailable for livestock grazing.	**Management Action RM-1**: The presence of GRSG HMAs would not affect whether an area is available for livestock grazing; maintain existing areas designated as available or unavailable for livestock grazing. During grazing authorization renewals, Allotment Management Plan development, or other appropriate implementation-level planning, consider adjustments to active AUMs, timing, intensity, duration, and frequency of grazing are completed at the allotment scale based on site-specific conditions to meet or make progress towards meeting Land Health Standard for special status species. Additionally, temporary adjustments of timing, intensity, duration, and frequency of grazing can be made annually to livestock numbers, the number of AUMs, and season of use within the range of the terms and conditions and in accordance with applicable regulations. In managing livestock grazing, consider and apply where appropriate the livestock grazing best management practices and design features in **Appendix 15**.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
There is substantial variation between the various states in the language and actions that address how domestic livestock grazing would be administered in GRSG HMAs, including addressing issues such as livestock trailing, placement of feed or mineral supplements, language encouraging coordination, prioritization of various other grazing-related actions, or suggestions of what could be considered during implementation of the grazing program in GRSG HMAs. Many actions are not decisions, but lists of items to consider during implementation. There are some consistent concepts across GRSG range, including the following concepts in all states,: • Prioritize monitoring (both field checks and land health assessments) and renewal of grazing in SFAs (as applicable) and PHMAs outside of SFAs. • Include/adjust permit terms and conditions needed to meet land health standards and GRSG habitat objectives, including suggestions for what the BLM could do on specific allotments if problems were identified. See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1, except as summarized under the row for Objective RM-1 above. See **Appendix 2** or **Appendix 15** for specific language by state.	Not applicable.	**Management Action RM-2**: (PHMA/IHMA, GHMA) During the land health assessment (LHA) process, use the criteria identified in the Sage-Grouse Habitat Assessment Framework (BLM-TR-6710-1 - Stiver et al. 2015 – as revised) and other BLM approved methodology to provide multiple lines of evidence (which are consistent with BLM Manual 1283) for determining whether vegetation structure, condition, and composition are meeting or making significant progress towards meeting the Land Health Standards (LHS) for BLM special status species – which includes GRSG. referencing appropriate ESD, associated State and Transition Model (STM) and existing ecological condition information. , For GRSG, the standard would generally be met when vegetation conditions provide for suitable or marginal GRSG habitat at the HAF site scale (see **Table 8-1**, **Appendix 8**), based on existing ecological condition, ecological potential, and existing vegetation information. Where the LHS for SSS habitat (including GRSG) is not being met – as indicated by an unsuitable site-scale HAF assessment relative to site potential – and existing livestock grazing is a significant causal factor (43 CFR Part 4180, BLM H-4180-1 or subsequent changes to regulations or policy),	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	adjustments to livestock grazing practices and activities will be made at the authorization, allotment or activity plan level and in accordance with applicable regulations (43 CFR Part 4180.2l or subsequent changes to regulations or policy). Any adjustments to grazing will be made based on current ecological potential according to ESD, associated STM and existing ecological state.	*(See above.)*
All the states include language related to thresholds and responses to address and respond to future conditions in new fully processed permits. The specificity of this language and when it is required varies by state. See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1, except as summarized under the row for Objective RM-1 above. See **Appendix 2** or **Appendix 15** for specific language by state.	Not applicable.	**Management Action RM-3:** In PHMA (and IHMA in ID) the NEPA analysis when fully processing grazing authorizations (I.e., permit or lease) shall include at least one alternative that includes specific thresholds and defined responses in the terms and conditions of the grazing authorization in the following circumstances, as workload capacity allows: • Where the special status species standard is not being met, specific to GRSG habitat suitability and current livestock grazing has been identified as a significant causal factor (43 CFR Part 4180, BLM H-4180-1 or subsequent changes to regulations or policy); • In high priority allotments (e.g., based on prioritization from IM 2018-024, as amended or	**Management Action RM-3:** In PHMA (and IHMA in ID) the NEPA analysis when fully processed grazing authorizations should consider including at least one alternative that considers specific thresholds and defined responses in the terms and conditions of the grazing authorization, where the special status species standard is not being met, specific to GRSG habitat suitability, and current livestock grazing has been identified as a significant causal factor (43 CFR Part 4180, BLM H-4180-1 or subsequent changes to regulations or policy), as workload capacity and priorities allow. One or more defined responses will allow the authorizing officer to implement adjustments to livestock grazing during the term of the authorization that have already been analyzed in a NEPA document. Thresholds specific to GRSG habitat would be developed to maintain or move

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	superseded) in PHMA/IHMA; or • When changing grazing management on a grazing authorization (e.g., new season of use, rotation schedule, new livestock type, etc.) to provide an alternative approach if the terms and conditions do not have the desired intent. One or more defined responses will allow the authorizing officer to implement adjustments to livestock grazing during the term of the authorization that have already been analyzed in a NEPA document. Thresholds specific to GRSG habitat will be developed to maintain or move PHMA/IHMA toward providing suitable GRSG habitat (**Table 8-1**, **Appendix 8**), designed to address the site-level HAF indicators that warranted the HAF assessment rating, and consider ecological site potential, and relevant locally specific conditions, and Land Health Standards (43 CFR 4180.2).	PHMA/IHMA toward providing suitable GRSG habitat (**Table 8-1**, **Appendix 8**), and be designed to address the site-level HAF indicators that warranted the HAF assessment rating, and consider ecological site potential, and relevant locally specific conditions, and Land Health Standards (43 CFR Part 4180.2 or subsequent changes to regulations or policy).

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states include guidance on how livestock grazing/range management infrastructure projects are addressed. Some states include actions for existing water projects, new water projects, existing non-water projects, and new non-water projects. All generally relate to limiting impacts from new and existing water and structural range improvements, See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1, except UT consolidated multiple actions into one, and WY clarified their action.	Not applicable.	**Management Action RM-4 (existing Range Improvement Projects):** During the grazing authorization renewal process, evaluate all existing livestock management range improvements with respect to their effect on GRSG and GRSG habitat. Consider removal or modification of projects that negatively affect GRSG or GRSG habitat. Functional projects needed for management of sensitive species habitat or other sensitive resources should be maintained but consider improving in a manner less impactful to GRSG (See **Appendix 15** for Livestock Grazing Management Best Management Practices and Design Features).	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states include guidance on how livestock grazing/range management infrastructure projects are addressed. Some states include actions for existing water projects, new water projects, existing non-water projects, and new non-water projects. All generally relate to limiting impacts from new and existing water and structural range improvements, See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1, except UT consolidated multiple actions into one, and WY clarified their action.	Not applicable.	**Management Action RM-5 (new Range Improvement Projects):** Design new range improvement projects (any activity or program relating to rangelands which is designed to improve forage, change vegetative composition, control patterns of use, provide water, stabilize soil and water conditions and provide habitat for livestock and wildlife) to enhance livestock distribution or management and to control the duration, timing and intensity of utilization, including application of new technologies such as virtual fencing. In PHMA, focus authorization of new water developments and structural range improvements (e.g., fences) to projects that have a nominal or incidental effects or that are beneficial to GRSG seasonal habitats. Any new structural range improvements should be placed along existing disturbance corridors or in the least suitable habitat, to the extent practical, and are subject to appropriate design features (**Appendix 15**).	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states include a management action related to fences in GRSG habitat management areas, though the level of detail varies state-to-state. See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1.	Not applicable.	**Management Action RM-6 (fences):** Identify fences in high-risk areas - especially within 1.2 miles of an active lek (Christiansen 2009; Stevens 2011) - or other areas identified as important seasonal habitats or areas of GRSG concentration (e.g., geophagy sites) in coordination with the state wildlife agency. Evaluate if the fence is needed and/or up to BLM fencing standards (BLM H 1741). If the fence is unnecessary, remove it. If the fence is needed to support management, mark fences (install reflective fence markers) in high risk or important areas (Christiansen 2009; Stevens 2011). Where marking fences does not reduce fence-related GRSG mortality, modify fences. Modification could include re-routing, altering construction materials, drop fencing, or limiting perch potential. New fences within high-risk areas would only be authorized if: • It is consistent with the overall RMP GRSG objective; • Local terrain features shield nearby habitat or reduce the habitat importance; • The fence is constructed to BLM standards and with high visibility markers to reduce GRSG strikes. Monitoring of existing fences to assess mortality risk is recommended in all GRSG habitats.	Same as Alternative 4.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states include language related to agency considerations if a permittee voluntarily relinquishes a permit or lease. See **Appendix 2** or **Appendix 15** for specific language by state.	Same as Alternative 1.	Not applicable.	**Management Action RM-7:** At the time a permittee or lessee voluntarily relinquishes grazing preference and the associated authorization, the BLM will consider whether to offer the permit for re-authorization to other grazing applicants or if the public lands where that permitted use was authorized shall be used for other resource management objectives. This does not apply to or impact grazing preference transfers, which are addressed in 43 CFR Part 4110.2-3. When a permittee or lessee voluntarily relinquishes grazing preference and associated grazing authorization, consider conversion of the allotment to a reserve common allotment that will remain available for use on a temporary, nonrenewable basis for the benefit of GRSG habitat. Authorize temporary nonrenewal permits in reserve common allotments to meet resource objectives elsewhere such as rest or deferment due to wildfire or vegetation treatments. Temporary use of reserve common allotments would not be allowed due to drought or overuse of allotments.	Same as Alternative 4.

2.5.11 Wild Horse and Burro Management

Grazing of wild horses and burros results in reduced plant diversity, altered soil characteristics, lower grass cover, lower grass density, fragmented and reduced shrub cover and increased abundance of cheatgrass (Beever et al. 2008, Beever and Brussard 2000, Coates et al. 2021), although impacts vary with elevation, density, and season and duration of use (Beever and Aldridge, 2011). The loss of shrub and grass cover can increase predation risk to nesting GRSG (Connelly et al., 2000). Wild horse and burros also negatively impact important mesic areas that provide GRSG brood-rearing habitats (Beever and Aldridge 2011). Unlike domestic livestock there is little if any direct management of wild horses and burros, such as fencing, lease deferral and pasture rest, potentially exacerbating their impacts on GRSG habitats at local scales. Recent research in Nevada predicted GRSG declines due to habitat alteration and loss from wild horses when appropriate management levels established for wild horse herds are exceeded (Coates et al., 2021). Therefore, management of wild horses and burros at appropriate management levels is a key component for GRSG planning.

At the RMP-level, the BLM identifies wild horse or burro Herd Areas, Herd Management Areas, and Herd Areas not designated as Herd Management Areas. This planning effort considers not designating wild horse and burro Herd Management Areas in areas that overlap PHMA under Alternative 3. Under alternatives 4, 5, and 6, changes focus on the few actions described below, but the rest of existing wild horse and burro actions would be unchanged. See **Appendix 2** for a description of which actions would be unchanged under Alternatives 4, 5 and 6 by state. Defining the appropriate management level (AML) and managing wild horse and burro populations in designated Herd Management Areas to the AML are implementation-level actions rather than RMP-level decisions. Such actions are dependent on local conditions and available resources to manage the populations using the available tools.

Table 2-13, Comparison of Alternatives, Wild Horse and Burro Management, presents management by alternative for this management issue.

Table 2-13. Comparison of Alternatives, Wild Horse and Burro Management

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
All states (where wild horses and burros overlap with GRSG): • Manage wild horse and burro populations within established appropriate management levels (AML). • Incorporate GRSG habitat objectives into wild horse and burro management (e.g., herd management area plans, AML) monitoring, and gather prioritization, with prioritization of such activities in SFAs, then PHMA, then GHMA. • CO, ID, NV/CA, OR, UT: Prioritize gathers in GRSG SFAs and PHMA unless removals are necessary in other areas to address higher priority issues, including herd health impacts.	Same as Alternative 1, except removal of references to SFAs for the states that removed them, and removal of the reference to GHMA in UT, which removed that HMA type under this alternative.	No new wild horse and burro herd management areas would be designated in areas that overlap PHMA. Where there are currently herd management areas, wild horses and burros would be removed. Because there would be no wild horse and burros herd management areas in PHMA, the wild horse and burro objectives and associated management actions associated with GRSG would be removed. These areas will be monitored and any wild horses or burros that re-establish in PHMA will be removed.	Same as Alternative 2, except references to GHMA in Utah would be retained and applied to GHMA as defined under this alternative..	Same as Alternative 2, except references to GHMA in Utah would be retained and applied to GHMA as defined under this alternative.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
ID, NV/CA, OR, UT, WY: Manage wild horse and burros herd management areas in GRSG habitat within established appropriate management level (AML) ranges to achieve and maintain GRSG habitat objectives. CO: Manage wild horse population levels within established AML.	Same as Alternative 1.	No wild horse and burro herd management areas would be designated in the Herd Areas that overlap PHMA, or portions of the Herd Areas, if the remaining areas outside PHMA could still support herd management areas. In those areas where there are currently herd management areas, wild horses and burros would be removed. Because there would be no wild horse and burros herd management areas in PHMA, the wild horse and burro objectives and associated management actions associated with GRSG would be removed. These areas will be monitored and any wild horses or burros that re-establish in PHMA will be removed	All States: • Manage wild horse and burros herd management areas in GRSG habitat (or portions of the herd management area overlapping or within GRSG habitat) within the low-end of the established AML ranges to achieve and maintain GRSG habitat objectives and achieve or make significant progress towards achieving LHS, considering the full suite of approaches to maintain AML, including temporary fertility control and non-reproducing, or partially non-reproducing herds.	All States: • Manage wild horse and burros herd management areas in GRSG habitat (or portions of the herd management area overlapping or within GRSG habitat) within the established AML ranges to achieve and maintain GRSG habitat objectives and achieve or make significant progress towards achieving LHS, considering the full suite of approaches to maintain AML, including temporary fertility control and non-reproducing, or partially non-reproducing herds.

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
ID, NV/CA, OR, UT: In SFA (where applicable) and PHMA outside of SFA, assess and adjust AMLs through the NEPA process within HMAs when wild horses or burros are identified as a significant causal factor in not meeting land health standards, even if current AML is not being exceeded. CO: AML would be prioritized for all BLM HMAs within PHMA based on indicators that address vegetation structure/condition/composition and measurements specific to achieving GRSG habitat objectives. GRSG habitat requirements would be considered, and preference given to GRSG habitat unless site-specific circumstances warrant an exemption. WY: PHMA (core only) management objectives will be considered when evaluating AML.	Same as Alternative 1, except removal of references to SFAs for the states that removed them.	No wild horse and burro herd management areas would be designated in the Herd Areas that overlap PHMA, or portions of the Herd Areas, if the remaining areas outside PHMA could still support herd management areas. In those areas where there are currently herd management areas, wild horses and burros would be removed. Because there would be no wild horse and burros herd management areas in PHMA, the wild horse and burro objectives and associated management actions associated with GRSG would be removed. These areas will be monitored and any wild horses or burros that re-establish in PHMA will be removed	All States: • If GRSG site scale habitat objectives are not being met in PHMA and GHMA (and IHMA in Idaho), evaluate AMLs and adjust if necessary through the NEPA process where wild horse or burro use is identified as significant causal factor to not meeting LHS, or is a factor in the area not meeting the GRSG habitat objectives.	Same as Alternative 4.

2.5.12 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are designated where special management attention is needed to protect important historical, cultural, and scenic values, or fish and wildlife or other natural resources. To be analyzed in the EIS, potential ACECs must be evaluated and determined to meet two evaluation criteria – relevance and importance. The presence of GRSG meets the relevance criteria across the entire range. Importance evaluations considers substantial significance to include special worth, consequence, distinctiveness, or cause for concern. For the importance criteria to be met values must be more than locally significant.

An evaluation of importance for all GRSG habitats was conducted to determine if any habitat within the range of GRSG met the importance criteria. Evaluation criteria included population density (e.g., Doherty et al., 2016), lek and habitat persistence (e.g., Wann et al., 2022, Palmquist et al., 2021, Rigge et al. 2021), genetic uniqueness and connectivity (e.g., Cross et al, 2018, Row et al. 2018, Cross et al. 2023, Oyler-McCance et al., 2022), amount of existing habitat disturbance and habitat quality (e.g., Doherty et al., 2022). Areas identified with the above criteria are analyzed in this EIS to determine if they meet the third FLPMA required: the need for special management to protect and prevent irreparable damage.

The BLM also received multiple nominations for ACEC designations. Each of these nominations were reviewed using the criteria presented by the nominator(s) and the criteria listed above. Nominated areas that met the importance criteria based on the rangewide review listed above and subsequent local evaluations were moved forward for further consideration. Additional details associated with the ACEC evaluation process is available in **Appendix 5**. These evaluations will be updated and finalized following the public comment period.

ACEC designations are only presented for Alternatives 3 and 6. Management allocations within potential ACECs is targeted at maintaining the importance value for which they would be designated, which varied across the range of GRSG.

Table 2-14, Comparison of Alternatives, ACEC Management, presents management by alternative for this management issue.

Table 2-14. Comparison of Alternatives, ACEC Management

Summary of Alt. 1	Summary of Alt. 2	Alternative 3	Alt. 4	Alt. 5	Alternative 6
No new ACECs specific to management of GRSG were designated as part of the 2015 planning effort.	No new ACECs specific to management of GRSG were designated as part of the 2019 planning effort.	ACECs specific to the management of GRSG would be designated (see **Map 2.3**). • Colorado: 4,547 acres • Idaho: 3,438,307 acres • Montana: 726,062 acres • Nevada/California: 5,766,150 acres • Oregon: 0 acres • Utah: 365,181 acres • Wyoming: 839,225 acres Under Alternative 3, the ACECs would have the same allocations as the rest of PHMA: • Locatable minerals –The BLM recommends all PHMA for withdrawal from location and entry under the Mining Law of 1872. The portion of the PHMA that is within the SFA boundaries from 2015 is already being analyzed for withdrawal in a separate NEPA document. Lands recommended for withdrawal would remain open for mineral location and entry under the Mining Law of 1872 unless and until the Secretary of the Interior withdraws them. In addition, In designated ACECs operators must submit a plan of operations and obtain BLM approval before beginning any operations causing surface disturbance greater than casual use (as defined in 43 CFR Part 3809.5). (see 43 CFR Part 3809.11(c)(3)). • Fluid minerals (including geothermal) – Closed to leasing • Non-Energy minerals – Closed to leasing	No new ACECs specific to management of GRSG would be designated.	No new ACECs specific to management of GRSG would be designated.	ACECs specific to the management of GRSG would be designated (see **Map 2.6**). • Colorado: 4,547 acres • Idaho: 3,438,307 acres • Montana: 726,062 acres • Nevada/California: 5,766,150 acres • Oregon: 0 acres • Utah: 365,181 acres • Wyoming: 839,225 acres In addition to the management of the GRSG habitat management areas described in Alternative 5, apply the following management in the potential ACECs: • Locatable minerals –Available for mineral location. Based on federal regulations (43 CFR 3809.11(c)(3)), within In designated ACECs operators must submit a plan of operations and obtain BLM approval before beginning any operations causing surface disturbance greater than casual use (as defined in 43 CFR Part 3809.5). (see 43 CFR Part 3809.11(c)(3)). • Fluid minerals (including geothermal) – Open to leasing subject to major constraints (no surface occupancy stipulation). An exception could be considered to allow surface occupancy only if the criteria described under the NSO Exception #1 are met, but applicable to the entire ACEC area, not just in areas near to the lek(s) (see WEMs language). • Non-Energy minerals – Closed to new leases and expansion associated

Summary of Alt. 1	Summary of Alt. 2	Alternative 3	Alt. 4	Alt. 5	Alternative 6
(See above.)	*(See above.)*	• Saleable Minerals/Mineral Materials – Closed to saleable mineral sale/development, including sand and gravel and other common variety minerals. • Major ROWs – Exclusion area for major ROWs. • Wind – Exclusion • Solar – Exclusion All management not included above would be same as described for PHMA.	*(See above.)*	*(See above.)*	with existing operations (e.g., fringe leases). • Saleable Minerals/Mineral Materials – Closed to new operations for all sale types except for free-use pits in order to support maintenance needs for existing local roads to ensure public safety. Even in these instances, new pits should avoid the ACEC; if avoidance is not possible, they would need to apply the minimization measures identified for PHMA (e.g., disturbance cap, noise reduction, seasonal limitations, etc.). • Major ROWs – Exclusion to major ROWs (≥100 kV transmission lines and ≥24" pipelines). Minor ROWs would be avoidance. Designated RMP ROW corridors in the ACECs would be open for new ROWs, but new ROWs within the corridor would require compensatory mitigation to offset direct and indirect impacts of the development. • Wind – Exclusion • Solar – Exclusion • No exceptions to the disturbance cap otherwise available in PHMA. All management not included above would be same as described for PHMA.

2.5.13 Adaptive Management

Implementing adaptive management can address unanticipated negative impacts to GRSG and its habitat before consequences become severe or irreversible. Adaptive management was identified by the U.S. Fish and Wildlife Service (FWS) as a key component of BLM land use plans "…to help ensure that implementation of allocative decisions and limitations on disturbance are effective at conserving sage-grouse and their habitats, and mitigation provisions where disturbance cannot be avoided. Like monitoring, adaptive management is a key element of complex long-term conservation strategies, particularly where there is uncertainty" (FWS, 2015).

Establishing thresholds for adaptive management is essential to identify when potential management changes are needed to continue meeting GRSG conservation objectives. "Soft" thresholds are indicators that management or specific activities may not be achieving the intended results of conservation actions or that unanticipated changes have occurred that have the potential to place habitats or populations at risk. "Hard" thresholds are indicators that management for species conservation is likely not achieving desired conservation results. Adaptive management thresholds are not specific to any one project, but rather identify anomalies in habitat and/or population status. For this planning effort adaptive management responses are directed to addressing habitat concerns on BLM lands and are limited to PHMA (and IHMA in Idaho) even though data are collected across the entire species' range. Local responses to thresholds reached in GHMA can be considered if deemed necessary by the BLM and the appropriate state agency.

Sagebrush habitat fragmentation, loss and disturbance have been identified as the primary influences on GRSG population trends (Knick and Hanser, 2011). GRSG population trends can provide valuable information about habitat conditions on BLM lands. Both the BLM and the States have a responsibility to use the best available information for assessing whether a habitat and/or population threshold (as described below) has been met, and to work together to address causes.

To accurately assess any anomalies or thresholds being met, and any necessary responses, monitoring of habitat and population trend should be conducted at the same scale. The BLM will use neighborhood clusters identified by USGS (Coates et al., 2021) to track habitat conditions, the same spatial scale used by USGS for population trend analyses. A neighborhood cluster generally represents a GRSG population unit and includes local aggregations of leks and seasonal habitats used by birds attending those leks based on state wildlife agency and research data. Habitat trends can also be monitored at smaller scales (e.g., lek level) as identified by state wildlife agency plans for GRSG, or at larger scales if local GRSG populations are known to consistently range outside of neighborhood clusters. (Note: Monitoring habitat for adaptive management purposes does not preclude the need to track habitat losses for conformance with the anthropogenic disturbance caps).

To assess sagebrush habitat availability, the BLM will use geospatial data, updated at a minimum biennially (e.g., RCMAP, LandFire, and multiple geospatial data sources for habitat degradation; see 2023 Monitoring Framework, **Appendix 7**). Additional data collected through the Habitat Assessment Framework (HAF) – a multi-scale assessment tool that provides data to evaluate sagebrush habitats for GRSG suitability (Stiver et al., 2015 and subsequent updates) may also be considered where available. HAF data can inform pre-existing habitat conditions and threshold analyses. Habitat baselines will be determined using geospatial data layers updated in the year prior to threshold assessment.

State wildlife agencies have primacy over GRSG populations and collect data essential for estimating population trends. Population data collected by States are important to the BLM for effective management of the species habitat. Population monitoring methods in previous adaptive management strategies varied by state, and the metrics to measure trends varied widely. In most instances methods used were inadequate to establish when an anomaly in population trends could be linked to habitat management actions. Further, results were not comparable across political boundaries, creating challenges in determining effective habitat management responses and applying differential management to projects crossing state boundaries. Finally, none of the previous methods identified where habitat concerns, and not climatic conditions were contributing to trends.

The BLM's use of a population threshold as a proxy for habitat condition does not supersede the responsibility of the state for monitoring populations and identifying population areas of concern. The BLM must consider all available information regarding population threshold status. This includes state wildlife agency population trend analyses and annual population trend results published using the Hierarchical Population Monitoring Framework (currently the Targeted Annual Warning System procedures [TAWS]; Coates et al., 2021) or subsequent updates or revisions which provides a consistent and objective range-wide tool incorporating state lek count data and is able to identify if habitat conditions, not climatic conditions, are likely influencing populations. This model was developed with the cooperation of state wildlife agencies to provide an objective and consistent tool to alert land managers to potential habitat issues affecting population trends anywhere within the range of the species. The BLM will additionally use results from population trend analyses provided by state wildlife agencies in determining if habitat concerns may be affecting populations. If a soft or hard population trend threshold is identified by either source, the BLM will coordinate with the state wildlife agency to verify the trend as the first step in an initial causal factor analysis (see below).

Table 2-15, Comparison of Alternatives, Adaptive Management, presents management by alternative for this management issue.

Table 2-15. Comparison of Alternatives, Adaptive Management

<table>
<tr><th>Summary of Alternative 1</th><th>Summary of Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td>Every state has an adaptive management process. All the states include language to the effect of the following:
While there should be no expectation of hitting a hard trigger, if unforeseen circumstances were to occur that trip either a habitat or population hard trigger, more restrictive management would be required.
Hard triggers represent a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives set forth in the BLM plans.
The BLM will also undertake any appropriate plan amendments or revision if necessary.
While the adaptive management concept and the potential for changes in management are consistent across the GRSG range, there is no consistency in the specific triggers between states or the strategies associated with responding to those triggers. The metrics, thresholds, and timeframes and spatial scales vary state by state, as does the level of detail that explains each of these. Similarly, the responses associated with adaptive management triggers varies by state, with some prescribing specific actions and others identifying teams to develop a response.</td><td>Same as Alternative 1, though some states applied strategies to improve the process based on lessons learned during implementation between 2015 and 2019. This included the addition of “un-triggers” in some states, to allow management to return to what was in the RMP amendments if conditions improved, requiring timeframes for determining the cause of the trigger being met, or clarifying what management changes would apply. The differences between the states persisted, creating challenges for comparing range-wide trends by using adaptive management triggers, as well as identifying and addressing concerns in populations that cross state lines.</td><td colspan="3">Habitat Adaptive Management Thresholds:
A soft habitat threshold is met when any single occurrence or combination of occurrences in PHMA/IHMA in a neighborhood cluster result in the loss of more than 5% of the area capable of supporting sagebrush in a given year (including wildfire). Where a neighbor cluster overlaps with more than one habitat designation (e.g., PHMA and GHMA) the percent habitat loss will be calculated on the PHMA/IHMA only. Baselines for calculating sagebrush loss will be determined by the sagebrush base layer delineated using LandFire data (detailed in Appendix 7) and from the most recent year prior to publication of the RODs.
A hard habitat threshold will be met when existing sagebrush extent, as described in the first bullet, within a neighborhood cluster drops below 65% of the area capable of supporting sagebrush (Aldridge et al., 2008; Connelly et al., 2000).
A hard habitat threshold will also be met if a soft habitat threshold is met in 4 consecutive years (≥5% decline in each of 4 consecutive years).
A hard or soft habitat threshold can be reversed if restoration of sagebrush vegetation communities within the neighborhood cluster returns to the sagebrush conditions and/or habitat function prior to the events that resulted in meeting a habitat threshold. If the neighborhood cluster cannot be restored to original sagebrush conditions and/or habitat function due to ecological or disturbance limitations (e.g., intense fire killed soil microfauna, dense anthropogenic activities) restoration and/or habitat enhancement in adjacent neighborhood clusters can be considered to increase the number of GRSG supported in those areas. This will be done in coordination with appropriate state agencies. If enhancing habitats in adjacent areas does not reverse the threshold, and further assessment may be necessary to determine if the area in which the habitat threshold was met should still be considered GRSG habitat.</td></tr>
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<table>
<tr><th>Summary of Alternative 1</th><th>Summary of Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td>Population triggers vary by state. See Appendix 2, Existing GRSG Management, for specifics.</td><td>Population triggers vary by state. See Appendix 2, Existing GRSG Management, for specifics.</td><td colspan="2">Population Trend Adaptive Management Thresholds:
State wildlife agencies can alert the BLM when population thresholds (soft or hard) are met to initiate a causal factor analysis. The BLM will also review the annual results of TAWS in determining if population trends indicate potential habitat concerns. All population thresholds identified by TAWS will be confirmed with the state wildlife agency within 60 days (preferably less) of being identified at the neighborhood cluster scale by the model. If the state wildlife agency determines the TAWS model was in error, the data supporting reversal of the threshold will be documented. If there is disagreement in the analyses, BLM and the state will work together to identify the source of the error (in either agency's analysis).

Interpretation of TAWS model results will be as follows:
• A soft population trend threshold is equivalent to a TAWS watch (a 2 consecutive year, negative rate of population change at the neighborhood cluster that shows a population decline that is either different or more rapid than that of the associated climate cluster; Coates et al., 2021).
• A hard population trend threshold is equivalent to a TAWS warning (a 2 out of 3 (fast) or 3 out of 4 (slow) consecutive year negative rate of population change at the neighborhood cluster that is either different or more rapid than those of the associated climate cluster; Coates et al., 2021).

A hard or soft population trend threshold can be reversed if the following criteria are met:
• Population trends at the neighborhood cluster trend realigns with the climate cluster trend as indicated by the TAWS model (i.e., no longer a TAWS "watch" or "warning"); OR
• There are sufficient numbers of GRSG (abundance) to allow for recovery of population numbers to those present at or before the threshold was met, based on local growth rates determined by the state wildlife management agency, and BLM has the concurrence of the state wildlife management agency; OR
• The state wildlife management agency can demonstrate the TAWS model incorrectly identified a watch or warning.

If a habitat or population threshold is met the BLM, along with state wildlife management personnel and other stakeholders with knowledge of local conditions will initiate an assessment as soon as alerted to a threshold being hit to determine the causal factor(s).</td><td>Same as Alternatives 3 and 4 except new authorizations can be considered during the rapid assessment period. Project level NEPA will specifically evaluate if any new permitted activity could contribute to any cause identified during the rapid assessment.</td></tr>
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Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	Causal Factor Analysis (CFA) teams will include at a minimum the local BLM biologist, BLM state sage-grouse lead, and a representative from the state wildlife agency. Additional subject matter experts and other affected parties can be added as necessary for individual site-specific analyses. Causal factor analyses will occur within the time periods described below and will be used to inform the adaptive management response, if needed. The analysis shall be detailed in a written report that includes descriptions of existing land uses, landownership patterns, history of population and habitat trends in the area, condition of the habitat, cause(s) of habitat and/or population decline, recommendations of management actions to address the potential causes of decline, and the data and expertise used to reach conclusions presented in the report. The report will be submitted to the local BLM manager, the BLM state sage-grouse lead in the state(s) the threshold was met, and the BLM national sage-grouse coordinator as well as all members on the CFA team as soon as the analyses are complete. An annual review of habitat and population information between the BLM and associated state wildlife agency is encouraged even if no thresholds are identified.		*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Habitat and population adaptive trigger responses vary by state. See **Appendix 2**, Existing GRSG Management, for specifics.	Habitat and population adaptive trigger responses vary by state. See **Appendix 2**, Existing GRSG Management, for specifics.	Adaptive Management Responses: When any adaptive management threshold is met, (and population thresholds confirmed with the state wildlife agency) a rapid assessment to identify "obvious" causes will be completed within 60 days (or less). Obvious causes are those easily identified such as a large wildfire. If the rapid assessment identifies the cause, a formal CFA will not be needed. No new permitted activities will be authorized until the rapid assessment is completed and documented. Existing permitted activities can continue unless those activities are causing mortality to GRSG or direct loss or degradation of occupied GRSG habitat. If an obvious causal factor cannot be identified in the rapid assessment, a I CFA to identify potential causes of the adaptive management threshold being met will be completed within 6 months of the rapid assessment. If a soft threshold is met, new permitted activities can be considered during the completion of the CFA as long as those activities do not result in mortality of GRSG or GRSG habitat loss and degradation. However, if a soft threshold is met and the CFA is not completed within the above time frame, no new permitted activities will be authorized until a CFA is completed, as legally allowed. New authorizations, or reauthorization of existing permits can then be considered if similar activities were not contributing to factors resulting in meeting either a population or habitat threshold. Project level NEPA will specifically evaluate if the new permitted activity could result in the threshold being sustained or met again. If a hard threshold is met no new proposed permitted activities will be authorized until a CFA is completed. Project level NEPA will then specifically evaluate if the new permitted activity could result in additional or cumulative impacts to GRSG. The CFA team can alter the level of the threshold met (soft to hard, or hard to soft) based on their review and if supported by local data. For example, habitat loss of 5 percent results in a soft threshold, but if the loss is of limited crucial habitat (e.g., the only winter or mesic habitat in the neighborhood cluster) the CFA team can request hard threshold management responses be implemented. Similarly, a local assessment of habitat loss meeting a hard threshold may be reversed if the loss is of marginal areas, or areas documented as not supporting GRSG. These threshold reversals must be supported by data and fully detailed in a written report. Final determination of the reversal will be made by the		—

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<tr><th>Summary of Alternative 1</th><th>Summary of Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td>(See above.)</td><td>(See above.)</td><td colspan="2">authorizing officer, in consultation with the local CFA team. The CFA team can expand the analysis and management response to adjacent neighborhood clusters based on their review. For example, migratory populations that utilize multiple neighborhood clusters may require increased protection during other seasonal habitats and use areas to reverse population declines.

If the CFA identifies the cause for habitat or population declines BLM will modify any permitted activity identified as a causal factor to meeting a threshold, as legally allowable, on BLM lands in coordination with the permit holder. Monitoring of the affected habitat or population (or both if appropriate) will be necessary to assess the efficacy of the modification. For new authorizations project level NEPA will specifically evaluate if the proposed new activity could result in contributing to sustaining the threshold or result in the threshold being met again. New authorizations may be limited to restrictions identified in Alts. 3 or 4 for the specific resource, as determined necessary by local information.

Exceptions to limitations imposed for exceeding thresholds include:
• Renewal of existing activities that require a permit if:
  o The activity is scheduled within 60 days of when a threshold is met and identified, and
  o The project proponent can show significant negative economic impacts (i.e., documented loss of income equivalent to the income potential of the event), and The renewal can only be considered if it does not result in known impacts to habitats or populations.
• Activities essential for human health and safety in a current or likely catastrophic event (e.g., repair of dams, emergency vehicle access).
• ES&R activities essential to restoration after a wildfire.
• Grazing permits that will expire within the same year the threshold is identified. A permit or lease to extend the current grazing practice for less than 10 years may be renewed until the causal factor analysis is completed. If grazing is not determined as a causal factor to an adaptive management threshold, grazing permit or lease renewal can proceed normally. If grazing is a contributing cause to an adaptive management threshold, the terms and conditions of the grazing permit or lease will need to be examined and based on the outcome, would need to appropriately be modified to reduce or eliminate the impact.</td><td>(See above.)</td></tr>
</table>

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	• Continuing the terms and conditions for livestock grazing when a permit or lease has expired or was terminated due to a grazing preference transfer in accordance with Section 402(c)(2) of the FLPMA as amended by Public Law No. 113-291. BLM will work with proponents identified in the above exceptions to reduce potential impacts on GRSG habitats. If the neighborhood cluster in which a population trend threshold is met is 50% or greater GHMA, lek level threshold TAWS analyses should be conducted to determine which leks are contributing to the trend deviation. If meeting the threshold is the result of lek attendance declines entirely within GHMA new permits can be considered prior to completing a CFA if that activity is not in conflict with any GHMA designation identified by the state wildlife agency (restoration, connectivity, seasonal, or other), and if that activity will not negatively impact habitats or populations in the adjacent PHMA. If a reduction in the ability for the habitat to support GRSG occurs as a result of habitat impacts, additional restrictions may be necessary to preclude further habitat losses. Local responses to thresholds in GHMA can be considered if deemed necessary by the BLM and the appropriate state agency. A similar analysis will be conducted if a neighborhood cluster covers mixed landownerships. The lek level cluster will determine the landownership that is contributing to the threshold. If the threshold is the result of habitat conditions on non-BLM administered lands, new authorizations can be considered if the activity will not negatively impact habitats or populations in the adjacent lands or contribute to indirect or cumulative impacts. The restrictions from meeting soft or hard habitat or population trend thresholds will be removed once the criteria for reversing the threshold, described above are met.		*(See above.)*

Summary of Alternative 1	Summary of Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Habitat triggers vary by state. See **Appendix 2**, Existing GRSG Management, for specifics.	Habitat triggers vary by state. See **Appendix 2**, Existing GRSG Management, for specifics.	<u>Habitat Threshold due to Wildfire</u>: An assessment of impact on affected GRSG habitat will be conducted within 60 days (or less) by BLM staff and appropriate state agency personnel of the event to determine the actual extent of habitat loss (which can include an assessment of burn severity – did the wildfire burn hot enough to kill the sagebrush) within the wildfire perimeter. This will be done in addition to any BLM ESR review. No new discretionary authorizations that would result in additional habitat loss within PHMA or IHMA in affected neighborhood clusters will be authorized until the assessment of habitat impacted is completed (this can include the initial 60-day rapid assessment if the results indicate the threshold can be reversed). If the assessment indicates wildfire severity is such that habitat services (the ability of the area to provide food, cover, water, and connectivity at the time just prior to the wildfire) for GRSG within the wildfire perimeter remain and the area can support the same abundance of GRSG that was present prior to the wildfire the threshold will be considered reversed. If habitat assessment determines the PHMA (and IHMA) influenced by the wildfire can no longer support GRSG populations at levels prior to the wildfire, new infrastructure projects or permits may be deferred if consistent with applicable law (such as the Mining Law of 1872), and valid existing rights until an assessment demonstrates the habitat can support GRSG at the levels that existed prior to the wildfire event have been restored. Authorizations may be considered if the proposed project will have no direct or indirect impact to GRSG or their habitats. The associated determination must be documented in a report to the BLM state sage-grouse lead, the BLM state director and the National BLM GRSG coordinator. If the wildfire event precludes restoration to GRSG habitat permanently, further assessment may be necessary to determine if the area in should still be considered GRSG habitat.		
No similar action.	No similar action.	<u>Inconclusive CFAs</u>**:** If no cause for a habitat or population decline can be determined the BLM may consider implementing additional restrictions on existing or new authorizations in the area, consistent with permits/surface use rights in coordination with the permit holder and the state wildlife management agency. This is to reduce disturbance until either a causal factor can be determined through additional monitoring and analyses, or the population declines cease. The state wildlife agency can provide data that supports limiting these potential restrictions made solely on population threshold data (vs. habitat data) if they can demonstrate the population analyses are incorrect. New authorizations must disclose a threshold has been met and consider the proposed activity's potential cumulative impact to either the habitat or population trend (dependent on which threshold has been met). Any restrictions will be determined by the authorizing officer, with the documented biological rationale from BLM field biologists. Any disagreement between BLM staff will be elevated to the BLM State Director for resolution. New permits in an area where the CFA is inconclusive cannot be authorized until the full CFA analyses is completed and reports submitted.		

2.6 STATE-SPECIFIC CIRCUMSTANCES

Though this EIS is range-wide in its scope, there are also state-specific circumstances that will be considered. Such state specific circumstances may warrant consideration at the state level rather than at a range wide level. This could include the following:

- Differences in management tools or approaches specific to a given state – such as Research Natural Areas present in Oregon, Important Habitat Management Areas in Idaho, or Restoration Habitat Management Areas in Montana. These tools are limited to those given states, and adjustments to their management, if considered, would only be applicable in those states.
- Ecological and topographic differences such as the differences between the sweeping prairies of eastern Montana and Wyoming compared to the basin and range of the Great Basin, or the high mountain valleys in Idaho and Utah, or the areas with substantial differences in elevation and vegetation associated with the plateaus associated with the Colorado Plateau in Utah and Colorado.
- Different management situations in different states such as the presence of state-run management tools such as mitigation banks, regulatory state plans, etc.

Issues or management differences between states are not based on preference, but rather on specific circumstances that fall into the above categories. And are focused on issues, topics, and actions that would help meet the purpose and need of improving GRSG conservation. Through the alternative development process all states identified at least one state-specific circumstance. However consideration of non-habitat in the habitat management areas during implementation identified by one state became a cross-cutting topic after discussion with agency staff and cooperating agencies. The following sections present the alternatives associated with state-specific circumstances. Colorado

Most state-specific circumstances in Colorado are a result of different planning approaches in the 2015 and 2019 NWCO GRSG ARMPAs (plans). The BLM will also clarify management decisions that have been unclear since implementation of the 2015 plan.

Colorado has variable topography leading to naturally fragmented habitats, affecting ecology and plant communities, and therefore differences between GRSG population areas.. Significant elevational changes may fall within standard lek buffer distances in some Colorado GRSG populations (e.g., Parachute Piceance Roan (PPR) population). Colorado typically does not see large wildfires in sagebrush ecosystems or conversion to agriculture to the same degree as other states.

Prior to the current planning process, the BLM and the State of Colorado adopted refined habitat management area maps. The multi-year (2016-2019), collaborative mapping process refined previously mapped areas to remove non-habitat in habitat management areas or expand areas with documented GRSG use. The re-mapping effort incorporated state-specific, timely research and mapping tools. See **Appendix 3** for a summary of the Colorado habitat management area mapping strategy.The state specific circumstances for the State of Colorado being addressed in this effort include the following: 1) management scale, 2) application and use of lek buffers, 3) consistency across resource uses, and 4) integration of lessons learned during implementation.

Management Scale

Colorado manages populations and sub-populations by Management Zone (MZ) which are biologically driven units delineated by GRSG use, topographic and other natural features, differences in ecological potential, and differences in issues affecting GRSG (Colorado Greater Sage-grouse Steering Committee 2008). The BLM uses the CO MZs to calculate project-scale disturbance and density caps rather than the density and disturbance methodology used by many other states. The MZs are geographically consistent with the areas used by Colorado Parks and Wildlife (CPW) but have different numbering (e.g.- BLM MZ 2 is the same area as CPW MZ 1). For ease of communication, the BLM intends to adjust the MZ numbering during this planning effort to be more consistent with the CPW naming convention.

Lek Buffers

Clarification of lek activity periods

The BLM will clarify the activity period for the leks being included in management allocations and decisions. Both the 2015 and 2019 plans included allocations and management decisions based on the distance from "active" leks using CPW's definition, which is an area used by two or more displaying males in two of the last five years in larger populations and one or more males in any of the last five years in small populations (Colorado Greater Sage-grouse Steering Committee 2008). There are inconsistencies between the CPW definition and the WAFWA definition, which describes an active lek as a lek that has 2 or more males counted during two or more years within the last 10 years (Cook et al. 2022, Connelly et al. 2000). Because GRSG populations generally follow 9- to 10-year population cycles (Rich 1985, Fedy and Aldridge 2011, Fedy and Doherty 2011), the BLM will use a lek definition that better captures the fluctuation of population dynamics. The BLM will analyze use of the "occupied" lek definition from the 2015 and 2019 plans, which is defined as a lek that has been active during at least one strutting season within the past 10 years. CPW concurs with the approach.

The clarification of lek activity periods results in an increase to the amount of BLM-managed lands within the corresponding buffer distances. According to the Colorado 2022 lek count data from CPW, 276 leks are classified as active using the 5-year activity timeframe. The total number of leks with activity in the last 10 years increases to 445 leks. Using the 2015 and 2019 plan definitions, approximately 571,375 acres of BLM-managed lands were within 1-mile of an active lek (CPW, 5-year timeframe). With the clarification, approximately 811,215 acres are within 1-mile of an occupied lek, representing a 42% increase in BLM-managed lands that are subject to more intensive management decisions for the protection of leks, nesting, and early brood-rearing habitat.

Distance of buffer

In the 2015 plan, fluid mineral leasing was closed within 1-mile of an active lek compared to a 0.6 mile. In coordination with CPW, the BLM increased the previous stipulation area (i.e.- 0.6-mile buffer NSO) to a 1-mile closure to provide protection for leks and nesting and early brood rearing habitat in the closest proximity to leks. The 2019 plan amended the decision from a 1-mile closure to a 1-mile NSO with a different set of waiver, exception, and modification (WEM) criteria than the rest of PHMA (also NSO) but maintained the 1-mile closure around an active lek. The 1-mile standard was subsequently incorporated into the State of Colorado oil & gas regulations (CO Code § 34-60-101, 2022). The BLM will analyze the 1-mile lek buffer distance as the minimum threshold in Colorado under Alternatives 1 and 2 (No Action alternatives), and 5.

Allocations/management decisions within 1-mile buffer

The 2019 plan amended the decision from a 1-mile closure to a 1-mile NSO with a different set of WEM criteria than the rest of PHMA (also NSO). To reconcile the difference between the 2015 and 2019 plans, the BLM will analyze PHMA as being open to fluid mineral leasing subject to NSO. WEMs will include additional criteria within 1-mile of occupied leks rather than being limited to active (CPW) leks. This clarification would allow for PHMA to remain NSO with the distinction of more intensive management within 1-mile of a lek requiring the use of one NSO stipulation.

Allocations for GHMA

In the 2015 and 2019 plans, Colorado included a NSO stipulation within 2-miles of active leks in GHMA. Because of the lek status clarification above, the BLM will analyze the change between an NSO around active leks versus occupied leks in Alternative 4. The BLM will also analyze using a Controlled Surface Use (CSU) stipulation within 2-miles of occupied leks in Alternative 5 and a CSU within 1-mile of PHMA in Alternative 6 instead of the NSO to assess the impacts of different stipulation types.

CSU stipulations are applied at the leasing phase and allow the BLM to carefully consider site-specific factors during implementation that provide the appropriate level of protection and restrictions. Common CSU measures include relocating operations by more than 200 meters (656 ft) or deferring the action for more than 60 days to avoid or minimize impacts.

Alternative 4 would increase the acreage of GHMA with NSO stipulations compared to Alternatives 1 and 2. Under Alternative 5, the same amount of acreage under major stipulation (NSO) in Alternative 4 would be under moderate stipulation (CSU). Alternative 5 would allow for more flexibility in development while maintaining the BLM's ability to apply site-specific criteria for GRSG habitat protection. Alternative 6 also analyzes CSU stipulations but would be applied in GHMA within 1 mile of PHMA. This would allow for increased flexibility while allowing the BLM to consider the indirect effects that development in GHMA may have on all PHMA, not just where leks occur.

Consistency Across Resources

The BLM will analyze use of more consistent criteria for management actions such as fluid mineral permitting and ROW authorizations. Many fluid mineral permits include both an Application for Permit to Drill (APD) and a ROW (e.g.- an access road to a well pad begins off-lease and crosses on-lease). Under the 2015 and 2019 plans, the authorization would be subject to two varying sets of siting criteria. By using consistent criteria, the BLM intends to ease plan conformance and coordination across resource uses.

Lessons Learned

The BLM is including clarifications to several management decisions because of lessons learned during implementation of the previous GRSG plans. The BLM will clarify management decisions in the Fluid Mineral and Land and Realty sections. Lessons learned primarily involve administrative clarifications and remedies and are not likely to impact GRSG habitat, other resources, or resource uses.

Table 2-16. Colorado State-Specific Circumstances – Fluid Minerals (MR)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Unleased Fluid Minerals				
MD MR-1: No new leasing 1 mile from active leks in ADH.	**MD MR-1:** One mile from active leks: Open to leasing subject to **NSO-1.** See Appendix B (Existing Management) for WEM criteria.	No new leasing in PHMA. Upon expiration or termination of existing leases, prohibit issuance of new leases or reinstatement of leases in PHMA.	No similar action (see line below)	No similar action (see line below)
MD MR-2: No Surface Occupancy (NSO) without waiver or modification in PHMA. See Appendix B (Existing Management) for exception criteria.	**MD MR-2:** (one mile from active leks to the remainder of PHMA): Open to leasing subject to No Surface Occupancy (**NSO-2**) with waivers, exceptions, or modifications in PHMA. See Appendix B (Existing Management) for WEM criteria.	No similar action (Alt 3 is closed to new leasing)	PHMA will be open to fluid mineral leasing subject to No surface occupancy with waivers, exceptions, or modifications (WEMs). See range-wide WEM criteria.	PHMA will be open to fluid mineral leasing subject to No surface occupancy with waivers, exceptions, or modifications (WEMs). See range-wide WEM criteria, but the exception distance for Colorado will be 1 mile from occupied leks.
MD MR-3: In GHMA, any new leases would include **TL** stipulations to protect GRSG and its habitat. The following stipulation would apply: **GRSG TL-46e:** No activity associated with construction, drilling, or completions within 4 miles from active leks during lekking, nesting, and early brood-rearing (March 1 to July 15). Authorized Officer could grant an exception, modification, or waiver in consultation with the State of Colorado.	Same as Alternative 1 (no change made in 2019).	No similar action (Alt 3 is closed to new leasing)	In PHMA & GHMA, any new leases would include TL stipulations to minimize impacts to GRSG during lekking, nesting, and early brood-rearing. The following stipulation would apply: No activity associated with construction, drilling, or completions within 4 miles of occupied leks during lekking, nesting, and early brood-rearing (March 1 to July 15). The Authorized Officer could grant an exception, modification, or waiver in coordination with the State of Colorado.	Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6	
				Alt 5	**Alt 6**
MD MR-4: No Surface Occupancy (NSO) within 2 miles of active (CO definition) leks in GHMA. See Appendix B (Existing Management) for WEM criteria.	Same as Alternative 1 (no change made in 2019).	No similar action (Alt 3 is closed to new leasing)	GHMA will be open to fluid mineral leasing subject to **No Surface Occupancy (NSO)** within 2 miles of **active*** (WAFWA active, CO occupied) leks. See range-wide WEM criteria.	GHMA will be open to fluid mineral leasing subject to **Controlled Surface Use (CSU)** within 2 miles of **active*** leks. See CSU criteria below. See range-wide WEM criteria.	GHMA will be open to fluid mineral leasing subject to **Controlled Surface Use (CSU)** in GHMA within 1 mile of PHMA. See CSU criteria below. See range-wide WEM criteria.
No similar action	No similar action	No similar action	No similar action	**Controlled Surface Use (CSU):** Apply CSU constraints on surface use, occupancy, placement of permanent tall structures, and surface-disturbing activities in *[GHMA within 2 miles of occupied leks for Alt 5/GHMA within 1 mile of PHMA for Alt 5a*] that would decrease breeding/nesting habitat availability or functionality, or that create new perching/nesting opportunities for avian predators. Surface use including infrastructure and surface-disturbing activities may require special design, construction, and implementation measures. The actual required measures will be based on the purpose, nature, and extent of the surface occupancy including infrastructure and total surface disturbance, the affected seasonal habitat, and the feasibility of relocating the project. A tall structure is any man-made	

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	*(See above.)*	structure that provides for perching/nesting opportunities for predators (e.g., raptors, ravens) that may naturally be absent, or that decreases the use of an area. A determination as to whether something is considered a tall structure would be made based on local conditions such as existing vegetation or topography. Examples of measures and limitations include: 1) Relocate operations more than 200 meters (656 feet) to areas outside of habitat, to areas of existing disturbance, or to areas where site-specific topography mitigates project impacts; 2) Defer activities longer than 60 days to avoid seasonal habitat use periods; 3) Modify project design to discourage avian predator perching; 4) Limit or relocate placement of tall structures to reduce impacts of project infrastructure; 5) Limit activity associated with construction, drilling, or completions to certain seasons or times of day; 6) Minimize noise using the best available technology to dampen or direct noise away from breeding or nesting habitat. Modify access routes to avoid important areas or habitats.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD MR-5: Disturbance on new leases would be limited to 3 percent in PHMA (biologically significant unit) (see Appendix E, Methodology for Calculating Disturbance Caps) and would limited to 1 disturbance per 640 acres calculated by Colorado MZ. The following Lease Notice (LN) would apply: **GRSG LN-46e**: Any lands leased in PHMA are subject to the restrictions of 1 disturbance per 640 acres calculated by biologically significant unit (Colorado populations) and proposed project analysis area (Colorado MZ) to allow clustered development.	Same as Alternative 1 (no change made in 2019).	No similar action (Alt 3 is closed to new leasing)	Disturbance on new leases would be limited to 3 percent in PHMA (biologically significant unit) and would be limited to 1 disturbance per 640 acres calculated by Colorado MZ. The following Controlled Surface Use (CSU) would apply: Any lands leased in PHMA are subject to the restrictions of 3 percent disturbance and 1 disturbance per 640 acres calculated by Fine Scale and proposed project analysis area (Colorado MZ) to allow clustered development.	Disturbance on new leases would be limited to 3 percent in PHMA (biologically significant unit) and would be limited to 1 disturbance per 640 acres calculated by Colorado MZ. The following Controlled Surface Use (CSU) would apply: Any lands leased in PHMA are subject to the restrictions of 3 percent disturbance and 1 disturbance per 640 acres calculated by biologically significant unit (Colorado populations) and proposed project analysis area (Colorado MZ) to allow clustered development.
MD MR-7: (PHMA) Allow geophysical exploration within PHMA to obtain information for existing federal fluid mineral leases or areas adjacent to state or fee lands within PHMA. Allow geophysical operations only using helicopter-portable drilling, wheeled or tracked vehicles on existing roads, or other approved methods conducted in accordance with seasonal TLs and other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood-rearing, and winter habitats during their season of use by GRSG.	Same as Alternative 1 (no change made in 2019).	Same as Alternative 1	(PHMA) Allow geophysical exploration within PHMA to obtain information for existing federal fluid mineral leases or areas adjacent to state or fee lands within PHMA. Allow geophysical operations with the application of reasonable measures that minimize impacts to GRSG and GRSG habitat (e.g., helicopter-portable drilling, wheeled or tracked vehicles on existing roads) and are in accordance with seasonal TLs and other applicable restrictions. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood-rearing, and winter habitats during the season of use by GRSG.	Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Leased Fluid Minerals				
MD MR-8: Within 1 mile of active leks, disturbance, disruptive activities, and occupancy are precluded. If it is determined that this restriction would render the recovery of fluid minerals infeasible or uneconomic, considering the lease as a whole, or where development of existing leases requires that disturbance density exceeds 1 disturbance per 640 acres and/or the 3 percent disturbance cap (see Appendix E, Methodology for Calculating Disturbance Caps), use the **criteria*** below to site proposed lease activities to meet GRSG habitat objectives and require mitigation as described in Appendix F (Greater Sage-Grouse Mitigation Strategy).	Same as Alternative 1 (no change made in 2019).	—	Within 1 mile of occupied leks, disturbance, disruptive activities, and occupancy are precluded. If it is determined that this restriction would render the recovery of fluid minerals infeasible or uneconomic, considering the lease as a whole, or where development of existing leases requires that disturbance density exceeds 1 disturbance per 640 acres and/or the 3 percent disturbance cap, use the **criteria*** below to site proposed lease activities to meet GRSG habitat objectives and require mitigation.	Same as Alternative 4, but with siting criteria from Alternatives 5 and 6 (see below)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD MR-9: In PHMA and within 4 miles of an active lek, the **criteria*** below would be applied to guide development of the lease or unit that would result in the fewest impacts possible to GRSG. **Criteria*:** • Location of proposed lease activities in relation to critical GRSG habitat areas as identified by factors, including, but not limited to, average male lek attendance and/or important seasonal habitat • An evaluation of the potential threats from proposed lease activities that may affect the local population as compared to benefits that could be accomplished through compensatory or off-site mitigation • An evaluation of the proposed lease activities, including design features, in relation to the site-specific terrain and habitat features. For example, within 4 miles from a lek, local terrain features such as ridges and ravines may reduce the habitat importance and shield nearby habitat from disruptive factors. This is particularly likely in Colorado MZ 17, which has an atypical GRSG habitat featuring benches with GRSG habitat interspersed with steep ravines To authorize an activity based on the criteria above, the environmental record of review	Same as Alternative 1 (no change made in 2019).	Same as Alternative 4, but both PHMA and GHMA are classified as PHMA under Alternative 3	In PHMA and GHMA, the **criteria*** below would be applied to guide development of the lease or unit that would result in the fewest impacts possible to GRSG. 1) The location of the proposed authorization is determined to be nonhabitat, lacks the ecological potential to become habitat, does not provide important connectivity between habitat areas, and the project includes design features to prevent indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function. 2) Topography/areas of non-habitat create an effective barrier to impacts. 3) By co-locating the proposed authorization with existing disturbance, impacts would be minimized or similar to impacts associated with the existing infrastructure. 4) The proposed location would be undertaken as an alternative to a similar action occurring on a nearby parcel (for example, due to landownership patterns), and authorizing the activity on the parcel in question would have less of an impact on GRSG or its habitat than on the nearby parcel; this criterion must also include measures sufficient to allow the BLM to conclude that such benefits will endure	In PHMA and GHMA, the **criteria*** below would be applied to guide development of the lease or unit that would result in the fewest impacts possible to GRSG. 1) The location of the proposed authorization is determined to be nonhabitat, lacks the ecological potential to become habitat, does not provide important connectivity between habitat areas, and the project includes design features to prevent indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function. 2) Topography/areas of non-habitat create an effective barrier to impacts. 3) By co-locating the proposed authorization with existing disturbance, impacts would be minimized or similar to impacts associated with the existing infrastructure. 4) The proposed location would be undertaken as an alternative to a similar action occurring on a nearby parcel (for example, due to landownership patterns), and authorizing the activity on the parcel in question would have less of an impact on GRSG or its habitat than on the nearby parcel; this criterion must also include measures sufficient to allow the BLM to conclude that such benefits will endure

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
must show no significant direct disturbance, displacement, or mortality of GRSG.	*(See above.)*	*(See above.)*	for the duration of the proposed action's impacts. If the criteria above do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider permitting the action. The environmental record of review must demonstrate the following: 1) As the first step in mitigating impacts to GRSG, efforts to avoid impacts by locating the proposed project in areas outside the NSO areas or in areas of non-habitat shall be documented. 2) As the second step in mitigating impacts to GRSG, efforts to minimize impacts by applying project design features shall be documented (e.g., use of RDFs, buffer distances, seasonal limitations, etc.). The compensation project must be completed and habitat functionality documented before the authorization is granted to ensure the offset in impacts will occur.	for the duration of the proposed action's impacts. In addition to meeting one of the criteria above, applicable minimization measures including Disturbance Caps, Timing Limitations, Design Features, or other site-specific constraints would be included as Conditions of Approval (COAs) on the authorized activity. If the criteria above do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider permitting the action. The environmental record of review must demonstrate why avoidance is not attainable. To grant the activity based on compensatory mitigation, the compensation project must be planned, funded, and approved by the operator, BLM, surface owner, in coordination with the State of Colorado prior to construction, surface occupancy, or surface disturbing activities.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD MR-10: Based on site-specific conditions, prohibit construction, drilling, and completion within PHMA within 4 miles of a lek during lekking, nesting, and early brood-rearing (March 1 to July 15). In consultation with the State of Colorado, this TL may be adjusted based on application of the **criteria*** above.	Same as Alternative 1 (no change made in 2019).	Prohibit construction, drilling, and completion within PHMA during lekking, nesting, and early brood-rearing (March 1 to July 15).	Based on site-specific conditions, prohibit construction, drilling, and completion in PHMA or GHMA within 4 miles of an occupied lek during lekking, nesting, and early brood-rearing (March 1 to July 15). In coordination with the State of Colorado, this TL may be adjusted based on application of the **criteria*** above.	Same as Alternative 4, but with siting criteria from Alternatives 5 and 6 (see above)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6	
				Alt 5	Alt 6
No Similar action	No Similar action	No Similar action	No Similar action	No Similar action	In the Case Flats ACEC, any new leases would include TL stipulations to minimized impacts to GRSG during winter concentration. The following stipulation would apply: No activity associated with construction, drilling, or completions during the winter concentration period (December 1 to March 15). The Authorized Officer could grant an exception, in consultation with the State of Colorado, if the environmental record of review shows no significant direct or indirect disturbance, displacement, or mortality of GRSG. No modifications or waivers would be authorized.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD MR-14: For future actions in ADH, require a full reclamation bond specific to the site in accordance with 43 CFR Parts 3104.2, 3104.3, and 3104.5. Ensure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000; Hagen et al. 2007) that would result in full restoration of the lands to the condition it was found prior to disturbance. Base the reclamation costs on the assumption that contractors for the BLM will perform the work.	Same as Alternative 1 (no change made in 2019).	Same as Alternative 1	In PHMA and GHMA, require a full reclamation bond specific to the site in accordance with 43 CFR Parts 3104.2, 3104.3, and 3104.5. Ensure bonds are sufficient for costs relative to reclamation that would result in full restoration of the lands to the condition prior to disturbance. Base the reclamation costs on the assumption that contractors for the BLM will perform the work.	Same as Alternative 4

Table 2-17. Colorado State-Specific Circumstances – Solid Minerals (MR)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Nonenergy Leasable Minerals				
MD MR-20: Existing nonenergy mineral leases: Apply the following conservation measures as conditions of approval (COAs) where applicable and feasible: • Preclude new surface occupancy on existing leases within 1 mile of active leks (Blickley et al. 2012; Harju et al. 2012). • If the lease is entirely within 1 mile of an active lek, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features (Appendix G, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations). • Preclude new surface disturbance on existing leases within 2 miles of active leks within PHMA. If the lease is entirely within 2 miles of an active lek, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features (Appendix G, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations). • Limit permitted disturbances to 1 disturbance per 640 acres average across the landscape in PHMA. Disturbances may	Same as Alternative 1 (no change made in 2019).	Same as Alternative 4	Existing nonenergy mineral leases: Apply the following conservation measures as conditions of approval (COAs) where applicable and feasible: • Preclude new surface occupancy on existing leases within 1 mile of occupied leks (Blickley et al. 2012; Harju et al. 2012). • If the lease is entirely within 1 mile of an occupied lek, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features (Appendix G, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations). • Preclude new surface disturbance on existing leases within 2 miles of occupied leks within PHMA. If the lease is entirely within 2 miles of an occupied lek, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features (Appendix G, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations). • Limit permitted disturbances to 1 disturbance per 640 acres average across the landscape in PHMA. Disturbances may	Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
not exceed 3 percent in PHMA (see Appendix E, Methodology for Calculating Disturbance Caps) in any biologically significant unit (Colorado populations) and proposed project analysis area (Colorado MZ). GRSG TL-47-51 – Based on site-specific conditions, prohibit surface occupancy or disturbance within PHMA within 4 miles of a lek during lekking, nesting, and early brood-rearing (March 1 to July 15).	*(See above.)*	*(See above.)*	not exceed 3 percent in PHMA in any biologically significant unit (Colorado populations) and proposed project analysis area (Colorado MZ). GRSG TL-47-51 – Based on site-specific conditions, prohibit surface occupancy or disturbance within PHMA within 4 miles of an occupied lek during lekking, nesting, and early brood-rearing (March 1 to July 15).	*(See above.)*

Table 2-18. Colorado State-Specific Circumstances – Lands and Realty (LR)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Lands and Realty (LR)				
MD LR-1: Manage areas within PHMA as avoidance areas* for BLM ROW permits. (See Appendix G, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations.) ***GRSG PHMA ROW Avoidance.** ROWs may be issued after documenting that the ROWs would not adversely affect GRSG populations based on the following criteria: • Location of proposed activities in relation to critical GRSG habitat areas as identified by factors, including, but not limited to, average male lek attendance and/or important seasonal habitat. • An evaluation of the potential threats from proposed activities that may affect the local population as compared to benefits that could be accomplished through compensatory or off-site mitigation An evaluation of the proposed activities in relation to the site-specific terrain and habitat features. For example, within 4 miles from a lek, local terrain features such as ridges and ravines may reduce the habitat importance and shield nearby habitat from disruptive factors.	Same as Alternative 1 (no change made in 2019).	Manage areas within PHMA as exclusion areas for BLM ROW permits, except for designated corridors.	Manage areas within PHMA as avoidance areas* for BLM ROW permits. ***ROW Avoidance Criteria:** ROWs may be issued if it can be demonstrated that the proposed authorization would have no adverse impacts on GRSG or its habitat based on at least one of the following: 1) The location of the proposed authorization is determined to be nonhabitat, lacks the ecological potential to become habitat, does not provide important connectivity between habitat areas, and the project includes design features to prevent indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function. 2) Topography/areas of non-habitat create an effective barrier to impacts. 3) By co-locating the proposed authorization with existing disturbance, impacts would be minimized or similar to impact associated with the existing infrastructure. 4) The proposed location would be undertaken as an alternative to a similar action occurring on a nearby parcel (for example, due to landownership patterns), and authorizing the ROW on the	Manage areas within PHMA as avoidance areas* for BLM ROW permits, except for designated corridors, which would be open to ROW permits. ***ROW Avoidance Criteria:** ROWs may be issued if it can be demonstrated that the proposed authorization would have no adverse impacts on GRSG or its habitat based on at least one of the following: 1) The location of the proposed authorization is determined to be nonhabitat, lacks the ecological potential to become habitat, does not provide important connectivity between habitat areas, and the project includes design features to prevent indirect disturbance to or disruption of adjacent seasonal habitats that would impair their biological function. 2) Topography/areas of non-habitat create an effective barrier to impacts. 3) By co-locating the proposed authorization with existing disturbance, impacts would be minimized or similar to impact associated with the existing infrastructure. 4) The proposed location would be undertaken as an alternative to a similar action occurring on a nearby parcel (for example, due to

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	parcel in question would have less of an impact on GRSG or its habitat than on the nearby parcel; this criterion must also include measures sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts. In addition to meeting one of the criteria above, applicable minimization measures including Disturbance Caps, Timing Limitations, Design Features (Appendix XX- Design Features), or other site-specific constraints would be included as Terms & Conditions of the ROW. If the **criteria*** above do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider permitting the action. The environmental record of review must demonstrate the following: 1) As the first step in mitigating impacts to GRSG, efforts to avoid impacts by locating the proposed project in areas outside the NSO areas or in areas of non-habitat shall be documented. 2) As the second step in mitigating impacts to GRSG, efforts to minimize impacts by applying project design features shall be documented (e.g., use of RDFs, buffer	landownership patterns), and authorizing the ROW on the parcel in question would have less of an impact on GRSG or its habitat than on the nearby parcel; this criterion must also include measures sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts. In addition to meeting one of the criteria above, applicable minimization measures including Disturbance Caps, Timing Limitations, Design Features (Appendix XX- Design Features), or other site-specific constraints would be included as Terms & Conditions of the ROW. If the **criteria*** above do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider granting a ROW. The environmental record of review must demonstrate why avoidance is not attainable. To grant a ROW based on compensatory mitigation, the compensation project must be completed prior to construction, surface occupancy, or surface disturbing activities. Applicable minimization measures including Disturbance Caps, Timing Limitations, Design Features (Appendix XX- Design Features), or other site-specific constraints

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	*(See above.)*	*(See above.)*	distances, seasonal limitations, etc.). 3) The compensation project must be completed and habitat functionality documented before the authorization is granted to ensure the offset in impacts will occur. The compensation necessary to grant this authorization must provide the offsetting benefit to the population being impacted by the potential development.	would be included as Terms & Conditions of the ROW.
MD LR-2: Manage areas within GHMA as avoidance areas* for major (transmission lines greater than 100 kilovolts and pipelines greater than 24 inches) and minor BLM ROW permits (see avoidance criteria above).	Same as Alternative 1 (no change made in 2019).	No similar action	Manage areas within GHMA as avoidance areas* BLM ROW permits (see avoidance criteria above).	Manage areas within GHMA as avoidance areas* for BLM ROW permits, except for designated corridors, which would be open to ROW permits (see avoidance criteria above).
No similar action	No similar action	No similar action	In PHMA and GHMA, If the ROW authorization is the off-lease component of an action that occurs on-lease (e.g.- a road beginning off-lease that crosses on-lease would require both a ROW and subject to the conditions of the APD), ensure that the conditions for each authorization are consistent for mitigation, reclamation, and design features, as appropriate.	Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD LR-3: No new roads or above-ground structures would be authorized within 1 mile of an active lek. Above-ground structures are defined as structures that are located on or above the surface of the ground, including but not limited to: roads, fences, communication towers, and/or any structure that would provide perches. Above-ground structures would only be authorized if: 1. It is consistent with the overall objective of the RMP Amendment; 2. The effect on GRSG populations or habitat is nominal or incidental; 3. Allowing the exception prevents implementation of an alternative more detrimental to GRSG or similar environmental concern, and; Rigid adherence to the restriction would be the only reason for denying the action.	Same as Alternative 1 (no change made in 2019).	No similar action	No new tall structures would be authorized within 1 mile of an occupied lek. Tall structures are defined as any man-made structure that provides for perching/nesting opportunities for predators (e.g., raptors, ravens) that may naturally be absent, or that decreases the use of an area. A determination as to whether something is considered a tall structure would be made based on local conditions such as existing vegetation or topography. Tall structures include but are not limited to: communication towers, meteorological towers, power lines, and transmission lines. Tall structures would only be authorized if it can be demonstrated that the proposed authorization would have no adverse impacts on GRSG or its habitat based on the **ROW Avoidance Criteria*** above. Additionally, if tall structures cannot be buried (i.e.- power lines), require perch deterrents.	Same as Alternative 4, but with ROW avoidance criteria from Alternatives 5 and 6

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD LR-4: PHMA and GHMA are designated as avoidance areas for high-voltage transmission line ROWs, except for the transmission projects specifically identified below. All authorizations in these areas, other than the following identified projects, must comply with the conservation measures outlined in this ARMPA, including the RDFs and avoidance criteria presented in this document. The BLM is currently processing applications for the TransWest and Energy Gateway South Transmission Line projects, and the NEPA review for these projects is well underway. Conservation measures for GRSG are being analyzed through the projects' NEPA review process, which should achieve a net conservation benefit for the GRSG.	Same as Alternative 1 (no change made in 2019).	No similar decision	No similar decision	No similar decision
MD LR-6: Prohibit surface occupancy and surface-disturbing activities associated with BLM ROW within 4 miles from active leks during lekking, nesting, and early brood-rearing (March 1 to July 15). (See special stipulations applicable to **GRSG PHMA ROW TL**.)	Same as Alternative 1 (no change made in 2019).	No similar decision	In PHMA and GHMA, prohibit surface occupancy and surface-disturbing activities associated with BLM ROW within 4 miles of occupied leks during lekking, nesting, and early brood-rearing (March 1 to July 15).	Same as Alternative 4
MD LR-8: (PHMA) In PHMA, or within 4 miles of an active lek, for ROW renewals, where existing facilities cannot be removed, buried, or modified, require perch deterrents.	Same as Alternative 1 (no change made in 2019).	No similar decision	(PHMA and GHMA) In PHMA and GHMA, for ROW renewals, where existing facilities cannot be removed, buried, or modified, require perch deterrents.	Same as Alternative 4
MD LR-9: (PHMA) Reclaim and restore ROWs considering GRSG habitat requirements.	Same as Alternative 1 (no change made in 2019).	—	(PHMA and GHMA) Reclaim and restore ROWs considering GRSG habitat requirements.	Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
MD LR-10: (PHMA) Designate new ROW corridors in GRSG PHMA only where there is a compelling reason to do so and location of the corridor within PHMA will not adversely affect GRSG populations due to habitat loss or disruptive activities.	Same as Alternative 1 (no change made in 2019).	No similar decision	(PHMA and GHMA) Designate new ROW corridors in GRSG PHMA and GHMA only where there is a compelling reason to do so and location of the corridor within PHMA will not adversely affect GRSG populations due to habitat loss or disruptive activities.	Same as Alternative 4

2.6.1 Idaho

In addition to Idaho's three-tier habitat approach, state specific circumstances are a result of specific language unique from 2015 and 2019, and clarifying 2015 implementation management decisions. State specific circumstances for the State of Idaho include 1) management of saleable minerals/mineral materials – specifically consideration of new free use pits in PHMA, 2) application and use of lek buffers (see **Appendix 19**), and 3) application of renewable energy management to nuclear and hydropower developments in addition to wind and solar.

Table 2-19. Idaho State-Specific Circumstances – Mineral Resources (MR)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Saleable Minerals/Mineral Materials				
MD MR 11: PHMA are closed to new mineral materials sales. However, these areas remain "open" to free use permits and the expansion of existing active pits only if the following criteria are met: • the project area disturbance cap is not exceeded within a BSU; • the activity is subject to the provisions set forth in the mitigation framework [Appendix F in the 2015 ARMPA]; • all applicable required design features are applied; and • the activity is permissible under the Idaho exception and development criteria (MD SSS 29 and MD SSS 30 in the 2015 ID ARMPA) IHMA: All IHMA will be open to mineral materials development, consistent with the Idaho Anthropogenic Disturbance Criteria (MD SSS 30 in the 2015 ID ARMPA), and subject to RDFs, and buffers. Sales from existing community pits within IHMA will be subject to seasonal timing restrictions (Appendix C in 2015 ARMPA). GHMA: All GHMA will be open to mineral materials development, subject to RDFs and buffers. Sales from existing community pits within GHMA will be subject to seasonal timing restrictions (Appendix C in 2015 ARMPA).	**MD MR 11:** PHMA: All PHMA will be closed to new mineral materials development, but continued use of existing pits will be allowed. New free use permits and the expansion of existing free use permits may be considered only if the following criteria are met: • the project area disturbance cap is not exceeded within a BSU; • the activity is subject to the provisions set forth in the mitigation framework [Appendix F in the 2015 ARMPA]; • all applicable required design features are applied; and • the activity is permissible under the Idaho exception and development criteria (MD SSS 29 and MD SSS 30 in the 2019 ID ARMPA) IHMA: All IHMA will be open to mineral materials development, consistent with the Idaho Anthropogenic Disturbance Criteria (MD SSS 30 in the 2019 ID ARMPA), and subject to RDFs, and buffers. GHMA: All GHMA will be open to mineral materials development, subject to best management practices, as described in Appendix C (in 2019 ARMPA).	**MD MR 11:** Same as Alternative 1. All HMA is PHMA.	**MD MR 11:** PHMA—All PHMA will be closed to new mineral materials development but continued use of existing pits will be allowed. New free use permits and the expansion of existing pits may be considered only if the following criteria are met: a. The disturbance cap is not exceeded in a within a fine-scale HAF; b. The activity is subject to the provisions set forth in the mitigation framework (Appendix F in the 2019 ARMPA); c. All applicable RDFs are applied; and d. The activity is permissible under the Idaho exception and development criteria (MD SSS 29 and MD SSS 30 in the 2019 ID ARMPA). In order to support maintenance needs for existing local roads and ensure public safety, exceptions to criteria b) and d) listed above may be granted for new free-use permits in areas with existing anthropogenic disturbance. IHMA—All IHMA will be open to mineral materials development, consistent with the Idaho Anthropogenic Disturbance Criteria (MD SSS 30 in the 2019 ID ARMPA) and subject to RDFs and buffers. GHMA—All GHMA will be open to mineral materials development, subject to BMPs as described in Appendix C (in the 2019 ID ARMPA).	**MD MR 11:** Same as Alternative 4

Table 2-20. Idaho State-Specific Circumstances – Special Status Species (SSS)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Anthropogenic Disturbance				
Appendix B. Buffers (in the 2015 ID ARMPA). {The management action associated with the buffers is MD SSS 35; the details on buffer sizes and how to apply them is in the appendix.}	**Appendix B. Buffers** (in the 2019 ID ARMPA) {The management action associated with the buffers is MD SSS 35; the details on buffer sizes and how to apply them is in the appendix.}	Same as Alternative 4.	**Appendix B. Buffers** (see proposed changes in the Idaho Buffers Appendix Alternative Language (**Appendix 19**). Modified from Appendix B referenced in Alt 1 to apply to active or pending active leks, with no buffer exceptions.	**Appendix B. Buffers** (see proposed changes in the Idaho Buffers Appendix Alternative Language (**Appendix 19**). Modified from Appendix B referenced in Alt 2 to apply to active and pending leks and providing buffer exception for IHMA/GHMA.

Table 2-21. Idaho State-Specific Circumstances – Renewable Energy (Wind and Solar) (RE)

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Industrial Solar, Wind, Nuclear, and Hydropower Development				
MD RE 1: PHMA: Designate and manage PHMA as exclusion areas for utility scale (20 MW) wind and solar testing and development, nuclear and hydropower energy development. IHMA: Designate and manage IHMA as avoidance areas for wind and solar testing and development, nuclear and hydropower development. GHMA: Designate and manage GHMA as open for wind and solar testing and development and nuclear and hydropower development subject to RDFs and buffers.	**MD RE 1:** PHMA: Designate and manage PHMA as exclusion areas for utility scale (20 MW) wind and solar testing and development, nuclear and hydropower energy development. IHMA: Designate and manage IHMA as avoidance areas for wind and solar testing and development, nuclear and hydropower development. GHMA: Designate and manage GHMA as open for wind and solar testing and development and nuclear and hydropower development	Same as cross-cutting language for wind and solar described above, but with the additional application to nuclear and hydropower energy development.	Same as cross-cutting language for wind and solar described above, but with the additional application to nuclear and hydropower energy development.	Same as cross-cutting language for wind and solar described above, but with the additional application to nuclear and hydropower energy development.

2.6.2 Montana/Dakotas

GRSG in Montana range across most of the state, with about 1,000 confirmed active sage-grouse leks. GRSG in North and South Dakota have limited distributions and small population sizes. These differences resulted in variable factors being considered for identifying HMAs (in cooperation with state natural resource entities) (see **Appendix 3**, GRSG HMA State-by-State Mapping Strategies). Factors include differences in the amount of the population in GHMA, HMAs to address different seasonal movement strategies, and addressing cross-state populations. These differences also require consideration of different management approaches at a local level (state specific circumstances) in contrast to range-wide approaches (cross-cutting issues) considered in this EIS/RMPA.

GRSG planning efforts completed in 2015 were initiated while plan revisions were ongoing for multiple other plans in the region. The 2015 effort resulted in updated GRSG management in seven plans. However, the Butte Field Office (BFO) and the Upper Missouri River Breaks National Monument (UMRBNM) were not included due to minor amounts of habitat (BFO) and protections provided by inclusion of GRSG as an object and value of the UMRBNM proclamation. Subsequently, the Lewistown Field Office completed a plan revision in 2021, and the North Dakota Field Office is currently undergoing a plan revision. Montana-Dakotas BLM offices were not part of the GRSG plan amendments completed in 2019.

While concepts and approaches are generally consistent between the plans, separate planning efforts resulted both wording and management action inconsistencies. State-specific circumstances address: 1) measures to improve consistency between the nine Field Offices (RMPs) for sage-grouse management; 2) incorporating unique circumstances of peripheral populations and accounting for the higher proportion of sage-grouse leks found in GHMA in Montana; and 3) applying 2021 Plan Evaluation recommendations and lessons learned from implementation of the 2015 plans.

Increasing Consistency between Montana-Dakotas BLM Plans and State Conservation Approaches

BLM's review of the seven Montana-Dakotas plans included in the 2015 planning effort identified varying management recommendations. While some of these differences are simply minor wording differences, other inconsistencies include the omission or inclusion of actions not included in neighboring plans. These differences also include numerous stipulations for oil and gas leasing in HMAs and occupied GRSG habitat. Among offices, there are varying objectives for GRSG management under the sensitive status species sections or may contain objectives listed as management action in different plans. Furthermore, BLM identified differences in buffer distances for ROW avoidance around leks, variation in protections for winter range, and several other differences in management among HMAs between offices.

The BLM examined these inconsistencies to determine if they are justified using the following criteria: 1) Biological circumstances between offices that warrant distinction; 2) Wording differences that create inconsistent interpretation and management; 3) Whether specific management objectives and actions were needed within BFO and the UMRBNM, and; 4) Relationships with the state GRSG conservation plans from North Dakota, South Dakota, and Montana.

The action alternatives below strive to provide better consistency among BLM offices and partner natural resource entities. They are intended to provide clear and consistent direction to applicants and partners for cross-office boundary projects and simplify the coordination among field offices. Other potential changes including monitoring, adaptive management, and implementation tracking would be streamlined to increase internal efficiencies and improve coordination with partners.

Addressing Variations in HMAs and Peripheral Populations

In Montana, general habitat, and BLM GHMA, contains a larger proportion of leks relative to these habitat types than many other states (see **Appendix 3**, GRSG HMA State-by-State Mapping Strategies). To meet objectives for GRSG and be more consistent with state management approaches, more restrictive GHMA management is presented for some resources in the alternatives below. The Montana-Dakotas BLM is considering crucial winter range in stipulations and maintains lek-based buffers for ROWs in GHMA (including utility scale renewable energy projects). Peripheral populations present unique challenges to management approaches. The population spanning the Montana and North Dakota Border (Cedar Creek Anticline area) has specific objectives considered to address ongoing development in the area, restoration needs, and cross-state and cross organizational GRSG management in this mixed-ownership area. In Montana, this area is considered as an RHMA in most alternatives to reflect the desire for long-term restoration. In North Dakota, GRSG range is PHMA, but specific objectives and management are considered to address restoration and habitat enhancement, including protecting historical leks (those active in 2010) similar to currently active leks. This is intended to conserve the landscape to provide opportunities for restoration. GRSG in northern Montana and Canada exhibit unique migratory behavior, moving from breeding habitat in silver sage communities to winter south in Wyoming Big Sagebrush dominated communities. To capture these migratory pathways and protect stopover sites the BLM identified connectivity areas, called CHMA, based on the State of Montana connectivity areas (see **Appendix 3**, GRSG HMA State-by-State Mapping Strategies). While the revised GRSG HMAs in the action alternatives and the Pryor Mountain Wild Horse Range overlap by just over 300 acres in the Billings Field Office, GRSG and wild horse use do not overlap due to physical barriers. Therefore, this topic is not addressed in detail.

2015 Plan Evaluations and Lessons Learned

Implementation of the 2015 plans (including 2021 plan evaluations) has identified areas of potential misunderstanding that are included as cross cutting issues in alternatives in this EIS. The BLM Montana-Dakotas has also identified opportunities, unique to the region, including cross-boundary coordination with other natural-resource management entities. Additionally, new local and range-wide research provides updated information to consider for GRSG management action adjustments. As a result, the state-specific alternative below incorporates the following new information. The Dillon FO was previously included in a combined Idaho-SW Montana amendment. However, that amendment included management unique to Idaho, but not applicable in Montana including Wild Horse and Burro management, use of the Fire and Invasives Assessment Tool, and incorporation of Key Habitat references. The Montana-Dakotas BLM also considers options to remove the distinction between major and minor rights of way, both for consistency with state management and to address specific impacts of the proposed disturbance or disruption of ROW actions relative to GRSG. Lastly, the revised guidance on conservation buffer distances, project screens, and design features provides a common approach for analyzing different program and project types that result in similar impacts.

The remainder of this section includes the alternatives related to the applicable management actions. Columns for Alternatives 1 and 2 have been merged, since the BLM RMPs in the Montana/Dakota State Office did not amend any plans in 2019.

Table 2-22. Montana State-Specific Circumstances – Special Status Species (GRSG): Goals and Objectives

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Special Status Species (GRSG): Goals and Objectives				
Goal: Maintain and/or increase GRSG abundance and distribution by conserving, enhancing, or restoring the sagebrush ecosystem upon which populations depend, in cooperation with other conservation partners. (Language varies between plans) **Objective**: Sage-grouse management will utilize the 2005 Management Plan and Conservation Strategies for Sage-Grouse in Montana – Final for overall guidance and direction. (Various inclusion of BLM and state GRSG plans) West Nile Virus: When developing or modifying water developments, use applicable RDFs (see RDF/BMP appendix from each RMP) to mitigate potential impacts from West Nile virus. (Various inclusion as goal, objective, or management action, in different program areas)		Apply the cross-cutting GRSG goal, Habitat Objectives, etc. In addition, retain existing goals and objectives, but edit or add to ensure the following direction is contained: **Goal:** (see cross-cutting issue). **Objective**: Maintain, improve, and restore sagebrush habitats to increase habitat availability and quality for GRSG, sagebrush obligates and other sagebrush dependent species. **Objective**: Manage GRSG through collaborative, coordinated efforts that utilize cooperative planning and implement and monitor activities to achieve desired conditions and to maximize the utilization of available funding opportunities. Coordination efforts can include: adjacent landowners, federal and state agencies, local governments, tribes, communities, other agencies, nongovernmental organizations, and other interested parties/stakeholders. **All HMAs MA**: Greater sage-grouse management will be consistent with current adopted BLM conservation strategies, will utilize GRSG conservation plans, as revised or updated, from partners such as WAFWA (e.g., Sagebrush conservation strategy; Remington et al. 2021), USFWS (e.g., Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report; USFWS 2013), and state wildlife or habitat management agency action, management, or conservation plans (e.g., MT EO 2015, MT SGWG 2005, SD GF&P 2022, ND G&F 2014), and the best available science. **All HMAs MA**: Assess and modify as needed water features to reduce the risk of potential impacts from West Nile Virus or other disease outbreaks (see RDF/BMP appendix from each RMP).		

Table 2-23. Montana State-Specific Circumstances – Special Status Species (GRSG): Cedar Creek Anticline RHMA Objectives

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Special Status Species (GRSG): Goals and Objectives				
Objective 1: Strive for proponents to develop area-wide Habitat Recovery Plans. **Objective 2**: Strive for no net loss of GRSG habitat. **Objective 3:** Strive for the restoration of previously disturbed landscapes in a manner which increases or improves the quality and quantity of GRSG habitat.		**Objective 1:** Develop and implement an area-wide habitat restoration plan. The plan will identify restoration opportunities, including short term actions that can reduce disturbance and threats to sage-grouse (conifer encroachment, duplicative roads, infrastructure removal, etc.), habitat restoration (areas to increase sagebrush cover and understory plants), and longer-term actions to put in place as development is completed. **Objective 2**: Manage for no net loss of GRSG habitat, subject to valid existing rights, and maintained connectivity with North Dakota GRSG habitat. **Objective 3:** Strategically target restoration, as possible with partners across jurisdictions, in disturbed landscapes in a manner which increases or improves the quality and quantity of GRSG habitat.		

Table 2-24. Montana State-Specific Circumstances – Special Status Species (GRSG): North Dakota Specifics

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Special Status Species (GRSG): Goals and Objectives				
Objective SSS-1.1 through Objective SSS-1.4: These objectives cover disturbance cap, delineate PHMA and GHMA, and identify the Habitat Objectives		**Objective SSS 1.1-1.4:** See cross-cutting language for HMAs, disturbance, and habitat objectives above.		
Objective SSS-1.5: No similar objective		**Objective SSS-1.5** (New): Maintain the existing distribution of occupied GRSG habitat while taking strategic opportunities to enhance existing habitat and expand occupied habitat through restoration actions that remove the primary threats found on BLM managed surface acres (e.g., conifer encroachment, infrastructure, etc.) in North Dakota. **MA SSS-X** (New): Develop a MOU and/or restoration plan between interested partners such as the Forest Service, State of North Dakota USFWS, NRCS and other conservation partners and adjacent states (Montana, South Dakota) to establish a cooperative approach regarding implementation of sage-grouse conservation measures, proposed management changes, mitigation, site-specific monitoring, adaptive management, and addressing threats to GRSG. The MOU/plan will identify responsibilities, roles and interaction to maximize the party's individual conservation efforts.		

Table 2-25. Montana State-Specific Circumstances – Vegetation: GRSG Objectives and Actions

<table>
<tr><th>Alternative 1 Summary</th><th>Alternative 2 Summary</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="5">Vegetation: GRSG Objectives and Actions</td></tr>
<tr><td colspan="2">All HMAs: Various objectives and management actions

PHMA (Goal, Objective, or MA): The desired condition is to maintain all lands ecologically capable of producing sagebrush (but no less than 70%) with a minimum of 15% sagebrush canopy cover or as consistent with specific ecological site conditions. The attributes necessary to sustain these habitats are described in Interpreting Indicators of Rangeland Health (BLM Tech Ref 1734-6).

(Slight variations between plans, no quantitative objective for Butte and UMRBNM)

PHMA: Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) a high priority for restoration efforts in PHMA. Prioritize areas for juniper removal to benefit GRSG habitat. (Slight variation between plans, juniper not only issue in MT/Dak).

MA (All HMAs): Conifers encroaching into sagebrush habitats will be removed, in a manner that considers tribal cultural values. Treatments will be prioritized closest to occupied sage-grouse habitats and near occupied leks, and where juniper encroachment is phase 1 or phase 2. Use of site-specific analysis and principles like those included in the Fire and Invasives Assessment Tool (FIAT) report (Chambers, et al. 2014) and other ongoing modeling efforts to address conifer encroachment will help refine the location for specific priority areas to be treated.

(Slight variations between plans, no FIAT analysis for MT/Dak)

PHMA: Treatment actions (Slight variations between plans)</td><td colspan="3">Retain existing objectives and management actions, but edit or add to ensure the following direction is contained:

VEG OBJ-X (PHMA): The desired condition is to maintain all lands ecologically capable of producing sagebrush (but no less than 70%) with a minimum of 15% sagebrush canopy cover or as consistent with specific ecological site conditions. The attributes necessary to sustain these habitats are described in Interpreting Indicators of Rangeland Health (BLM Tech Ref 1734-6).

VEG OBJ-Y (PHMA): Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) a high priority for restoration efforts in PHMA. Prioritize areas for conifer removal to benefit GRSG habitat.

MA (All HMAs): Remove conifers encroaching into sagebrush habitats, in a manner that considers tribal and cultural values, as well as other key resources (e.g., other SSS, including T&E, species, soils, etc.). Prioritize treatments closest to occupied GRSG habitats and near occupied leks, and where encroachment is phase 1 or phase 2. Use of site-specific analysis and tools will help refine the location for specific areas to be treated.

VEG MA-X (PHMA): Treatments that conserve, enhance or restore GRSG habitat will be allowed as well as treatments that benefit other resources and do not adversely affect GRSG or their habitat.</td></tr>
</table>

Table 2-26. Montana State-Specific Circumstances – Special Status Species: Surface Disturbing Activities in GRSG Habitat Objective

<table>
<tr><th>Alternative 1 Summary</th><th>Alternative 2 Summary</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="5">Special Status Species: Surface Disturbing Activities in GRSG Habitat Objective</td></tr>
<tr><td colspan="2">All HMAs: In undertaking BLM management actions and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the United States geological Survey (USGS) Report (see Appendix B, GRSG Conservation Buffer).
[Minor variations between plans, including if buffers are referenced, or not, in different program areas]

(Plans variable in including additional language such as:
• Conduct implementation and project activities, including construction and short-term anthropogenic disturbances consistent with seasonal habitat restrictions described in Appendix C.
• Other resource uses within PHMA may be allowed pending project level environmental review provided that Mitigation, BMPs Guidelines, standard operating procedures (SOP), and RDFs are implemented, Impacts are evaluated as described in the GRSG Effects Analysis Process (Appendix I) and the project does not exceed the disturbance cap (Appendix E) and the goals for sage-grouse and sage-grouse habitat are not compromised.)</td><td colspan="3">Objective: Limit overall surface disturbance and disruption that impacts GRSG habitat through factors such as the reduction, co-location, and siting of activities and occupancy, and the restoration and enhancement of habitat. Uses in HMAs should be neutral or beneficial to GRSG as determined by analysis for projects. Consider general management practices as well as specific approaches and management for each program area when considering projects in all HMAs.

Management Action (all HMAs): For all activities, in undertaking BLM management actions and consistent with valid existing rights and applicable law in authorizing actions, the BLM will assess impacts to seasonal habitat and apply conservation measures and the mitigation hierarchy. Analyses for any individual action will apply best available science and consider the type and location of activities during implementation-level project analysis. BLM will apply applicable BMPs, design features, and COAs (see applicable appendices in existing plans) as needed and demonstrated through project analysis.</td></tr>
</table>

Table 2-27. Montana State-Specific Circumstances – Wind, Solar, and Associated ROWs

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Utility Scale Solar and Wind (>20 MW and/or based on power supply to a community)				
PHMA: Exclusion **RHMA**: • Exclusion (Elk Basin, Cedar Creek, South Carter County, West Decker) • Avoidance (Outside Elk Basin in Billings) **GHMA**: • Avoidance • Exclusion (SD in winter habitat and within 1 mile of leks) **CHMA**: No similar action (No specific action in Butte. UMRBNM is Exclusion.)		**PHMA**: Exclusion **RHMA**: No similar action **GHMA**: No similar action **CHMA**: Avoidance	**PHMA**: Exclusion **RHMA**: • Exclusion (Cedar Creek, West Decker) • Same as GHMA (Billings) **GHMA**: • Exclusion o Within 3.3 km (2 miles) of active leks o UMRBNM o Crucial winter habitat • Avoidance o >2 miles from active leks **CHMA**: Avoidance	**PHMA**: • Exclusion o Within 3.3 km (2 miles) of active leks o UMRBNM o North Dakota o Crucial winter habitat • Avoidance o >2 miles from active leks **RHMA**: • Exclusion (Cedar Creek, West Decker) • Same as GHMA (Billings) **GHMA**: • Exclusion o UMRBNM o Crucial winter habitat • Avoidance o Within 3.3 km (2 miles) of active leks o Wind in HiLine per existing management actions • Open, subject to GRSG LUP objectives o >2 miles from active leks **CHMA**: Same as GHMA

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Rights of Way				

Major
PHMA: Avoidance
RHMA: Avoidance
GHMA: Avoidance
Minor
PHMA: Avoidance (Dillon open w/ RDFs and Buffers)
RHMA:
• Billings – Avoidance
• Miles City – Allowed with design features
GHMA:
• Avoidance (South Dakota within 2 miles of leks)
• Open (Dillon, Billings, Lewistown, HiLine, Miles City, North Dakota, and outside 2 miles from lek in South Dakota)
 	
(Corridors exist in UMRBNM, HiLine, and Billings, no specific action in Butte, UMRBNM avoidance)
 	
Definitions:
Major: 100 kilovolts and over for overhead transmission lines, 24 inches and over in width for pipelines.
Minor: other ROWs and land use authorizations/permits, such as smaller infrastructure and communication sites and towers.
		PHMA:
		• Avoidance in currently designated corridors
		• Exclusion (otherwise)
		CHMA: Avoidance
			PHMA:
			• Exclusion:
			  ○ Surface disturbing or disruptive activities within 2km (1.2 miles) of active leks (in ND – occupied leks in 2010)
			  ○ Crucial winter range
			• Avoidance
			  ○ In existing corridors or ROWs
			  ○ Rest of PHMA
			RHMA: Same as PHMA
			GHMA: Avoidance
			CHMA: Avoidance
				PHMA:
				• Exclusion:
				  ○ Surface disturbing or disruptive activities within 1km (0.6 miles) of active leks (in ND – active leks and those occupied in 2010)
				  ○ Crucial winter range
				• Avoidance
				  ○ In existing corridors or ROWs
				  ○ Rest of PHMA
				RHMA: Same as GHMA
				GHMA:
				• Avoidance
				  ○ Within 2 km (1.2 miles) of active leks
				  ○ Crucial winter range
				• Open, subject to GRSG LUP objectives
				  ○ >1.2 miles from active leks
				CHMA: Open

Table 2-28. Montana State-Specific Circumstances – Minerals

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Minerals				
All HMAs: Where the federal government owns the mineral estate in PHMA and GHMA, and the surface is in nonfederal ownership, the federal government will apply the same stipulations, Conditions of Approval (COAs), and/or conservation measures and mineral RDFs if the mineral estate is developed on BLM administered lands in that management area, to the maximum extent permissible under existing authorities, and in coordination with the landowner. Where the federal government owns the surface and the mineral estate is in non-federal ownership in PHMA and GHMA, the federal government will apply appropriate surface use COAs, stipulations, and mineral RDFs through ROW grants or other surface management instruments, to the maximum extent permissible under existing authorities, in coordination with the mineral estate owner/lessee. (Language and inclusion varies, silent on other HMAs)		**All HMAs**: Where the federal government owns the mineral estate in GRSG HMAs, and the surface is in nonfederal ownership, the federal government will apply the same stipulations, Conditions of Approval (COAs), and/or conservation measures and mineral RDFs as if the mineral estate is developed on BLM administered lands in that management area, to the maximum extent permissible under existing authorities, and in coordination with the landowner. Where the federal government owns the surface and the mineral estate is in non-federal ownership in GRSG HMAs, the federal government will apply appropriate surface use COAs, stipulations, and mineral RDFs through ROW grants or other surface management instruments, to the maximum extent permissible under existing authorities, in coordination with the mineral estate owner/lessee.		

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Oil and Gas (including Geothermal)				

PHMA:
• Open with Major stipulations (NSO)
• No WEMs in SFAs
RHMA:
• Open with Major stipulations (NSO in West Decker and South Carter)
• Open with Major stipulations (0.6 m NSO from leks in Billings)
• Open with moderate (CSU for Billings and Cedar Creek, but language varies)
• Open with Minor (TL w/in 3 miles of a lek in Billings)
GHMA:
• Open with Major stipulations (0.6 m NSO from leks in Billings, Lewistown, HiLine, Miles City, South Dakota)
• Open with Major stipulations (NSO in winter range in Billings and South Dakota)
• Open with moderate (CSU for crucial winter range in HiLine)
• Open with moderate (CSU for Dillon, North Dakota, HiLine, Miles City, and South Dakota, but language and distances vary)
• Open with Minor (TL varies by office including winter range, lek buffers, etc.)
Other:
• LN – GRSG Habitat and compensatory mitigation (some offices)
• ¼ mile lek NSO (Butte)
• Winter/spring TL (Butte)
• Geothermal is based on O&G where explicit decisions do not exist
UMRBNM: Closed
		PHMA: Closed
		CHMA: Open with Major Stipulations (NSO)
			All HMAs:
			• TL (Breeding and Winter)
			PHMA:
			• Open with Major Stipulations (NSO)
			• CSU for Disturbance/Density
			• Closed (UMRBNM)
			RHMA:
			• Open with Major stipulations (NSO in West Decker)
			• Open with moderate (CSU for Cedar Creek)
			• Billings-Musselshell (same as GHMA)
			GHMA:
			• Open with Major stipulations (NSO)
			  ○ 0.6 m from active leks
			  ○ Crucial winter range
			• Open with moderate (CSU for all GHMA)
			• Closed (UMRBNM)
			CHMA: Open with CSU
				HMAs: Same as 4

Nonenergy Leasable Minerals				
PHMA: Closed **RHMA**: Language/inclusion varies **GHMA**: Language/inclusion varies (No specific action in Butte, Miles City, and Billings, and UMRBNM Withdrawn)		**PHMA**: Closed **CHMA**: Open	**PHMA**: Closed **RHMA**: Closed **GHMA**: • UMRBNM (Withdrawn) • Other offices open **CHMA**: Open	**HMAs**: Same as 4

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Saleable Minerals/Mineral Materials				
PHMA: • Lewistown (Open to new for both free and commercial use with guidelines) • Other offices closed (Open for new free use permits & expansion of existing) **RHMA**: Language/inclusion varies **GHMA**: Language/inclusion varies (No specific action in Butte, UMRBNM withdrawn)		**PHMA**: Closed **CHMA**: Open	**PHMA**: • Closed UMRBNM • Other offices closed (Open for new free use permits & expansion of existing) **RHMA**: Closed (Open for new free use permits & expansion of existing) **GHMA**: • UMRBNM (Withdrawn) • Other offices open **CHMA**: Open	**HMAs**: Same as 4
Locatable Materials				
PHMA: • The BLM recommended all SFAs for withdrawal from location and entry under the Mining Law of 1872. The proposed withdrawal itself is being analyzed in a separate NEPA document. Lands recommended for withdrawal would remain open for mineral location and entry under the Mining Law of 1872 unless and until the Secretary of the Interior withdraws them. • Withdrawn (UMRBNM) **RHMA**: Same as PHMA, but without the SFA recommendation for withdrawal. **GHMA**: Same as RHMA. (No specific action in Butte, UMRBNM withdrawn)		**PHMA**: • The BLM recommended all SFAs for withdrawal from location and entry under the Mining Law of 1872. The proposed withdrawal itself is being analyzed in a separate NEPA document. Lands recommended for withdrawal would remain open for mineral location and entry under the Mining Law of 1872 unless and until the Secretary of the Interior withdraws them. • UMRBNM (Withdrawn) **CHMA**: Open	**PHMA**: • Withdrawn (UMRBNM) **RHMA**: Same as PHMA **GHMA**: • UMRBNM (Withdrawn) • Other offices same as PHMA **CHMA**: Same as PHMA	**HMAs**: Same as 4

Table 2-29. Montana State-Specific Circumstances – Fire and Fuels

<table>
<tr><th>Alternative 1 Summary</th><th>Alternative 2 Summary</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="5">Fire and Fuels</td></tr>
<tr><td colspan="2">All HMAs: If prescribed fire is used in GRSG habitat, the NEPA analysis for the Burn Plan will address:
• why alternative techniques were not selected as a viable options;
• how GRSG goals and objectives will be met by its use;
• how the COT Report objectives will be addressed and met;
• a risk assessment to address how potential threats to GRSG habitat will be minimized

Prescribed fire as vegetation or fuels treatment shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Prescribed fire can be used to meet specific fuels objectives that will protect GRSG habitat in PHMA (e.g., creation of fuel breaks that will disrupt the fuel continuity across the landscape in stands where annual invasive grasses are a minor component in the understory, burning slash piles from conifer reduction treatments, used as a component with other treatment methods to combat annual grasses and restore native plant communities).

Prescribed fire in known winter range shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Any prescribed fire in winter habitat will need to be designed to strategically reduce wildfire risk around and/or in the winter range and designed to protect winter range habitat quality.

(Slight variations between plans)</td><td colspan="3">All HMAs: If prescribed fire is used in GRSG habitat, the NEPA analysis for the Burn Plan will address:
• why alternative techniques were not selected as a viable options;
• how GRSG goals and objectives will be met by its use;
• how the COT Report objectives will be addressed and met;
• a risk assessment to address how potential threats to GRSG habitat will be minimized

Prescribed fire as vegetation or fuels treatment shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Prescribed fire can be used to meet specific fuels objectives that will protect GRSG habitat in PHMA (e.g., creation of fuel breaks that will disrupt the fuel continuity across the landscape in stands where annual invasive grasses are a minor component in the understory, burning slash piles from conifer reduction treatments, used as a component with other treatment methods to combat annual grasses and restore native plant communities).

Prescribed fire in known winter range shall only be considered after the NEPA analysis for the Burn Plan has addressed the four bullets outlined above. Any prescribed fire in winter habitat will need to be designed to strategically reduce wildfire risk around and/or in the winter range and designed to protect winter range habitat quality.</td></tr>
</table>

Table 2-30. Montana State-Specific Circumstances – Field Office Specific Actions

Alternative 1 Summary	Alternative 2 Summary	Alternative 3	Alternative 4	Alternatives 5 and 6
Dillon FO Objectives and Management Decisions				
Fire and Invasives Tool (FIAT): MDs including SSS MD 5, 6, 37; VEG Objective 2, VEG MD 2, 8, and 9; and MD FIRE 3, 5, 7, 9-13, 20, 21, and 33. Key Habitat References: MDs including as SSS MD 8, 9, 17, 18, 13, 41, and 42 Wild Horse and Burro Section		Remove or modify Management Actions to clarify the FIAT does not apply to SW Montana (geographic scope ended at Idaho border) Remove MDs with key habitat management actions (key habitats are an ID specific GRSG habitat effort). Remove MDs or clarify these only apply to WH&B's in Idaho (no WH&B HMAs in Dillon)		

2.6.3 Nevada/California

As noted in **Appendix 3** (GRSG HMA State-by-State Mapping Strategies) Nevada and California states developed their HMAs using a habitat prioritization model based on an intersection of seasonal habitat selection patterns and indices of space use to prioritize areas with varied relevance to GRSG. This model was initially developed for 2015 and is periodically updated with additional field data and advances in mapping products. An update of this model provided the base for HMA delineation in the 2019 planning effort. The model is currently being updated again and will incorporate GRSG survival metrics, which allow for the identification of population source areas. The latest version will be incorporated into this EIS following publication. The identification of source areas is unique to the States of Nevada and California, and the alternatives consider this draft data in both HMA identification and several management actions within this document. The role wildfire and invasive grasses play in the health of GRSG habitat in Nevada and California resulted in considering adjustments to several management actions focused on addressing these threats compared to the 2015 and 2019 decisions. Decisions being considered for amendment for these states are development of non-energy leasable minerals on lands where mining operations are currently authorized under 43 CFR Subpart 3715, 3802, or 3809, adjustment of allocation exception language considered in 2019, and clarification of application of perch deterrents and lek buffers to newly discovered leks.

Table 2-31. Nevada/California State-Specific Circumstances – Special Status Species

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Special Status Species				
MD SSS 1: In PHMAs and GHMAs, work with the proponent/applicant, whether in accordance with a valid existing right or not, and use the following screening criteria to avoid effects of the proposed human activity on GRSG habitat. A. First priority—locate project/activity outside PHMAs and GHMAs B. Second priority—if the project/activity cannot be placed outside PHMAs and GHMAs, locate the surface-disturbing activities in non-habitat areas first, then in the least suitable habitat for GRSG I. In non-habitat, ensure the project/activity will not create a barrier to movement or connectivity between seasonal habitats and populations C. Third priority—collocate the project/activity next to or in the footprint of existing infrastructure	Same as Alternative 1 (no change made in 2019). A.	**MD SSS 1:** In PHMAs and GHMAs, work with the proponent/applicant, whether in accordance with a valid existing right or not, and use the following screening criteria to avoid effects of the proposed human activity on GRSG: A. First priority—locate project/activity outside PHMAs and GHMAs while avoiding and/or minimizing direct and indirect impacts to GRSG and/or their habitat; B. Second priority—if the project/activity cannot be placed outside PHMAs and GHMAs, locate and adjust the project/activity to: a. avoid and/or minimize indirect impacts to lekking and source areas (e.g., PHMA+ in Coates et al. HMA manuscript in review; See **Appendix 3**) by using topography and/or other available methods to negate or reduce auditory and visual intrusions; AND b. locate direct impacts (i.e., surface-disturbing activities) in non-habitat areas first, then in the least suitable habitat for GRSG without creating a barrier to movement or connectivity between GRSG seasonal habitats and populations. C. Third priority—collocate the project/activity next to or in the footprint of existing infrastructure.		

Table 2-32. Nevada/California State-Specific Circumstances – Fire and Vegetation

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Fire and Vegetation Actions				
Not included	Not included	**MD VEG X (new):** Use collaborative planning efforts (e.g., Cooperative Range Improvement Agreement, Local Area Working Groups, Shared Stewardship, etc.) to develop and implement habitat restoration and enhancement projects. Projects of this type will use expertise and ideas from entities such as local landowners, local GRSG working groups, permitted land users, and other federal, state, county, and private organizations. Input from interested partners will be solicited by BLM and considered in development of restoration projects.		
Objective Fire 3: Protect post-fire treatments in SFA first, followed by PHMAs outside of SFA, and then GHMAs from subsequent wildfires.	**Objective Fire 3:** Protect post-fire treatments in PHMAs first, followed by GHMAs from subsequent wildfires.	**Objective FIRE 3**: Protect post-fire treatments, source areas (e.g., see **Appendix 3**), or areas that are vulnerable to invasive annual grass conversion, including areas essential for connectivity, in PHMAs first, followed by similar areas in GHMAs from subsequent wildfires. Incorporate the best available science in the prioritization of post-fire treatments.		
Not included	Not included	**MD FIRE X (new):** Prioritize actions (pre-suppression, suppression, and rehabilitation) that support the persistence of GRSG source areas (e.g., see **Appendix 3)**. Use the best available science (e.g., Doherty et al. 2022, Ricca and Coates 2020, Stringham et al. 2016, etc.) to identify habitats essential for maintaining current GRSG populations.		
MD FIRE 23: If prescribed fire is used in GRSG habitat, the NEPA analysis for the Burn Plan will address: • Why alternative techniques were not selected as a viable option • How GRSG goals and objectives will be met by its use • How the COT report objectives will be addressed and met • A risk assessment to address how potential threats to GRSG habitat will be minimized. Allow prescribed fire as a vegetation or fuels treatment, and it shall only be considered after the NEPA analysis for the burn plan has addressed the four bullets outlined above. Prescribed fire can be used to meet specific	Same as Alternative 1 (no change made in 2019).	**MD FIRE 23:** Use prescribed fire designed to reduce wildfire risk or improve GRSG habitat, only when there is no other feasible means to achieve the same or similar result. The NEPA analysis for project implementation will address: • Why alternative techniques were not selected as a viable option • How GRSG goals and objectives will be met by its use • How the COT report objectives, as updated, will be addressed and met • A risk assessment to address how potential threats to GRSG habitat will be minimized. Prescribed fire shall only be considered after the NEPA analysis for the project has addressed the four bullets outlined above. Prescribed fire can be used to meet specific fuels objectives that will protect GRSG habitat in PHMAs (e.g., creation of fuel breaks, burning slash piles from conifer reduction treatments, burning high-elevation late brood-rearing habitat (e.g., restore senescent vegetation, etc.), used as a component with other treatment methods to combat annual grasses and restore native plant communities, etc.). Avoid prescribed broadcast burns in known GRSG winter habitat.		

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
fuels objectives that will protect GRSG habitat in PHMAs (e.g., creation of fuel breaks that would disrupt the fuel continuity across the landscape in stands where annual invasive grasses are a minor component in the understory, burning slash piles from conifer reduction treatments, used as a component with other treatment methods to combat annual grasses and restore native plant communities). Allow prescribed fire in known winter range, and it shall only be considered after the NEPA analysis for the burn plan has addressed the four bullets outlined above. Any prescribed fire in winter habitat will need to be designed to strategically reduce wildfire risk around and/or in the winter range and designed to protect winter range habitat quality.	*(See above.)*	*(See above.)*		
MD FIRE 25: Design fuels treatments through an interdisciplinary team process to expand, enhance, maintain, and protect PHMAs and GHMAs. Fuel reduction techniques, such as prescribed fire and chemical, biological (including targeted grazing), and mechanical treatments, are acceptable. Use green strips and fuel breaks, where appropriate, to protect seeding from subsequent fires.	Same as Alternative 1 (no change made in 2019).	**MD FIRE 25:** Design fuels treatments such as, but not limited to, conifer or annual invasive grass removal through an interdisciplinary team process to expand, enhance, maintain, and protect PHMAs and GHMAs. Fuel reduction techniques, such as mechanical, chemical, and biological (including prescribed and targeted grazing) treatments and prescribed fire (see MD FIRE 23), are acceptable. Use green strips and fuel breaks, where appropriate, to protect treatment areas from subsequent fires. Use the best available science (e.g., Doherty et al. 2022, Ricca and Coates 2020, Stringham et al. 2016, etc.) to identify habitats essential for maintaining current GRSG populations.		

Table 2-33. Nevada/California State-Specific Circumstances – Non-Energy Minerals

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Non-Energy Minerals				
MD MR 25: Manage PHMAs as closed to new non-energy leasable mineral leasing (see Appendix A; Figure 2-7).	**MD MR 25:** Manage PHMAs as closed to new non-energy leasable mineral leasing, unless the new non-energy leasable mineral lease meets one of the allocation exception criteria outlined in MD SSS 5 (see Appendix A; Figure 2-7).	**MD MR 25:** Manage PHMA as closed to new non-energy leasable mineral leasing.	**MD MR 25:** Manage PHMAs as closed to new non-energy leasable mineral (e.g., phosphate, sodium, potassium, sulfur, etc.) leasing, unless the new non-energy leasable mineral lease meets one of the allocation exception criteria outlined in MD SSS 5 (see Appendix A; Figure 2-7, in the 2019 NV/CA ARMPA) or the new non-energy leasable mineral has coincident occurrence within existing disturbance and is subject to a non-competitive lease. No additional direct or indirect impacts shall result from extraction of the new non-energy leasable mineral.	

Table 2-34. Nevada/California State-Specific Circumstances – Allocation Exception Criteria

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Allocation Exception Criteria				
{MD SSS 5 in the 2015 NV/CA ARMPA addressed designation and management of SFAs. In the 2019 effort the SFAs were removed. This management action number was then used for the Allocation Exception Criteria. In this effort, SFAs are addressed as a cross-cutting topic in the HMA actions above. The management number here is less important than the management being considered. Under the 2015 NV/CA ARMPA, there was no specific action that provided exception criteria for allocations.} **MD SSS 5:** Designate SFA, as shown on Figure 1-3 (of the NV/CA 2015 ARMPA) (2,797,400 acres). SFA will be managed as PHMAs, with the following additional management: • Recommended for withdrawal from the General Mining Act of 1872, subject to valid existing rights	**MD SSS 5 (Allocation Exception Criteria):** In PHMA, GHMA, and OHMA, the State Director may grant an exception to the allocations and stipulations described in Table 2-1 (of the 2019 NV/CA ARMPA): Comparative Summary of Alternatives if one of the following applies (in coordination with NDOW, SETT, and/or CDFW): i. The location of the proposed activity is determined to be unsuitable (by a biologist with GRSG experience using methods such as Stiver et. al. 2015, as revised) and lacks the ecological potential to become marginal or suitable habitat; and will not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions will not apply to those areas	**MD SSS 5 (Allocation Exception Criteria):** In PHMA, GHMA, and OHMA, the State Director (in coordination with NDOW, SETT, and/or CDFW) may grant an exception to the allocation decisions (described in Table 2-1: Summary of Allocation Decisions by GRSG Habitat Management Areas, in the 2019 NV/CA ARMPA and potentially amended through this planning effort in **Section 2.5.2**) if one of the following applies: i. {Consideration of non-habitat is removed from this section and addressed in **Section 2.5.2**, Criteria-Based Management for Non-Habitat within GRSG Habitat Management Areas. See that section for comparable language for these alternatives.} ii. The proposed activity will be authorized to address federal, state, or local government public health and safety concerns, specifically as they relate to preventing an emergency or responding to a catastrophic event such as a flood, wildfire, or earthquake. iii. The proposed activity is determined to be a routine administrative function conducted by federal, state or local governments, including renewal or reauthorization of prior existing uses, valid existing rights and existing infrastructure (i.e., rights-of-way for roads) or expansion of existing county or local government infrastructure that serves a public purpose and will have no adverse impacts on GRSG and its habitat, or is in compliance with BLM mitigation policy, CEQ regulations (40 CFR Part 1508.1(s) and the State's mitigation policy (NAC 232.400-480). iv. Exceptions to non-disposal or exchange of lands that are identified for retention in Appendix A, Figure 2-12 (in the 2019 NV/CA ARMPA) could be considered if (a) the lands in question are identified for disposal through previous planning efforts or address a Congressional Acts (e.g., the respective Lincoln and White Pine County Conservation, Recreation, and Development Acts) and are in conformance with State law (e.g., NAC 232.400-480), or (b) the agency can demonstrate that the disposal, including land exchanges, will have no adverse direct, indirect or cumulative impacts on GRSG and its habitat.		

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• Managed as NSO, without waiver, exception, or modification, for fluid mineral leasing • Prioritized for vegetation management and conservation actions in these areas, including, but not limited to land health assessments, wild horse and burro management actions, review of livestock grazing permits/leases, and habitat restoration (see specific management sections).	determined to be unsuitable if the area has passed a threshold and lacks the ecological potential to become marginal or suitable habitat. ii. The proposed activities impacts will be offset to result in no adverse impacts on GRSG or its habitat, through use of the mitigation hierarchy and the State's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of Nevada regarding compensatory mitigation, consistent with federal law). In cases where exceptions may be granted for projects with a residual impact, voluntary compensatory mitigation consistent with the State's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of Nevada regarding compensatory mitigation, consistent with federal law) will be one mechanism by which a proponent achieves the Approved RMPA goals, objectives, and exception criteria. When a proponent volunteers compensatory mitigation as their chosen approach to address residual impacts, the BLM will incorporate those actions	*(See above.)*		

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	into the rationale used to grant an exception. The final decision to grant a waiver, exception, or modification will be based, in part, on criteria consistent with the State's GRSG management plans and policies. iii. The proposed activity will be authorized to address public health and safety concerns, specifically as they relate to federal, state, local government and national priorities. iv. Renewals or re-authorizations of existing infrastructure in previously disturbed sites or expansions of existing infrastructure that do not result in direct, indirect, or cumulative impacts on GRSG and its habitat. v. The proposed activity is determined to be a routine administrative function conducted by federal, state or local governments, including prior existing uses, authorized uses, valid existing rights and existing infrastructure (i.e., rights-of-way for roads) that serve a public purpose and will have no adverse impacts on GRSG and its habitat, consistent with the State's mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of	*(See above.)*		

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
(See above.)	Nevada regarding compensatory mitigation, consistent with federal law). vi. Exceptions to non-disposal or exchange of lands that are identified for retention in Appendix A, Figure 2-12 could be considered if (a) they are identified for disposal through previous planning efforts or address a Congressional Acts (e.g., the respective Lincoln and White Pine County Conservation, Recreation, and Development Acts), (b) the agency can demonstrate that the disposal, including land exchanges, will have no adverse direct, indirect or cumulative impacts on GRSG and its habitat, or (c) adverse impacts on GRSG or its habitat will be offset, through use of voluntary compensatory mitigation, consistent with the States' mitigation policies and programs, such as the State of Nevada's Executive Order 2018-32 (and any future regulations adopted by the State of Nevada regarding compensatory mitigation, consistent with federal law).	*(See above.)*		

Table 2-35. Nevada/California State-Specific Circumstances – Lek Buffers

<table>
<tr><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="5">Lek Buffers</td></tr>
<tr><td>MD LR 17: Within 4 miles of active and pending leks in GRSG habitat, require ROW, permit, and lease holders to retrofit those portions of power lines and other utility structures with nesting and perch- deterring devices. Do this during the renewal and amendment process if adverse effects, such as increased nest predation, on GRSG populations have been documented. This requirement shall be predicated on research and monitoring studies specific to power lines or other utility structures.</td><td>Same as Alternative 1 (no change made in 2019).</td><td colspan="3">MD LR 17: Within 4 miles of active and pending leks, require ROW, permit, and lease holders to retrofit those portions of power lines and other utility structures with nesting and perch- deterring devices. Do this during the renewal and amendment process. Monitor and maintain perch-deterring effectiveness through the life of the structures following guidance from scientifically accepted protocols.</td></tr>
<tr><td>Concept not included.</td><td>Concept not included.</td><td colspan="3">MD SSS 18 (new) – (insert after MD SSS 17, then move subsequent MDs down a number): If an Active or Pending Active lek is identified in an area outside of PHMA or GHMA lek buffer-distances will be applied as described in Appendix B (of the 2019 NV/CA ARMPA) to avoid direct and indirect impacts to lek activity and habitat. Active or Pending Active leks not included in the HMA model will be added when the model is updated.</td></tr>
</table>

2.6.4 Oregon

State specific circumstances for the State of Oregon include management of 18 Areas of Critical Environmental Concern/Research Natural Areas (ACEC/RNA) as "Key RNAs" or "Key ACECs", as well as management of saleable minerals/mineral materials in GRSG HMAs. This amendment effort is limited to RMP-level actions needed to provide guidance for subsequent implementation-level actions. The land use allocation will be identified in the ROD, but if public lands are disposed of or devoted to a public purpose which precludes livestock grazing, a site-specific NEPA and a site-specific decision process pursuant to the Taylor Grazing Act and 43 C.F.R. 4100.4-2 is necessary to cancel permits and/or removal of livestock from these areas.

Key ACECs/RNAs

The 2015 Oregon GRSG ARMPA designated the entirety of fifteen (15) existing Areas of Critical Environmental Concern/Research Natural Areas (ACEC/RNAs) as "Key RNAs" and all of three additional ACECs as "Key ACECs" (see 2015 ARMPA Special Designations Objective SD 4 and Table 2-6). The 2015 Oregon ARMPA also allocated all or portions of thirteen Key RNAs as unavailable to livestock grazing. Two ACEC/RNAs are already unavailable to livestock grazing; Foster Flat in Three Rivers Field Office under the 1992 Three Rivers RMP and Guano Creek-Sink Lakes in Lakeview Field Office by a 1998 act of Congress. The three ACECs and fifteen ACEC/RNAs were designated in various, underlying district Resource Management Plans (RMPs) prior to the 2015 amendment.

During the 2019 GRSG RMP amendment process, BLM Oregon proposed and analyzed a reversal of the 2015 decision to make all or portions of the 13 key RNAs (excluding the two ACEC/RNAs allocated as unavailable to livestock grazing under the 1992 Three Rivers and 2003 Lakeview RMPs) available to livestock grazing. However, the 2019 GRSG ARMPA retained the Key RNA designations, along with the applicable Management Objectives and Management Direction (BLM OR 2019 FEIS; Pages 2-8 and 2-9). Table 2.26 below displays, as Alternatives 1 and 2 respectively, the 2015 and 2019 estimated acreages available or unavailable to livestock grazing, along with anticipated changes to the number of Animal Unit Months (AUMs) affected by the availability/unavailability decisions.

Alternatives 3, 4, 5, and 6 are based upon changed habitat management area boundaries. In 2022, ODFW informed BLM that they were going to update core and low density HMA s. The timeline outlined by ODFW for updating and approving Core- and Low-Density areas was inconsistent with the EIS analysis process. Therefore, after coordination with the state, BLM used ODFW's published methodology and data up through the 2022 field season to estimate likely core habitat and draft PHMA map.

Under Alternative 3, all proposed PHMA and GHMA from Alternative 4 would become PHMA and be allocated as unavailable to livestock grazing, including all of the 13 key RNAs. The mapping process referenced above became the basis for BLM's proposed PHMA and GHMA designations in Alternative 4. This alternative would retain the 2015 decision that makes all or portions of the 13 key RNAs as unavailable to livestock grazing. Alternatives 5 and 6 propose management clarifications and changes to areas unavailable to livestock grazing. The updated Key RNAs and revised portions allocated as unavailable to livestock grazing would continue to be managed over the long term to meet the objectives established by the 2015 ARMPA and to reflect a diversity of vegetative communities that are representative of important GRSG habitat needs.

Under Alternatives 5 and 6, modifications to areas allocated as unavailable to livestock grazing in the 13 key RNAs are based on district-generated, site-specific information. The proposed modifications vary by individual Key RNA and reflect site specific vegetation or habitat conditions in those areas (Table 2.36

below). In most cases, the Key RNA designation and objectives to provide opportunities for research and serve as a broad spectrum of vegetation communities across GRSG habitat are retained. Additionally, the BLM is proposing eliminating or modifying certain portions or all of areas within Key RNAs that were allocated as unavailable to livestock grazing, to avoid resource conflicts. These conflicts include but are not limited to constructing fences in proximity to cultural sites, within 1.2 miles of an occupied or pending lek (a conformance violation of the 2015 ARMPA) or within existing designated Wilderness Study Areas. Under Alternatives 5 and 6, and depending on the specific Key RNA, the area presently allocated as unavailable to livestock grazing under the 2015 ARMPA may be reallocated to livestock grazing or the size and/or location of the area excluded from grazing may be modified.

The alternatives below present the range of alternatives for management of the Key RNAs/Key ACECs.

Table 2-36. Oregon Key RNAs – Summary of Estimated Acres and AUMs by Alternative[1]

RNA Name	District	Total Acres of the Key RNA	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternatives 5 and 6	
			Key RNA Acres Available for Livestock Grazing	Key RNA Acres / estimated AUMs Unavailable for Livestock Grazing	Key RNA Acres / estimated AUMs Available for Livestock Grazing	Key RNA Acres Unavailable for Livestock Grazing	Key RNA Acres Available for Livestock Grazing	Key RNA Acres / estimated AUMs that would continue to be Unavailable for Livestock Grazing	Key RNA Acres Available for Livestock Grazing	Key RNA Acres / estimated AUMs that would continue to be Unavailable for Livestock Grazing	2015 Key RNA Acres that would become Available for Livestock Grazing	Key RNA estimated Acres / estimated AUMs that would become Unavailable for Livestock Grazing
Black Canyon	Vale	2,600 [7]	0	2,600/260	2,600/260	0	0	2.600/260	0	2,600/260	2,600	0/0
Dry Creek Bench	Vale	1,637	1,015	622/52	1,637/52	0	0	1,637/52	1,015	622/52	622	0/0
East Fork Trout Creek	Burns	361	57	304/47	361/47	0	0	361/0 [9]	57	304/0	57 [9]	304/0 [9]
Fish Creek Rim	Lakeview	8,725	5,966	2,750/110	8,725/110	0	0	8,725/110	5,966	2,750/110	8,621	95/4 [2]
Foley Lake	Lakeview	2,228	959	1,269/51	2,228/51	0	0	2,228/51	959	1,269/51	1,342	797/33 [2]
Foster Flat	Burns	2,687	0	2,687	0	2,687	0	2,687	0	2,687	0	2,687
Guano Creek–Sink Lakes	Lakeview	11,185	0	11,185	0/0	11,185	0	11,813	0	11,813	0	11,813 [3]
Lake Ridge	Vale	3,872	3,091	778/74	3,872/74	0	0	3,872/74	3,091	778/74	778	13/0 [4]
Mahogany Ridge[5] (southern unit only)	Vale	444	527	155/27	155/27	0	0	140/27	527	140/27	15	140/0
North Ridge Bully Creek	Vale	1,569	1,405	164/19	1,569/19	0	0	1,569/19	1,405	164/19	164	0/0
Rahilly-Gravelly	Lakeview	18,678	10,396	8,282/586	18,678/586	0	0	18,678/586	10,396	8,282/586	16,653	2,025/144

			Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternatives 5 and 6	
RNA Name	**District**	**Total Acres of the Key RNA**	**Key RNA Acres Available for Livestock Grazing**	**Key RNA Acres / estimated AUMs Unavailable for Livestock Grazing**	**Key RNA Acres / estimated AUMs Available for Livestock Grazing**	**Key RNA Acres Unavailable for Livestock Grazing**	**Key RNA Acres Available for Livestock Grazing**	**Key RNA Acres / estimated AUMs that would continue to be Unavailable for Livestock Grazing**	**Key RNA Acres Available for Livestock Grazing**	**Key RNA Acres / estimated AUMs that would continue to be Unavailable for Livestock Grazing**	**2015 Key RNA Acres that would become Available for Livestock Grazing**	**Key RNA estimated Acres / estimated AUMs that would become Unavailable for Livestock Grazing**
South Bull Canyon[6]	Vale	770	21	749/116	749/116	0	0	749/116	43	749/116	492	257/0
South Ridge Bully Creek	Vale	621	224	397/61	621/61	0	0	621/61	224	397/61	397	0/0
Spring Mountain	Vale	996	0	996/153	996/153	0	0	996/153	0	996/153	995	0/0
Toppin Creek Butte [8]	Vale	3,998	1,133	2865/216	3,998/216	0	0	2,865/216	1,133	2,865/216	2,626	239/0
Totals		60,362	24,996	35,803/1,772	46,775/1,772	13,872	0	59,532/1,772	24,996	36,416/1,772	35,403	18,370/288

Notes:

1 - Acreage estimates and AUM estimates/calculations have been updated from the 2015 ARMPA ROD .

2 – Estimated AUMs for Alternatives 5 and 6 associated with the area allocated as 'unavailable to livetock grazing' would be absorbed in portions of the associated pasture and/or allotment in which the Key RNA exists. Site-specific monitoring would inform if AUMs cannot be absorbed, with site-specific NEPA and grazing decisions to implement any reductions in AUMs as a result of implementing removal of livestock from those areas allocated as unavailable to livestock grazing as a result of this alternative.

3 - The 2015 and 2019 estimates of acres used the Guano Creek Wilderness Study Area boundary. The Guano Creek-Sink Lakes ACEC/RNA is much smaller and contained entirely within the larger WSA boundary. The corrected acres reflect just the ACEC/RNA portion that is, and would continue to be, unavailable to livestock grazing use under all alternatives.

4 - Lakeridge key RNA would become available for livestock grazing, however a 13-acre area adjacent to the 2015 ARMPA identified Lakeridge key RNA and still within the ACEC/RNA would be available for research and would be unavailable to livestock grazing.

5 - Mahogany Ridge ACEC/RNA is divided into two "Parcels", totaling 622 acres. The southern parcel is 476 acres; the Key RNA is located solely in the southern parcel and totals 155 acres. In Alternatives 5 and 6, OR/WA BLM proposes 140 acres be retained as Key RNA and allocated as unavailable to livestock grazing. 15 acres would be outside of the Key RNA under this alternative and reallocated to available to livestock grazing.

6 - South Bull Canyon data has been revised based on district specific information resulting from assessments made during the closure process. The entire ACEC/RNA acreage is 770 of which 749 acres were designated as Key RNA (and allocated as unavailable to livestock grazing). The acres that would be allocated as available to livestock grazing under Alternatives 5 and 6 is the proposed new exclosure (and retention of unavailable allocation) subtracted from the 2015 Key RNA (749 minus 257 = 492)

7 - Black Canyon ACEC/RNA acres were reduced by 40 acres to reflect corrections in GIS of the boundary.

8 - Exception criteria would be have to be met for construction of exclosure fencing within WSA or increased management presence would be needed.

9 - The Oregon 2015 ARMPA estimated that 47 AUMs may be removed based strictly on the change in acreage. The 2019 RMPA used the same estimate of 47 AUMs. Alternatives 1 and 2 reflect the numbers from the prior EISs. This key RNA has been excluded from the allotment and pasture through an administrative process; no change to permitted AUMs is necessary because the remaining pasture can support the estimated 47 AUMs associated with the key RNA made unavailable to livestock grazing.

Table 2-37. Oregon State-Specific Circumstances – Research Management Areas

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Research Natural Areas				
Objective SD 4: Manage key RNAs, or large areas within the RNAs, as undisturbed baseline reference areas for the sagebrush plant communities they represent that are important for Greater Sage-grouse. Manage key RNAs for minimum human disturbance allowing natural succession to proceed.	**Objective SD 4:** Manage the Foster Flat and Guano Creek–Sink Lakes RNAs as undisturbed baseline reference areas for the sagebrush plant communities they represent that are important for Greater Sage Grouse. Minimize human disturbance in all 15 key RNAs, allowing natural ecological processes to proceed.	**Objective SD 4:** Manage Key RNAs, or large areas within the RNAs, as baseline reference areas for sagebrush plant communities they represent that are important to Greater Sage-grouse. Active or passive restoration actions are allowed within Key RNAs to support maintenance or improvement of identified vegetation communities and to meet GRSG habitat objectives.		
MD LG 1: All or portions of key RNAs will be unavailable to grazing (see Table 2.X above). Determine whether to remove fences, corrals, or water storage facilities (e.g. reservoirs, catchments, ponds).	**MD LG 1** is deleted. Livestock grazing management in the 13 key RNAs returns to being governed by applicable district RMPs as amended by the 2015 Oregon Greater Sage-Grouse ROD/ARMPA goals, objectives, and management decisions.	**MD LG 1:** All, some, or none of key RNAs will be unavailable to livestock grazing (see Table 2.36 above). Determine whether to remove, modify or construct additional fences, corrals, or water storage facilities (e.g. reservoirs, catchments, ponds). New proposed water-related range improvements (springs, pipelines, troughs, etc.) may be authorized where existing critical water development is no longer accessible as a result of implementing areas within the Key RNAs as unavailable to livestock grazing.		
All or part of Key RNAs identified would be closed to all disturbance types, including livestock grazing, OHV, minerals development, and lands and realty actions. The reason for these closures would be for research-related activities, including studying vegetative communities important to GRSG that do not contain land disturbing activities, as well as studying the effects of climate change on these vegetative communities.	RNAs remain subject to management to promote the key characteristics of the RNAs, including regulation of grazing, to maintain and promote the key characteristics of the RNAs.	Key RNAs and all PHMA areas allocated as unavailable to livestock grazing.	Key RNAs and areas allocated as unavailable to livestock grazing to facilitate the ability to compare un-grazed vegetation types to grazed vegetation types.	

Table 2-38. Oregon State-Specific Circumstances – Saleable Minerals/Mineral Materials

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Saleable Minerals/Minerals Management				
MD MR 14: PHMA are closed to new mineral material sales. However, these areas remain "open" to free use permits and the expansion of existing active pits, only if the following criteria are met: • The activity is within the Oregon PAC (also called BSU, and is the same footprint as PHMA) and project area disturbance cap. • The activity is subject to the provisions set forth in the mitigation framework in Appendix F (in the 2015 OR GRSG ARMPA). • All applicable required design features are applied and the activity is permissible under screening criteria (see SSS 13 in the 2015 OR GRSG ARMPA). Federal Highway Act material sites are a ROW and not subject to mineral sale requirements. See ROW section for management (MD LR 7 in the 2015 OR GRSG AMPRA).	Same as Alternative 1 (no change made in 2019).	**MD MR 14:** PHMA are closed to new mineral material sales.	Same as Alt 1, with the following addition: If BLM's NEPA analysis determines that the use or expansion of an existing, authorized material site (up to the entire footprint of the existing authorized area) could be implemented without significant impacts (i.e., upon completion of an Environmental Assessment, BLM determines that a FONSI is applicable) and the applicable area has not met the disturbance cap, BLM is authorized to implement without further analysis or mitigation.	

2.6.5 Utah

The BLM will address GHMA management as a Utah state-specific circumstance. HMA management in Utah is a result of different approaches to planning in the 2015 and 2019 Utah GRSG RMP amendments. In the BLM's 2019 GRSG ARMPA, the BLM increased habitat management area alignment with the State of Utah's Sage-Grouse Management Areas (SGMAs) and prioritized the importance of management prescriptions on PHMA. This was to focus protection on seasonal habitats that support over 95 percent of GRSG populations in Utah, and removed GHMA designation and management. .

The state-specific circumstances for the State of Utah being addressed in this effort is the result of the 2019 amendment effort. The remainder of this section includes management alternatives specific to GHMA in Utah under alternatives 4, 5 and 6. Refer to **Appendix 2** for specific language from the 2015 and 2019 amendments, and **Appendix 3** for additional information on the Utah approaches for identifying habitat management areas.

Table 2-39. Utah State-Specific Circumstances – General Habitat Management Areas

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Special Status Species (SSS)				
MA-SSS-5: In GHMA, apply the following management to meet the objective of a net conservation gain for discretionary actions that can result in habitat loss and degradation: <u>A- Existing Management:</u> Implement GRSG management actions included in the existing RMPs and project specific mitigation measures associated with existing decisions. <u>B- Net Conservation Gain:</u> In all GRSG habitat, in undertaking BLM management actions, and, consistent with valid existing rights and applicable law, in authorizing third-party actions that result in habitat loss and degradation, the BLM will require and ensure mitigation that provides a net conservation gain to the species, including accounting for any uncertainty associated with the effectiveness of such mitigation. This will be achieved by avoiding, minimizing, and compensating for impacts by applying beneficial mitigation actions. Exceptions to net conservation gain for GRSG may be made for vegetation treatments to benefit Utah prairie dog. Mitigation will be conducted according to the mitigation	**MA-SSS-5:** No similar action.	**MA-SSS-5:** No similar action.	**MA-SSS-5:** In GHMA, apply the following management to meet a minimum standard of no net loss for discretionary actions that can result in habitat loss and degradation: <u>A- Existing Management:</u> Same as Alternative 1. <u>B- Net Conservation Gain:</u> Apply a minimum standard of no net loss consistent with cross-cutting language. Refer to Mitigation in Table 2-5. <u>C- Buffers:</u> In undertaking BLM management actions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will assess and address impacts within the lek buffer-distances identified in the US Geological Survey Report Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review (Open File Report 2014-1239; Manier et al. 2014) in accordance with Appendix B, Applying Lek-Buffer Distances (Utah 2019 ARMPA). <u>D- Required Design Features/Best Management Practices:</u> Same as Alternative 1.	**MA-SSS-5:** Same as Alternative 4

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
framework contained in Appendix F (Utah 2015 ARMPA). <u>C- Buffers:</u> In undertaking BLM management actions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the US Geological Survey Report Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review (Open File Report 2014-1239; Manier et al. 2014) in accordance with Appendix B (Utah 2015 ARMPA). <u>D- Required Design Features/Best Management Practices:</u> In GHMA, apply the fluid mineral RDFs that are associated with GHMA identified in Appendix C (Utah 2015 ARMPA) when authorizing/permitting site-specific fluid mineral development activities/projects. The applicability and overall effectiveness of each RDF cannot be fully assessed until the project level when the project location and design are known. Because of site specific circumstances, some RDFs may not apply to some projects and/or may require slight variations. All variations in RDFs will require that at least one of the following be demonstrated in the NEPA analysis associated with the project/activity:	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
• A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable; • An alternative RDF, state-implemented conservation measure, or plan-level protection is determined to provide equal or better protection for GRSG or its habitat; • A specific RDF will provide no additional protection to GRSG or its habitat.	*(See above.)*	*(See above.)*	*(See above.)*	*(See above.)*
MA-SSS-6 Sage-Grouse Management Outside PHMA/GHMA Proposed projects within State of Utah SGMA and USFWS priority areas for conservation (PAC), as well as adjacent to PHMA outside these areas, will consider impacts on GRSG and implement measures to mitigate impacts when preparing site-specific planning and environmental compliance documents. Outside of PHMA, prior to site-specific authorizations, the BLM will evaluate habitat conditions and may require surveys to determine if the project area contains GRSG habitat (FLPMA, 43 United States Code (USC) 1701 Sec. 201 (a); BLM Manual	**MA-SSS-6:** Sage-Grouse Management Outside PHMA Outside PHMA, implement GRSG management actions included in the RMPs and project-specific mitigation measures associated with decisions that predated the 2015 amendments. Proposed projects within State of Utah SGMA and USFWS PACs, as well as adjacent to PHMA outside these areas, will consider impacts on GRSG and may implement measures to mitigate impacts on GRSG populations within adjacent PHMA when preparing site-specific planning and environmental compliance documents.	**MA-SSS-6:** Same as Alternative 2.	**MA-SSS-6**: Same as Alternative 2 but applying management to areas outside GHMA based on amended GHMA boundaries.	**MA-SSS-6:** Same as Alternative 4.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
6840.04 D3; BLM-M-6840.04 E2). Surveys will be required prior to authorizing discrete anthropogenic disturbances within 4 miles of an occupied lek that is located in PHMA, but only in existing sagebrush. If an area is determined to be GRSG habitat (e.g., nesting, brood-rearing, winter, transition), mitigation will be considered as part of the project level NEPA analysis and will be attached as conditions of approval to new discretionary actions, if deemed necessary to protect the habitat (BLM Manual 6840.04 D 5). Measures that may be considered include those identified in Appendix C. (Utah 2015 ARMPA) Outside of PHMA, but within SGMAs and PACs, avoid removal of sagebrush and minimize development that creates a physical barrier to GRSG movement; these areas may be used by GRSG to connect to other populations or seasonal habitat areas. Exceptions shall be made for vegetation treatments to benefit Utah prairie dog, where the landscape will be managed for both species. Outside of PHMA, but within SGMAs and PACs, consider noise and permanent structure stipulations around leks. Outside PHMA, portions of State of Utah opportunity areas (see	Outside of PHMA, but within SGMAs and PACs, avoid removal of sagebrush and minimize development that creates a physical barrier to GRSG movement; these areas may be used by GRSG to connect to other populations or seasonal habitat areas. Exceptions shall be made for vegetation treatments to benefit Utah prairie dog, where the landscape will be managed for both species. Outside of PHMA, but within SGMAs and PACs, consider noise and permanent structure stipulations around leks. Outside PHMA, after analyzing the impacts using the buffer distances identified in Appendix B (Utah 2019 ARMPA) from a lek that is located in PHMA, portions of State of Utah opportunity areas will be managed with the following allocations: • Fluid minerals will be open for leasing with CSU stipulations (noise and tall structures). • Lands ROWs, permits, and leases will be avoided, applying avoidance criteria for noise and tall structures. Avoid siting wind energy development in opportunity areas within the buffer distances identified in Appendix B (Utah 2019 ARMPA) from occupied GRSG leks that are in PHMA, if the lek buffer analysis as identified in Appendix B (Utah 2019	*(See above.)*	*(See above.)*	*(See above.)*

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Utah 2015 Final EIS Map 2.4) within 4 miles of a lek that is located in PHMA will be managed with the following allocations: • Fluid minerals will be open for leasing with CSU stipulations (noise and tall structures). • Lands ROWs, permits, and leases will be avoided, applying avoidance criteria for noise and tall structures. Do not site wind energy development in opportunity areas within 5 miles from occupied GRSG leks that are in PHMA. Outside of PHMA, avoid and minimize effects from discrete anthropogenic disturbances in areas that have been treated with the intent of improving or creating new GRSG habitat. Evaluate conditions in the treated area to determine if it is providing habitat for GRSG and if additional measures are necessary to protect the habitat.	ARMPA) shows that siting wind energy development in opportunities areas will impact lek persistence within PHMA. Outside of PHMA, avoid and minimize effects from discrete anthropogenic disturbances in areas that have been treated with the intent of improving or creating new GRSG habitat. Evaluate conditions in the treated area to determine if it is providing habitat for GRSG and if additional measures are necessary to protect the habitat. Outside of PHMA, provide that acres of GRSG seasonal habitat (based on best available maps, then confirmed to be regularly used by GRSG Grouse to sustain one or more seasonal habitat requirements through coordination with the appropriate State of Utah agency and through on-the-ground information) that is lost to habitat degradation actions (Appendix C, Table C.2 of the Utah 2015 ROD/ARMPA) are replaced by creating/improving GRSG habitat within PHMA.	*(See above.)*	*(See above.)*	*(See above.)*

<table>
<tr><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th><th>Alternatives 5 and 6</th></tr>
<tr><td colspan="5">Changes to Other Sections/Management Actions</td></tr>
<tr><td>The following management actions include a reference to GHMA, usually just pointing to the GHMA polygons or in a prioritization approach (see Appendix 2, Utah existing GRSG management):
• MA-SSS-1
• MA-FIRE-8
• MA-LG-1
• MA-LG-5
• MA-WHB-2
• Objective MR-1
• MA-MR-20
• MA-MR-24
• MA-RE-1</td><td colspan="2">No GHMA in Utah under these alternatives, so no similar action.</td><td colspan="2">Same as Alternative 1, but with the inclusion of the changes by alternative described in the rangewide alternatives (Section 2.5), including the updated GHMA boundaries described under Alternatives 4, 5 and 6.</td></tr>
<tr><td>The following management actions include a reference to GHMA, only include a reference to GHMA that references application of MA-SSS-5.
• MA-MR-1
• MA-MR-4
• MA-MR-14
• MA-MR-16
• MA-MR-23
• MA-LR-7</td><td colspan="2">No GHMA in Utah under these alternatives, so no similar action.</td><td colspan="2">Same as Alternative 1, by applying the amended MA-SSS-5 language described above and the updated GHMA boundaries described under Alternatives 4, 5, and 6.</td></tr>
</table>

2.6.6 Wyoming

Wyoming's Alternatives 5 and 6 are considering Stewardship Habitat Management Areas (SHMA) in addition to PHMA and GHMA. The SHMA designation is being applied in northeastern Wyoming where private landowners worked with the State of Wyoming to establish management objectives and approaches.

The remainder of this section includes the alternatives related to the applicable management actions associated with SHMA. Because these areas are only being considered under Alternative 5 and 6, there is no corresponding actions under Alternatives 1-4.

Table 2-40. Wyoming State-Specific Circumstances – Additional Habitat Management Area

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Habitat Management Area Alignments				
Not applicable	Not applicable	Not applicable	Not applicable	Stewardship Habitat Management Areas (SHMAs) as defined for Wyoming are GRSG habitats that are generally characterized by large percentages of private land, existing disturbance and prior and existing rights, and fragmented landscapes but that continue to support substantial populations of GRSG, provide important connections between populations, and are important for maintaining GRSG populations. Management in SHMA is consistent with GHMA restrictions.
Major Land Use Allocations				
Not applicable	Not applicable	Not applicable	Not applicable	Allocations in SHMA same as GHMA restrictions as proposed for Alternatives 5 and 6 in the cross-cutting topics above.
Fluid Mineral Leasing/Development				
Not applicable	Not applicable	Not applicable	Not applicable	Fluid mineral leasing/development in SHMA same as proposed for Alternatives 5 and 6 in the cross-cutting topics above.
Waivers, Exceptions, and Modifications (WEMs)				
Not applicable	Not applicable	Not applicable	Not applicable	WEMs in SHMA same as those proposed for active leks in GHMA for Alternatives 5 and 6 in the cross-cutting topics above.
Mitigation				
Not applicable	Not applicable	Not applicable	Not applicable	Mitigation in SHMA same as proposed for Alternatives 5 and 6 in the cross-cutting topics above.
Wind/Solar and Major ROWs				
Not applicable	Not applicable	Not applicable	Not applicable	Wind/Solar and Major ROWs in SHMA same as proposed for GHMA in Alternatives 5 and 6 in the cross-cutting topics above.
Adaptive Management				
Not applicable	Not applicable	Not applicable	Not applicable	Adaptive management in SHMA same as proposed for GHMA.
Application of Habitat Objectives				
Not applicable	Not applicable	Not applicable	Not applicable	Application of Habitat objectives in SHMA same as proposed for Alternatives 5 and 6 in the cross-cutting topics above.
Disturbance Caps				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable (disturbance caps in SHMA same as current GHMA)
Threats from Predation				
Not applicable	Not applicable	Not applicable	Not applicable	Threats from predation in SHMA same as proposed for PHMA for Alternatives 5 and 6 in the cross-cutting topics above.
Livestock Grazing				
Not applicable	Not applicable	Not applicable	Not applicable	Livestock grazing in SHMA same as proposed for PHMA for Alternatives 5 and 6 in the cross-cutting topics above.
Wild Horse and Burro Management				
Not applicable	Not applicable	Not applicable	Not applicable	Wild horse and burro management in SHMA same as proposed for PHMA for Alternatives 5 and 6 in the cross-cutting topics above.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternatives 5 and 6
Additional Management Considerations				
Not applicable	Not applicable	Not applicable	Not applicable	In partnership with appropriate Federal and State Agencies and landowners and their representatives, encourage the development and implementation of landowner-led conservation benefit agreements in SHMA that focus on ensuring the long-term viability of GRSG populations in the area, and at a minimum identify key habitats and linkages, potential threats to GRSG and its habitat, appropriate conservation measures, and an avoid/minimize/compensate strategy that identifies mitigation opportunities within the boundaries of SHMA.
Not applicable	Not applicable	Not applicable	Not applicable	Because the functional movement (i.e., movements that result in genetic connectivity) of GRSG likely occurs among leks, encourage the establishment of conservation benefit agreements that include management measures specific to maintaining active leks in SHMAs.
Not applicable	Not applicable	Not applicable	Not applicable	Support research that identifies habitat conditions that promote or limit the movement of GRSG through a landscape to better inform management of SHMAs. Research supported by BLM and partners should be actionable.
Not applicable	Not applicable	Not applicable	Not applicable	Encourage the development and implementation of invasive vegetation – including encroaching native species – management strategies in SHMA. Strategies should be inclusive of all private and public land managers and include, but not be limited to: engagement of all pertinent stakeholders, inventory and monitoring requirements, prioritization approaches, treatment and removal options, restoration (to include site-specific management of livestock), responses to wildfire, and an adaptive management framework.
Not applicable	Not applicable	Not applicable	Not applicable	Work with the appropriate State and Federal agencies to establish wildfire response in SHMA at the same priority as protection of property.
Not applicable	Not applicable	Not applicable	Not applicable	To minimize impact of predators to GRSG, encourage the development of a predator management plan in SHMA. Plans should include, but not be limited to: coordination requirements with appropriate State and Federal agencies if implementation of the plan becomes necessary, assessments of habitat conditions and relationships with predator populations and impacts to GRSG, anthropogenic structure design details to reduce opportunities for corvid and raptor perching and nesting, disposal options for anthropogenic food subsidies, approaches for addressing predation from domestic pets, descriptions of concurrent management actions required to address GRSG survival concerns long-term (for example, habitat enhancement), and monitoring requirements.

2.7 Plan Evaluation and Monitoring

The BLM planning regulations (including 43 CFR Part 1610.4-9) require land use plans establish intervals and standards for monitoring and evaluation, based on the sensitivity of the resource decisions involved.

2.7.1 Evaluation

Evaluation is the process of reviewing the RMP and determining whether the decisions and NEPA analysis are still valid and whether the RMP is being adequately implemented. The BLM Land Use Planning Handbook (H-1601-1; BLM 2005a) directs that RMPs should be evaluated at a minimum period of every 5 years. Specifically, RMPs are evaluated to determine if:

- Decisions remain relevant to current issues;
- Decisions are effective in achieving (or making progress toward achieving) desired outcomes;
- Any decisions should be revised;
- Any decisions should be dropped from further consideration; and
- Any areas require new decisions.

Data collected during RMP implementation helps to inform the RMP evaluation.

2.7.2 Monitoring

Land use plan monitoring is the process of tracking the implementation of land use plan decisions (implementation monitoring) and collecting data/information necessary to evaluate the effectiveness of land use plan decisions (effectiveness monitoring) in meeting the purpose and need of the plan or plan amendment. Monitoring strategies for GRSG habitat and populations must be collaborative, as habitat occurs across jurisdictional boundaries. As part of the 2015 GRSG amendment effort, the BLM developed a Monitoring Framework to provide consistent approaches to monitor planning actions across the range. In 2021 the BLM published the *Greater Sage-Grouse Plan Implementation Rangewide Monitoring Report for 2015-2020* with the results of implementing the 2015 monitoring framework. As part of this amendment process, the BLM is revisiting the approaches in the monitoring framework, updating it based on lessons learned over the past eight years. The draft updated monitoring framework is in **Appendix 7**. The BLM's monitoring efforts will continue in partnership with Federal and State fish and wildlife agencies. The BLM and other partners will use the resulting information to guide implementation of conservation activities.

Monitoring data is used to draw conclusions on whether management actions are being implemented, and if they are helping to meet the stated objectives. Conclusions are then used to recommend whether to continue current management or to identify what changes may need to be made to meet objectives. The BLM would use land use plan evaluations to determine if the decisions in the RMPA, supported by the accompanying NEPA analysis, are still valid in light of new information and monitoring data. Its evaluations would follow the protocols established by the BLM Land Use Planning Handbook (H-1601-1) or other appropriate guidance in effect at the time the evaluation is initiated.

2.8 Summary of Environmental Consequences

The summary of environmental consequences table is included in **Appendix 10**.

Chapter 3. Affected Environment

3.1 Introduction

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

Certain resources that may be present in the planning area are not addressed because issues relating to their management were not identified during scoping by the public, or by the BLM (see summary in Chapter 1). Information from broad-scale assessments was used to set the context for the decision-making process. The information and direction for BLM resources and resource uses has been further broken down into fine-scale assessments and information. The level of information presented in this chapter is commensurate with and sufficient to assess potential effects discussed in Chapter 4, based on the alternatives presented in Chapter 2.

Each resource section in this chapter contains a discussion of existing conditions, including trends. Existing conditions describe the location, extent, and current condition of the resource in the planning area (described in **Section 1.4**). For each resource, a general description of existing conditions is provided for the planning area, regardless of land status to provide a regional context. More detailed discussion of the existing conditions at various scales may be provided depending on the resource topic and availability of applicable information.

Acreage figures and other numbers are approximate projections; readers should not infer that they reflect exact measurements. Acreages were calculated using Geographic Information Systems (GIS) technology, and there may be slight variations in total acres between resources. Some information presented here has also been incorporated by reference from the individual state GRSG 2015 and 2019 plans and is cited as such.

3.2 Special Status Species – Greater Sage-Grouse

3.2.1 Species Background

Status and Distribution

On March 23, 2010, the USFWS determined that rangewide listing of GRSG was warranted but precluded by higher priority listing actions (75 FR 13910). On November 21, 2012, the USFWS assigned GRSG a listing priority number of 8, indicating that the rangewide threat to GRSG was moderate to low (77 FR 699940). On September 22, 2015, a status review conducted by the USFWS determined that the GRSG remains relatively abundant and well-distributed across the species' 173-million acre range and does not face the risk of extinction now or in the foreseeable future. The species was withdrawn from the candidate species list on October 2,015 (80 FR 59857). GRSG remains a BLM sensitive species.

The USFWS's decision not to list the bird followed an unprecedented conservation partnership designed to reduce threats to the GRSG across 90 percent of the species' breeding habitat. In making that decision, the USFWS stated a number of relatively large GRSG populations were distributed across the landscape and were supported by undisturbed expanses of habitat. The agency acknowledged some habitat loss associated with energy development, infrastructure, wildfire, and invasive plants will continue into the future. However, regulatory mechanisms provided by federal agencies and three states (Montana, Oregon, and Wyoming), as well as mitigation required by the state of Nevada, reduced threats. They also stated wildfire and invasive species continue to occur in GRSG habitats, especially in the Great Basin, but existing management and commitments for suppression, restoration, and noxious weed treatments were in place and could reduce these impacts.

Since 2015, additional states have added GRSG protection plans, amendments, laws, or executive orders. Federal land use plans, executive orders, or laws for the states of Idaho, Montana, North Dakota, Nevada, Oregon, South Dakota, Utah, and Wyoming build upon the progress made during past planning processes. The plans aim to protect, maintain, and increase GRSG populations and habitats by addressing localized threats, incorporating new science in monitoring and management, and including greater integration of adaptive management into land-use planning.

GRSG are considered a sagebrush ecosystem-obligate species; they rely on sagebrush on a landscape level and on a micro-habitat scale for their survival. Prior to 19th century European settlement, GRSG habitat is estimated to have covered 296,526,080 acres ranging from 4,000 feet to over 9,000 feet in elevation in the Great Basin and Colorado Plateau regions (Schroeder et al. 2004). Since European settlement of the West began, the amount, distribution, and quality of sagebrush habitats and GRSG populations have declined by approximately 50 percent (Schroeder et al. 2004; Homer et al. 2015; Doherty et al. 2022). Populations have been extirpated from Nebraska and British Columbia, and the species is now absent from almost half of its estimated historic distribution (Connelly et al. 2004; Schroeder et al. 2004; Knick and Connelly 2011; Hanser et al. 2018).

Population abundance has declined significantly over the last six decades, with rangewide declines of approximately 80% since 1965 and nearly 41% since 2004 (Prochazka et al. 2024). Although continued population declines over the entire species range are the overall trend, rates of change vary regionally (Coates et al. 2021). Declines in GRSG numbers and distribution are attributed primarily to the loss and degradation of sagebrush habitats (Connelly et al. 2000b; Schroeder et al. 2004; Knick and Connelly 2011; Hanser et al. 2018). The recent trends and condition of GRSG populations and habitat are further described below in **Section 3.2.2**, Conditions and Trends within the Planning Area.

Life History and Habitat Characteristics

GRSG persistence is linked to functioning sagebrush ecosystems containing minimal levels of human land use (Knick et al. 2013). Areas of occupation can range in size from 640 to over 64,000 acres to provide all seasonal life requirements (Beever and Aldridge 2011; Connelly et al. 2011a; Connelly et al. 2011b; Leu and Hanser 2011; Stiver et al. 2015). Sagebrush ecosystems are comprised of sagebrush–steppe and Great Basin sagebrush and contain various plant species composition (shrubs, perennial grasses, and forbs), essential for food, cover, and nesting habitat (Connelly et al. 2000). General habitat characteristics for rangelands supporting GRSG were reported by Braun et al. (1976) and later updated by Connelly et al. (2000) and others. These include local consideration of sagebrush shrub cover, annual precipitation (e.g., arid, mesic), herbaceous understory and soils (Connelly et al. 2000). GRSG distribution is strongly correlated with the distribution of sagebrush habitats (Schroeder et al. 2004; Connelly et al. 2011b; Doherty et al. 2016), especially with big sagebrush (e.g., Wyoming big sagebrush, mountain big sagebrush, and basin big sagebrush) (Braun et al. 1976; Connelly et al. 2000; Connelly et al. 2004; Miller et al. 2011). The behavioral complexity of the species (e.g., migratory or resident population), local variability of ecological sites, and quality and quantity of sagebrush and herbaceous understory influence population structure, which is thought to be highly clustered (Doherty et al. 2016; Coates et al. 2021). Landscape cover of sagebrush was identified as an important predictor of GRSG habitat, whereas conifer canopy cover and anthropogenic development were correlated with reductions in habitat selection across the GRSG range (Doherty et al. 2016). Additionally, GRSG within fragmented habitats (e.g., agricultural conversion, conifer encroachment) had lower tolerance to disturbances, suggesting effects vary across the range.

As a landscape-scale species, GRSG move between habitats seasonally, requiring large, interconnected winter, breeding, nesting, and summering areas to sustain a population (Connelly et al. 2011b; Doherty et al. 2016; 2022; Cross et al. 2018; Oyler-McCance et al. 2022). These habitat requirements increase their vulnerability to habitat loss, fragmentation and degradation from development, infrastructure, improper grazing management, and other disturbances (Connelly et al. 2011b; Doherty et al. 2016). GRSG populations have been found to be both non-migratory and migratory in their spatial and temporal distribution. Non-migratory populations often move 5 to 6 miles between seasonal habitats and use home ranges no more than 25,600 acres in size while annual movements of migratory populations may be 9 to 60 miles and have home ranges that cover hundreds of square miles. Seasonal population movements also vary by the amount of GRSG habitat available and year-to-year conditions. Populations in areas with a large amount of contiguous habitat move longer distances than those in isolated habitats (Dahlgren et al. 2015). There was significant variation it movement distances within and among sites across Wyoming (Fedy et al. 2012).

GRSG have a strong site fidelity to established nesting habitat and other seasonal habitats, suggesting resistance of individuals to adjust to changing habitat conditions (Holloran and Anderson 2005; Doherty et al. 2010; Holloran et al. 2010). Individuals may use currently unsuitable seasonal habitats, reflecting their fidelity to previous conditions in that area (Connelly et al. 2004; Knick and Connelly 2011; Dahlgren et al. 2015, 2016; Fregmen et al. 2016; Caudill et al. 2016).

During the spring breeding season males congregate at leks, traditional strutting grounds, to perform courtship displays to attract females. GRSG leks are generally found in areas with low, sparse vegetation with higher amounts of bare ground, surrounded by adjacent sagebrush habitat (Scott 1942; Patterson 1952, Klebenow 1985; Bradbury et al. 1989). Leks also include old fire scars, sparse hillsides, roads or pipeline scars. Lekking sites remain fairly consistent year-to-year and there is evidence that some leks have been in use for up to 130 years.

Productive nesting areas are typically characterized by sagebrush with an understory of native grasses and forbs, with horizontal and vertical structural diversity that provides an insect prey base, herbaceous forage, and cover for the hen while incubating eggs (Gregg et al. 1994; Connelly et al. 2000; Connelly et al. 2004; Connelly et al. 2011a). These areas also provide GRSG chicks with insects and forbs, essential nutritional components for chick survival and development (Klebenow and Gray 1968; Johnson and Boyce 1990; Connelly et al. 2004; Thompson et al. 2006). Some recent studies have shown mixed support for relationship between grass height and GRSG nest survival (Smith et al. 2018). After correcting for plant phenology (i.e., the timing of vegetation surveys), successful nests had high horizontal cover and total shrub cover during nesting and late brood rearing (Gibson et al. 2016). Taller perennial grasses (>12.1 centimeters) were associated with successful nests in xeric but not mesic sites because grasses were less available in xeric sites (Coates et al. 2017). Shrub canopy and grass cover provide concealment for GRSG chicks (Barnett and Crawford 1994; Gregg et al. 1994; Connelly et al. 2004).

Summer use areas include sagebrush habitats as well as riparian areas and wet meadows that provide an abundance of forbs and insects for both hens and chicks (Schroeder et al. 1999). GRSG gradually move from sagebrush uplands to more mesic areas (moist areas, such as streambeds or wet meadows) during the late brood-rearing period in response to summer desiccation of herbaceous vegetation in the sagebrush uplands (Connelly et al. 2000; Knick and Connelly 2011; Donnelly et al. 2016). Late brood-rearing habitats are often associated with sagebrush, and selection is based on shrub cover as well as the availability of forbs, correlated to a shift in the diet of chicks as they mature (Connelly et al. 1988 and references therein; Connelly et al. 2011a; Coates et al. 2017).

In the fall, GRSG transition to winter habitats. The timing of this transition depends largely on the weather. GRSG generally remain in summer habitat until plant phenology or frost eliminates the succulent vegetation. At this time, they move to their winter habitat and transition their diet to mostly sagebrush (Knick and Connelly 2011). These movements may include migrations of less than 37 miles (60 km), with the longest known migration occurring is approximately 75 miles (120 km) (Smith 2012). GRSG select winter-use sites based on sagebrush availability above the snow, which is influenced by snow depth, topographic factors (e.g., slope, aspect, elevation), environmental factors (e.g., wind speed, snow hardness), and vegetation characteristics (e.g., canopy cover, shrub height) (Smith et al. 2016).

Threats

Proximate reasons for population declines differ across the GRSG distribution, but ultimate underlying cause is loss, fragmentation, and/or degradation of suitable sagebrush habitat. The quality and quantity of sagebrush habitat has declined over the last 50 years to the extent that expanses of unfragmented sagebrush are rare across the landscape (Connelly et al. 2000; Miller and Eddleman 2001; Aldridge and Brigham 2003; Pedersen et al. 2003; Connelly et al. 2004; Schroeder et al. 2004; Leu and Hanser 2011; Homer et al. 2015). Habitat loss is attributed to large-scale conversions to cultivated croplands or pastures, increasing wildfire frequencies facilitating annual nonnative grass and noxious weed dominance at lower elevations, conifer encroachment, improper livestock grazing, herbicide use and chaining to reduce sagebrush, crested wheatgrass seedings, mineral and energy development, wild horse grazing, and recreational activities related to urban growth and increased human populations (Manier et al. 2013; USFWS 2013). Pinyon-juniper expansion and infill occurs from low to high elevations, especially in Nevada's Basin and Range GRSG habitats (Miller et al. 2011). Currently, sagebrush communities and GRSG continue to be at risk from multiple stressors acting across multiple scales (Manier et al. 2013; Hanser et al. 2018; Connelly et al. 2011b; Doherty et al. 2022).

Parts of the planning area have experienced severe habitat degradation from undesirable annual invasive species, including cheatgrass (*Bromus tectorum*), medusahead wildrye (*Taeniatherum caput-medusae*), and ventenata (*Ventenata dubia*). Invasive plants, including cheatgrass, alter plant community structure and composition, productivity, nutrient cycling, and hydrology and may competitively exclude native plant populations. The presence of invasive annual grasses can also change wildfire cycles, creating a positive feedback loop between wildfire frequency and invasive annual grass persistence, precluding reestablishment of sagebrush and reduce or eliminate vegetation that GRSG use for food and cover (Manier et al. 2013; Hanser et al. 2018). Warming trends may further exacerbate this cycle, preventing natural recovery in those areas and requiring active management approaches (Hanser et al. 2018; Pyke 2011). While wildfire is a primary factor facilitating annual grass invasion, annual grasses are also able to invade in landscapes that have not been burned for decades (Smith et al. 2023).

The expansion of native juniper (*Juniperus* spp.) and pinyon (*Pinus* spp.) woodlands (pinyon-juniper) can also contribute to GRSG habitat loss. Pinyon-juniper expansion intensifies avian predation threats by providing perch sites and nesting substrate for raptors and corvids (Prochazka et al. 2017), as well as changing vegetative understories. Studies have shown that GRSG incur population-level impacts as low as 4 percent of conifer encroachment (Baruch-Mordo et al. 2013). In addition, Douglas-fir (*Pseudotsuga menziesii*) expansion into GRSG habitat has occured in Montana (USGS 2011).

Wild horse and burro grazing disturbances have negatively influenced sage-grouse lekking activities (Muñoz et al. 2021), at times restricting GRSG breeding activities to areas that have not been disrupted by free-roaming horses. Sage-grouse population growth is sensitive to breeding success and can be impacted by wild horse and burro disturbances that degrade sagebrush ecosystems (Coates et al. 2021).

Predation is a common cause of mortality for GRSG (Connelly et al. 2011b; USFWS 2013; Conover and Roberts 2016), but it is not considered a threat to the persistence of the species (USFWS 2010a). Predators of GRSG include golden eagles (*Aquila chrysaetos*), great horned owls (*Bufo virginianus*), coyotes (*Canis latrans*), and common ravens (*Corvus corax*). Populations of golden eagles, great horned owls, and coyotes have not increased during the last century, so they likely have not contributed to GRSG population declines (Conover and Roberts 2016). However, populations of ravens in the West have increased due to anthropogenic causes (Conover and Roberts 2016; Boarman 2003; Boarman et al. 2006; USFWS 2023). This increase has caused an elevated predation rate on GRSG, which may be a contributing factor to the decrease in GRSG populations, particularly where sagebrush habitat conditions are poor (Conover and Roberts 2016; Coates et a. 2016; USFWS 2023).

3.2.2 Conditions and Trends within the Planning Area

Population, Abundance, and Trends

Lek count data have been widely used to monitor GRSG population trends and are considered a reasonable index to relative abundance (Reese and Bowyer 2007; Doherty et al. 2010, 2016). Because demographic properties, such as rates of population change, are affected by environmental and intrinsic factors that operate on different spatial and temporal scales (Gurevitch et al. 2016), clustering leks into hierarchical levels can help detect changes in abundance that are more likely driven by demographic rates. Pronounced clustering has been documented in GRSG populations within each management zone (i.e., Southern Great Basin, Snake River Plain, Northern Great Basin, Wyoming Basin, and Northern Great Plains; Doherty et al. 2016; see **Map 3.1** in **Appendix 1**). This suggests the species is vulnerable to those landscape-level risks that occur in high-density areas because they could negatively affect large proportions of the populations (Doherty et al. 2016).

New research has incorporated lek count variation and habitat selection into population estimates to more accurately reflect abundance and changes across different spatial and temporal scales (Baumgardt et al. 2017; Fremgen et al. 2016; Fremgen et al. 2017; McCaffery et al. 2016; Monroe et al. 2016). Coates et al. (2021) clustered GRSG leks to develop a multi-scale hierarchical population structure that can be used to assess population trends. Estimated trends show 37.0, 65.2, and 80.7-percent declines in abundance rangewide during short (17 years), medium (33 years), and long (53 years) temporal scales, respectively (see **Map 3.2** in **Appendix 1**). However, trends varied spatially and some areas exhibited evidence of increasing trends in recent decades. In general, population clusters at the periphery of the species range showed higher probabilities of extirpation relative to interior clusters (see **Map 3.3** in **Appendix 1**).

The use of statistical models applied to time series lek count data have also improved the understanding of GRSG population fluctuation. There is substantial variation in how GRSG populations fluctuate across space and through time. Populations in core range (Great Basin and Wyoming Basin) exhibited the most consistent fluctuation but with smaller differences between population highs and lows (Row and Fedy 2017). Trends for marginal populations did not follow expected fluctuations, and large-scale spatial synchrony among populations weakened as fluctuations weakened. Length between fluctuation for most populations also decreased with time.

Genetic Structure and Connectivity

Genetic variation and the dispersal of individuals are necessary to maintain GRSG resilience to current and future environmental and demographic stochasticity and anthropogenic effects. Several studies have used genetic network models to delineate subpopulations, which theoretically represent the core of each distinct genetic group and identify areas of increased importance to GRSG genetic connectivity (Cross et al. 2023; Cross et al. 2018; Oyler-McCance et al. 2022; see **Map 3.4** in **Appendix 1**). Areas outside of subpopulation centers are likely important for maintaining overall connectivity by allowing different genetic groups to converge (Cross et al. 2018; Oyler-McCance et al. 2022). However, subpopulation centers help maintain genetic diversity, as well as other "hubs" important for connectivity (Cross et al. 2018; Oyler-McCance et al. 2022) were identified as high priority for targeted conservation efforts. Areas outside subpopulation centers are also priorities for conservation to protect areas where different genetic groups converge maintain overall connectivity. Translocations have been recommended to reestablish and sustain genetic diversity in declining GRSG populations. Low genetic diversity has been shown to be coupled with declining population trends, suggesting relatively high conservation concern.

Gene flow is greater, and genetic differentiation less in areas of contiguous habitat in eastern Montana, most of Wyoming, much of Oregon, Nevada, and parts of Idaho. In contrast, areas of fragmented habitat such as in Utah exhibited the greatest genetic differentiation and lowest effective migration (Oyler-McCance et al. 2022). Migration rates were lower than expected and functional connectivity was constrained in central Wyoming east of the Continental Divide (Row et al. 2018; Oyler-McCance et al. 2022; see **Map 3.6** in **Appendix 1**).

Empirical evidence on the mechanisms governing the exchange of genetic information among populations shows that affinity to breeding leks can inherently restrict gene flow and provide a mechanism for maintaining localized genetic structure (Cross et al. 2016, 2017; Jahner et al. 2016). Additionally, landscape and habitat features, such as terrain ruggedness, may cause dispersing GRSG to avoid certain areas and affect connectivity between populations (Row et al. 2018). However, increased habitat suitability, especially during nesting and winter periods, decreased anthropogenic effects on the landscapes, and increased landscape connectivity can facilitate higher rates of gene flow that are important for population persistence (Cross et al. 2017; Jahner et al. 2016; Knick et al. 2013; Row et al. 2015, 2016). Research suggests minimum thresholds for sagebrush land cover across the landscape for GRSG persistence. One study showed 90% of active leks occurred on landscapes that were at least 40% dominated by sagebrush, while others have shown 25% to 30% sagebrush within 18- and 30-km scales (Aldridge et al. 2008; Wisdom et al. 2011). The rangewide map of habitat and genetic connectivity indicates areas that are important to genetic exchange and population persistence (see **Map 3.5** in **Appendix 1**).

Habitat Conditions and Trends

The distribution of GRSG is closely aligned with the distribution of sagebrush-dominated landscapes (Schroeder et al. 2004), and occupancy is associated with measures of sagebrush abundance and distribution. Sagebrush area (percentage of 18-km radius composed of sagebrush cover types) was the single best discriminator between occupied and extirpated ranges among 22 variables evaluated by Wisdom et al. (2011). Across the planning area, sagebrush vegetation communities still occur on approximately 109,131,000 acres across the planning area (**Table 3-1**, Comparative Summary of Greater Sage-Grouse Habitat Management Areas by State by Alternative, in **Appendix 9**).

Existing Habitat Management Areas

Currently, the BLM delineates GRSG habitat into management areas to help prioritize habitat and conservation activities while providing management flexibility. GRSG habitat management areas (HMAs) were identified during previous land use plan amendments based on considerations of GRSG occupancy, landscape, habitat and land use/adaptive management opportunities as described below. HMAs have been revised in some instances through plan maintenance actions.

PHMAs are considered those areas with the highest value for maintaining sustainable GRSG populations. Management within PHMAs is the most restrictive, designed to promote GRSG conservation. Sagebrush Focal Areas (SFAs), a subset of PHMA, are areas identified as "strongholds" with the highest densities of GRSG and habitat connectivity and persistence. Remaining suitable habitat is designated as GHMAs, which are either occupied seasonally or provide year-round habitat where some special management would apply. The GHMA designation is the least restrictive due to generally lower occupancy of GRSG and more marginal habitat conditions.

The RMP Amendments in Idaho and Nevada include additional habitat management area categories. Important Habitat Management Areas (IHMA) in Idaho are closely aligned with PHMA, but management is somewhat less restrictive, providing additional management flexibility. Other Habitat Management Areas (OHMA) in Nevada and Northeastern California are lands identified as previously unmapped habitat that are within the planning area and contain seasonal or connectivity habitat areas. The corresponding management for these other HMA categories is discussed in the previous RMPAs.

The acres of each HMA in the planning area are shown in **Table 3-1 (Appendix 9)**.

Habitat Assessment Framework

The Habitat Assessment Framework (HAF) fills the need for a multiple-scale, Sage-Grouse habitat assessment tool that can be easily integrated into the BLM landscape monitoring approach. The HAF established indicators to determine the status of Sage-Grouse habitat needs at multiple scales and for seasonal habitats. The results of these assessments provide necessary information to evaluate whether the BLM managed lands are meeting the Sage-Grouse land health habitat standard.

GRSG occupy large geographic extents and experience a high degree of spatial heterogeneity in biotic and abiotic variables across their range (Doherty et al. 2016; Coates et al. 2021). The general condition and trend of habitats on BLM-administered lands varies by geographic area within the region and is a result of various threats that are currently occurring or have occurred historically. The HAF was established to account for this variation and describes habitat suitability at different spatial scales (Stiver et al. 2015). The orders of habitat selection are hierarchical, in which each higher order is dependent on the previous order (Johnson 1980; Stiver et al. 2015):

- First-order (broad-scale): The physical or geographical range of a species (Johnson 1980). GRSG range is defined by populations of GRSG associated with sagebrush landscapes (Connelly et al. 2003).
- Second-order (mid-scale): Population areas; dispersal between subpopulations. These may include as many as 39 discrete populations (USFWS 2013).
- Third-order (fine-scale): Home range of isolated populations, subpopulations, or an individual, which is determined in part by the quality and the comparison of resources within and between seasonal habitats. Relevant ecological processes are those that may affect movements between seasonal habitats within a home range.

- Fourth-order (site-scale): The use of a particular nesting, feeding, or roosting site within one particular seasonal habitat. Ecological processes consider seasonal habitat needs related to the life requisites of shelter, food, and breeding.

Space is a significant life requisite for GRSG at all scales – pathways for movement within and between populations are critical for maintaining population viability, while access to well-connected sagebrush patches that provide dispersal and movement among subpopulations is essential for GRSG population viability and long-term persistence. At the fine scale, habitat availability, security, and connectivity within home ranges are important for securing seasonal movements to shelter and food needs. Shelter and food availability at the site-scale directly affects individual fitness, survival, and reproductive potential (Stiver et al. 2015).

The GRSG mid-scale HAF areas are shown in **Map 3.7** in **Appendix 1**, and the fine-scale HAF areas are shown in **Map 3.8** in **Appendix 1**.

Sagebrush Ecological Integrity

Advances in research have built upon the emerging understanding of the importance of multiscale habitat selection (Johnson 1980) and how landscape context affects GRSG habitat selection, survival, and population persistence (Aldridge and Boyce 2007; Aldridge et al. 2008; Doherty et al. 2008; Connelly et al. 2011b; Wisdom et al. 2011; Knick et al. 2013; Doherty et al. 2016; Coates et al. 2021). This work has identified the need for large intact sagebrush landscapes with minimal disturbance that provide all seasonal components required to meet GRSG life history needs. Geographical patterns in sagebrush ecological integrity were positively linked to GRSG population performance (Doherty et al. 2022). Therefore, conservation actions in those areas identified as having high sagebrush ecological integrity may be most beneficial.

Probability of Breeding Habitat and Lek Persistence

Breeding habitat is highly condensed within GRSG occupied range, and comprises 26% of the current range (see **Map 3.9** in **Appendix 1**). General habitat variables and climatic gradient variables were more important than disturbance variables in predicting occupied breeding habitat across the species' range. However, the human disturbance resulted in the sharpest probability distribution declines once identified thresholds were crossed (Doherty et al. 2016). GRSG response to sagebrush varies across the range with strong selection for landscape-level sagebrush and a strong avoidance of tree cover. Thresholds of disturbance factors (i.e., tillage, conifer, human disturbance index) also varied across the range (Doherty et al. 2016).

Rangewide lek persistence was modeled as a function of environmental covariates, including sagebrush cover, pinyon-juniper cover, topography, precipitation, point and line disturbance densities, and landscape configuration metrics (Wann et al. 2023). Five of these covariates showed significant regionally varying responses: sagebrush clumpiness (a measure of habitat aggregation), pinyon-juniper cover, point disturbance of anthropogenic features such as energy infrastructure and communication towers, elevation, and a topographic index associated with mesic habitats. The highest quality habitat (capturing 50% of active leks) was estimated as covering 25.5% of the occupied range, while the combined lowest through highest quality habitats (capturing 95% of active leks) covered 65.0% (see **Map 3.10** in **Appendix 1**). These results suggest that habitat management planning should consider regional environmental differences in addition to broader-scale habitat requirements (Wann et al. 2023).

Persistent and Emerging Threats

Interactions Between Climate Change, Wildfire, and Invasive Species

Over the past century, changing trends in temperature, precipitation, and atmospheric CO_2 have altered vegetation community composition and species distributions across the western US (Polley et al. 2013; Lucht et al. 2006; USGCRP 2018), resulting in changes to the composition and availability of sagebrush (Schlaepfer et al. 2015; Still and Richardson 2015). Research predicting sagebrush responses to changing climate has helped identify areas where climate change poses the greatest threat to GRSG habitat. Projections suggest geographically divergent responses of big sagebrush to climate change with changes in biomass ranging from −20% to +27% (Palmquist et al. 2021; see **Map 3.11** in **Appendix 1**). Decreases in sagebrush cover were projected across much of its range, although some increases were projected in Wyoming, the Northern Great Basin, and eastern Montana (Rigge et al. 2021; see **Map 3.12** in **Appendix 1**). Warmer, drier sites are likely more susceptible to sagebrush reductions compared with cooler, wetter sites (Rigge et al. 2021; Adler et al. 2018; Flerchinger et al. 2019; Palmquist et al. 2021). GRSG may have the ability to move to areas that are currently cooler and wetter, as long as the new regions are suitable and available for sagebrush expansion (BLM 2013a; Knick et al. 2013).

Within the planning area, California, Nevada, and Utah have experienced particularly severe and prolonged drought (Belmecheri et al. 2015; Griffin and Anchukaitis 2014), which, based on climate models, are expected to become more intense rangewide (BLM 2020; NOAA 2022; see **Section 3.13.1**, Air Resources, *Climate Change and Greenhouse Gases*). This drought has caused changes to vegetation conditions, including lower sagebrush canopy cover, reduced perennial grass and forb production, and changes to food resource availability (See **Section 3.3**, Vegetation). Such changes could trigger mismatches in timing between resource availability and GRSG life-history needs. Because GRSG population abundance is positively related to mesic availability (Donnelly et al. 2016, 2018), weather-driven productivity has been identified as a key factor influencing GRSG survival (Blomberg et al. 2013; Guttery et al. 2013; Donnelly et al. 2018). A diversity of mesic resources (e.g., rangelands, riparian, and wet meadows) may help sustain GRSG populations over time, but regional drought sensitivity may influence demographic performance differently across the species range (Donnelly et al. 2018).

Sagebrush habitats with low resistance and resilience to invasion by exotic annual grasses are also more likely to be negatively affected by climate changes (Adler et al. 2018). Climate change may worsen the spread of invasive species, such as cheatgrass, medusahead, and ventenata, by increasing the severity of droughts, reducing precipitation, or altering wildfire cycles (BLM 2013a; USGCRP 2018). Climate change models indicate less precipitation may occur from July through August in lower elevation sites; this may favor cheatgrass, which becomes dormant in summer, over native perennials, which depend on summer moisture for growth. Elevated temperatures due to climate change may increase the competitive ability of cheatgrass at higher elevations, expanding its range into sites where it currently is not widespread. Climate change may increase the spread of woody plants such as juniper at higher elevations due to increased precipitation in winter and spring and warmer temperatures, which may increase wildfire risk (BLM 2013a).

Disease Relative to Climate Change

GRSG are highly susceptible to mortality from West Nile virus, the zoonotic disease transmitted by mosquitoes and other anthropods (Clark et al. 2006; Naugle et al. 2004; Clark et al. 2006). Climate change is expected to increase the risk of exposure to West Nile virus because warmer temperatures associated with climate change can lengthen the mosquito breeding season, biting rates, and the incubation of the disease within a mosquito. Climate change may also likely alter GRSG ecology and physiology, as well as the mosquitoes that play a role in disease transmission and maintenance. During periods of drought, which are expected to be more frequent and possibly more intense under climate change, GRSG may also move toward water earlier in the year and, subsequently, come into contact with mosquitoes for longer periods during the transmission season (Naugle et al. 2004). The combined impacts of predicted climate change on sagebrush habitat and West Nile virus transmission are likely to reduce suitable GRSG habitat in the northern Great Plains and northern Rockies (Schrag et al. 2011).

Renewable Energy Development

There has been increasing interest in renewable energy development and many areas that are promising for wind, solar, and geothermal energy development overlap with GRSG habitat (Hanser et al. 2018). Due to negative impacts to GRSG associated with non-renewable energy development, is concern that renewable energy development may also have negatively affect GRSG habitats and populations (NWCC 2017; Hanser et al. 2018). For example, disturbance associated with existing energy infrastructure and human activity has been linked to reproductive costs incurred by GRSG exposed to diverse energy development. Female GRSG avoided areas where discrete disturbance was high during nesting and brood-rearing, and survival of nests and broods were highest in areas that had the least amount of disturbance. This indicates the importance of minimizing disturbance to maintain viable GRSG populations (Kirol et al. 2020).

Impacts from renewable energy development generally include direct habitat loss and fragmentation due to facilities, access roads, and transmission lines as well as disturbance and habitat avoidance from noise and increased human presence. Solar facilities in particular require a large land area and high water consumption (Hanser et al. 2018). Geothermal power is expanding, and while little is known regarding impacts of geothermal energy on wildlife populations, recent research suggests GRSG are adversely affected. GRSG experienced decreased nest and adult survival near geothermal infrastructure (Coates et al. 2023). Ravens also increased in density around geothermal plants, potentially increasing predation risk to GRSG (Coates et al. 2023).

Research has suggested that the sensitivity of GRSG to wind energy development varies with the life history stage and distance from disturbance (NWCC 2017). Brood site selection and summer habitat selection were both negatively affected by surface disturbance, such as cleared ground related to roads and turbine pads. Females raised broods in habitats with lower densities of turbines and access roads out to 1.2 km from the facility. At a wind facility in Wyoming, lek counts declined more severely near wind infrastructure after a 3 or 5-year time lag and the relative probability of GRSG selecting brood-rearing and summer habitats was negatively correlated with the percentage of surface disturbance associated with the facility infrastructure (LeBeau et al. 2017a, 2017b). Effects of wind infrastructure on lek attendance were weakly evident within 1.5 km from a turbine. However, survival rates were higher on the wind facility site relative to the undisturbed site, possibly due to lower numbers of avian predators (LeBeau et al. 2017b). Further research is needed to increase the understanding of the relationship between wind energy development and GRSG populations.

Predation

Predation, including hunting, is a common cause of direct mortality for GRSG during all life stages (Connelly et al. 2011b; USFWS 2013; Conover and Roberts 2016), but it is not considered a threat to the persistence of the species in areas where habitat is not limited and of good quality (USFWS 2010a). However, predation may limit population growth in fragmented habitats or areas where predator populations have supplemental food sources, such as landfills (Coates 2007), or where electrical transmission or other human-made structures facilitate nesting and perching by avian predators such as ravens (Howe 2012; Hagen 2011).

In particular, increased common raven (*Corvus corax*) populations as a result of anthropogenic subsidies (Boarman 2003; Boarman et al. 2006, USFWS 2023) have caused elevated predation rates on GRSG, which may have contributed to the declining GRSG populations in some areas in recent decades (Conover and Roberts 2016; Coates et al. 2016). In one study the majority (64%) of projected GRSG breeding concentration areas across the Great Basin and adjoining ecoregions had raven densities associated with below average GRSG nest survival, suggesting predation as a result of elevated raven numbers is a more widespread and greater threat than wildfire (Coates et al. 2020). Anthropogenic factors that contribute to greater raven occurrence include livestock presence, increased road density, presence of transmission lines, agricultural activity, and presence of roadside rest areas (O'Neil et al. 2018; Coates et al. 2016).

Wild Horses

The Wild Free-Roaming Horses and Burros Act of 1971 was created to manage population levels of herds to facilitate and protect "a thriving natural ecological balance" (Coates et al. 2021). The BLM was tasked to establish appropriate management levels (AMLs) for each herd management area to balance the multiple use mandate (Coates et al. 2021; BLM 2010). In recent years, the population of wild horses on public land has greatly increased. In Nevada, the current population estimate is 46,974 wild horses, which exceeds the BLM's AML upper limit of 11, 987 by 367% (Munoz et al. 2021).

Recent research suggests wild horses can directly and indirectly disrupt native wildlife populations within sagebrush ecosystems (Munoz et al. 2021). Wild horse presence causes fragmented and reduced shrub cover, increase soil compaction and erosion, and may contribute to the spread of invasive grasses (Coates et al. 2021; Munoz et al. 2021; Henning et al. 2021). Wild horses may be a particular threat during the lekking season. Research suggests that male GRSG respond differently when native (pronghorn and mule deer) and non-native (wild horses and cattle) ungulates are on established leks (Munoz et al. 2021). GRSG continue to display at leks when native ungulates are present, but they are not usually detected when non-native ungulates are present (Munoz et al. 2021).

3.3 VEGETATION

Vegetation provides many ecosystem services, including, but not limited to, stabilizing soils, preventing erosion, absorbing carbon dioxide, releasing oxygen, increasing species diversity, and providing habitat and food for animals and products for human use. Many land management policies are directed toward maintenance of healthy vegetation communities (Fattet et al. 2010; Yapp et al. 2010; Lawler et al. 2014).

Land Monitoring Frameworks (LMF) and field office collected Assessment, Inventory, and Monitoring (AIM) data provide estimates for consistent contextual information about habitat conditions (Herren et al. 2021). AIM data represent one of the largest available datasets to inform resource management decisions on BLM lands. The LMF is a component of the AIM strategy and is used to assess and monitor renewable resources on BLM-managed rangelands in 13 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming). LMF and AIM would be used to evaluate whether quantitative habitat objectives are met within seasonal habitats within HMAs.

GRSG rely on sagebrush ecosystems for all aspects of their life cycle. Typically, a range of sagebrush community composition within the landscape (including variations in sub-species composition, co-dominant vegetation, shrub cover, herbaceous cover, and stand age), along with the use of riparian and wet meadow areas, is needed to meet seasonal requirements for food, cover, nesting, and wintering habitats. Since GRSG require large landscapes, the ecology, management, and conservation of large, intact sagebrush ecosystems goes hand-in-hand with managing for the dynamics and behaviors of the populations themselves (Connelly et al. 2004; Crawford et al. 2004). Intact sagebrush does not imply uniform coverage of sagebrush across the ecosystem, but a mosaic of shrub, grassland, and riparian cover across the landscape that allows for migration of GRSG between seasonal habitats (Connelly et al. 2011). In addition, riparian and wetland areas provide important seasonal habitat, water, and forage for GRSG. See section 3.2.1 *Life History and Habitat Characteristics* for an in-depth discussion of GRSG habitat characteristics and requirements.

Historically, sagebrush-dominated vegetation was one of the most widespread habitat types in the US, but its expanse has been fragmented, lost, or altered by invasive plant species and anthropogenic disturbance (NTT 2011). Current protection of GRSG habitat involves restrictions and limitations on activities that contribute to the spread of invasive plant species, wildfire, and habitat fragmentation, reducing other surface disturbances, and management of vegetation to promote healthy sagebrush and understory vegetation to support GRSG. Some habitat loss associated with energy development, infrastructure, wildfire, and invasive plants will likely continue into the future.

There are two main sagebrush dominant vegetation communities: sagebrush steppe and sagebrush shrublands (Kuchler 1970). The sagebrush steppe resembles a semiarid grassland and is characterized by a mosaic of perennial bunchgrasses and forbs with sagebrush shrubs. Sagebrush shrubland resembles more of an arid, desert ecosystem with fewer grasses and forbs and sagebrush dominates (Arizona 2023). The open density, erosive soils, and low herbaceous cover of the sagebrush shrubland type contribute to the vulnerability of this sagebrush type to plant invasions (Barbour and Billings 2000).

Within both the sagebrush steppe and sagebrush shrubland types there are several different community types. The dominant community types are calculated and presented in acres by state within HMAs (**Table 3-1** [**Appendix 9**]), **Map 3.13** [**Appendix 1**]).

Table 3-1 (**Appendix 9**) and **Map 3.13** (**Appendix 1**) presents LANDFIRE EVT acres, which captures a number of different sagebrush, sagebrush-associated, and non-sagebrush communities. Several representative vegetation community types within each of those three categories are discussed below, but LANDFIRE EVT includes more communities included in the numbers above.

3.3.1 Representative Sagebrush Vegetation Communities

Wyoming Big Sagebrush/Grassland

The Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*)/grassland occurs in shallow-to-moderately deep soil at lower elevations, giving way to basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) in deeper soils and to mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) above 6,500 feet in elevation and within the 9- to 16-inch annual precipitation zones (Knight 1994). Shrub height varies from as little as six inches on shallow sites to around 30 inches in deeper soils. Canopy cover is usually under 30% which generally lower than observed in either basin or mountain big sagebrush.

Wyoming big sagebrush often appears as the dominant plant in mosaic communities intermixed with Gardner saltbush (*Atriplex gardneri*) and open grasslands. In shallow, rocky-to-gravelly soils, Wyoming big sagebrush may co-dominate with black sagebrush (*Artemisia nova*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and sometimes winterfat (*Krascheninnikovia lanata*). Grass and forb species vary depending on soil texture, aspect, and slope (Knight 1994). Common grass and grass-like species include bluebunch wheatgrass (*Pseudoroegneria spicata*) and thickspike wheatgrass (*Elymus lanceolatus*), Sandberg bluegrass (*Poa secunda sandbergii*) and mutton bluegrass (*Poa fendleriana*), Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread (*Hesperostipa comata*), threadleaf sedge (*Carex filifolia*), and bottlebrush squirrel tail (*Elymus* *elymoides*). Common forbs include phlox (*Phlox spp.),* Hooker sandwort (*Arenaria hookeri*), onion (*Allium spp.)*, goldenweed (*Pyrrocoma spp.),* sego lily (*Calochortus nuttallii*), buckwheat (*Eriogonum* spp.) penstemon (*Penstemon spp.)*, Indian paintbrush (*Castilleja spp.)*, globemallow (*Sphaeralcea spp.),* and prickly-pear cactus (*Opuntia spp.)*.

Basin Big Sagebrush Shrubland

Basin big sagebrush shrubland is found in moderately deep-to-deep soils of all soil textures, in zones of ten to 16 inches of annual precipitation (Beetle 1960). It occurs as pockets within Wyoming big sagebrush and Gardner saltbush communities, as the dominant plant type along valley bottoms and canyons, and along ephemeral washes. This subspecies of big sagebrush may reach 12 feet in height, with canopy cover reaching 70%.

Basin big sagebrush mixes with serviceberry *(Amelanchier spp.),* green and rubber rabbitbrush (*Ericameria nauseosa*), snowberry (*Symphoricarpos spp.),* bitterbrush (*Purshia tridentata*), silver sagebrush (*Artemisia cana*), and mountain mahogany (*Cercocarpus spp.),* depending on the soil depth, annual precipitation, and elevation. Grasses occurring in these communities include basin wildrye (*Leymus cinereus*), green needlegrass (*Nassella viridula*), Idaho fescue (*Festuca idahoensis*)*,* thickspike wheatgrass, Kentucky bluegrass (*Poa pratensis*) and mutton bluegrass, and bottlebrush squirrel tail. Common forbs include bluebell (*Mertensia spp.*), groundsel (*Senecio vulgaris*), onion, violet (*Viola spp.)*, buttercup (*Ranunculus spp.)*, sagebrush false dandelion (*Nothocalais troximoides*), buckwheat, penstemon, Indian paintbrush, lupine (*Lupinus spp.),* locoweed (*Oxytropis spp.)*, *Agoseris sp*., and prickly-pear cactus (Decker 2020).

Basin big sagebrush can provide important cover and habitat for wildlife species. In some areas it also provides critical winter habitat for GRSG when snow covers most other shrubs. Basin big sagebrush increases in density and cover as the dominant plant species, and to even a greater degree when associated with poor livestock management and/or interruptions in the wildfire cycle. The natural wildfire recurrence interval in the sagebrush type is approximately 30 to 75 years.

Mountain Big Sagebrush/Grassland

Mountain big sagebrush is located in shallow or moderately deep soils at elevations above 6,500 feet, in 9- to 20-inch annual precipitation zones (Innes 2018). This is one of the largest homogeneous communities of this sagebrush type in the United States. Mountain big sagebrush also occurs as smaller plant communities at the lower mountain elevations, intermixed with aspen (*Populus* spp.) and conifer woodlands. Shrub height will vary from eight to 60 inches, with canopy cover reaching 50% to 60%.

Mountain big sagebrush is usually the dominant shrub in foothill and mountain sage communities, with bitterbrush, serviceberry, snowberry, and mountain mahogany providing subdominant brush diversity. Grasses include Idaho fescue, king spike fescue (*Leucopoa kingii*)*,* needlegrass (*Achnatherum spp.)*, muttongrass, and Kentucky and big bluegrass; elk sedge (*Carex geyeri*), and Ross' sedge (*C. Rossii*). Common forbs found in these areas include Indian paintbrush, phlox, balsamroot (*Balsamorhiza spp.),* locoweed, lupine, larkspur (*Delphinium* spp.), penstemon, hawksbeard (*Crepis spp.)*, and Oregon grape (*Mahonia aquifolium*) (MTNHP 2023).

Mountain big sagebrush is limited as a food source for GRSG during the winter when these habitats become unavailable because of snow.

Silver Sagebrush/Grasslands

Silver sagebrush/grasslands have two subtypes with very different habitats. The most common is found in deep sandy soils and consists of silver sage as the dominant species. It is associated with basin big sagebrush, green rabbitbrush, serviceberry, chokecherry (*Prunus spp.),* and wood rose (*Rosa woodsii*). Herbaceous species include needle-and-thread, Indian ricegrass, poverty oatgrass (*Danthonia spicata*)*,* sand dropseed (*Sporobolus cryptandrus*)*,* scurfpea (*Pediomelum* spp.)*,* and prickly-pear cactus.

A second type of silver sagebrush is located in riparian habitat along streams above the wet sedge and willow riparian zone. This second riparian terrace is also habitat for basin wildrye, Kentucky bluegrass, streambank wheatgrass (*Elymus lanceolatus psammophilus*), redtop (*Agrostis gigantea*)*,* Baltic rush (*Juncus balticus*), clover (*Trifolium spp.),* checkermallow (*Sidalcea malviflora*), malva (*Malva sylvestris*), and, occasionally, cottonwood (*Populus spp.)* and willow (*Salix spp.)*.

Low Sages—Alkali, Birdsfoot, Black, and Wyoming Three-Tip Sagebrush/Grassland

Alkali sagebrush (*Artemisia arbuscula* ssp. *longiloba*) is found growing in clay soils and, as its name implies, can withstand soils of higher alkalinity than can other sagebrush species (Beetle and Johnson 1982; Knight 1994). It reaches six to 12 inches in height and occurs in relatively pure communities because of the high clay content and high cation exchange capacity in the soils in areas below 7,500 feet in elevation. Understory grasses include bluebunch wheatgrass, western wheatgrass (*Pascopyrum smithii*), mutton bluegrass, bottlebrush squirreltail, and Indian ricegrass. Forbs noted at this site include wild buckwheat (*Eriogonum ovalifolium*)*,* biscuit root (*Lomatium spp.)*, and wild onion.

Birdsfoot sagebrush (*Artemisia pedatifida*) is found in alkaline soils, where pH ranges from 8.5 to 11, and below 7,500 feet. It is a mat species, reaching only three to six inches in height. At lower pH levels, birdsfoot sage mixes with Gardner saltbush, and it appears with a mixture of grasses and forbs on windswept ridges and hills. At higher pH levels, birdsfoot sagebrush occurs as a monoculture.

Black sagebrush occurs on gravelly-to-rocky soils that have a "shallow effective" rooting depth (less than 15 inches) and various textures from sandy loams to clay loams. As a result, plant heights may vary between four and 12 inches. On the plains north of the Ferris and Seminoe Mountains, it is the principal shrub present, but it will often be intermixed with Wyoming big sagebrush. Above 7,400 feet, it gives way to Wyoming three-tip sagebrush. It also has been observed as an understory shrub in true mountain mahogany stands. On sandy sites, it is commonly found with needle-and-thread, threadleaf sedge, Junegrass (*Koeleria macrantha*)*,* sandwort, and buckwheat, whereas on loamy soils it will occur with wheatgrasses, bluegrasses, Indian ricegrass, phlox, onion, paintbrush, and penstemon.

Wyoming three-tip sagebrush (*Artemisia tripartita*) occurs above 7,000 feet in the foothills and at the higher elevations of the mountain ranges. It normally grows between four inches and 15 inches tall in moderately deep, well-drained soils (Beetle and Johnson 1982). It is often found intermixed with mountain big sagebrush and black sagebrush. Understory grasses and forbs include Idaho fescue, king spike fescue, Columbia needlegrass, elk sedge, Ross' sedge, Indian paintbrush, prairie clover (*Dalea spp.*), larkspur*,* balsamroot, phlox, and buckwheat. Wyoming three-tip sagebrush-dominated areas are often used as forage for wildlife.

3.3.2 Representative Sagebrush-Associated Vegetation Communities

Sagebrush-Associated Vegetation Communities are typically grasses and forbs species in shrub-dominated overstories and grass/forb-dominated understories that vary with geographic location, topography, soil, elevation, and climate throughout sagebrush ecosystems. Sagebrush steppe and shrublands vegetation follow a gradient of temperatures and moistures that may have perennial herbaceous species dominate or be co-dominant with sagebrush, depending on the last wildfire, insect outbreak, or climatic. (Arizona 2023).

Inter-Mountain Basins Mixed Salt Desert Scrub

Inter-mountain basins mixed salt desert scrub contains soils that are shallow to moderately deep, poorly developed, and often alkaline or saline. Salt desert shrubland is perhaps the most arid vegetation type in the intermountain West (Knight 1994). Gardner saltbush (*Atriplex gardneri*) dominates the salt desert shrub community type and in some instances occurs as up to 90 percent of the vegetation cover. Gardner saltbush normally grows no higher than 12 inches and may grow along the ground, forming a mat. These areas are characterized by accumulations of salt in poorly developed soils. Soils of these areas usually have a pH of 7.8 to 9, which restricts the uptake of water by all but the most salt-tolerant plants (halophytes). Soil textures can be sandy loam, sandy clay loam, or loam and clay. Salt desert shrublands occur at elevations between 5,000 and 7,600 feet within the lowest precipitation areas in the planning area (Arizona 2023). These areas are typically flat or rolling hills.

Rocky Mountain Gambel Oak-Mixed Montane Shrubland

The Rocky Mountain Gambel oak-mixed montane shrubland occurs in mountains, plateaus and foothills of the southern Rocky Mountains and Colorado Plateau, including the Uinta and Wasatch ranges and the Mogollon Rim. These shrublands are most commonly found along dry foothills, lower mountain slopes, and at the edge of the western Great Plains from approximately 6600 to 9500 ft in elevation and are often situated above pinyon-juniper woodlands (NatureServe 2022). Vegetation types in this system may occur as sparse to dense shrublands composed of moderate to tall shrubs. In many situations of this system, the canopy is dominated by the broad-leaved deciduous shrub Gambel oak (*Quercus gambelii*), which occasionally reaches small tree size. Climate is semi-arid and characterized by mostly hot-dry summers with mild to cold winters and annual precipitation of 10 to 25 inches (Reid 2022).

Northwestern Great Plains Mixed Grass Prairie

Mixed-grass prairie is characterized by needle-and-thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), Sandberg bluegrass (*Poa secunda*), threadleaf sedge (*Carex filifolia*), needleleaf sedge (*Carex duriuscula*), prairie junegrass (*Koeleria macrantha*), Indian ricegrass (*Achnatherum hymenoides*), prickly-pear cactus (*Opuntia* spp.), globemallow (*Sphaeralcea* spp.), fringed sagebrush (*Artemisia frigida*), sand dropseed (*Sporobolus cryptandrus*), threeawn (*Aristida purpurea*), little bluestem (*Schizachyrium scoparium*), and various species of milkvetch (*Astragalus* spp.) and locoweed (*Oxytropis* spp.). Summers in this area are cool, reducing evapotranspiration. Frequent thunderstorms in July and August maintain this grassland.

3.3.3 Nonsagebrush Vegetation Communities

Nonsagebrush communities are typically grasses and forbs species in pinyon-juniper dominated overstories and grass/forb-dominated understories that vary with geographic location, topography, soil, elevation, and climate throughout sagebrush ecosystems.

Pinyon-Juniper

Pinyon-juniper woodlands occupy dry woodland sites and grow on foothills, low mountains, mesas, and plateaus, depending on precipitation and soil conditions. These areas typically include portions of black sagebrush and Wyoming big sagebrush communities occupying the cooler and moister end of their range. It also includes cool and moist mountain big sagebrush and low sagebrush (*Artemisia arbuscula*) communities with moderately deep soils (Miller et al. 2013).

Plant species present in these areas vary widely. Typically, juniper dominates at lower elevations, and pinyon dominates at higher elevations. Pinyon and juniper woodlands are similar to semiarid communities where water and soil retention or losses are governed by structure, amount and cover of vegetation, inherent soil and topographic attributes, and climate. These semiarid woodlands occupy precipitation zones between 8 and 20 inches, elevations of less than 1,000 to over 8,000 feet, and a wide variety of soils and parent materials (Miller et al. 2019). In general, pinyon-juniper communities do not provide suitable habitat for GRSG, and further, mature trees displace shrubs, grasses, and forbs through direct competition for resources that are important components of GRSG habitat (Manier et al. 2013).

Pinyon-juniper woodlands naturally spread into sagebrush and perennial grass communities and have expanded across the landscape over the last 120 years (Miller et al. 2008; Rowland et al. 2008). Expansion has been greatest in cooler and/or moister portions of the landscape (Miller et al. 2013, Johnson and Miller 2006; Weisberg et al. 2007). Expansion largely coincides with soil temperature and moisture regimes that are cool to warm and moist, to cool and moist. Three phases of juniper succession are identified by Miller (2005). In Phase I, juvenile trees are present on site, with an occasional mature, seed-producing tree present, but shrub and herbaceous vegetation still maintain dominance of ecological processes (hydraulic, nutrient, and energy cycles). As juniper saplings develop in Phase I, GRSG use declines rapidly. In Phase II, trees are established on site and contribute an equal influence on ecological processes along with shrub and herbaceous species. Trees are increased in size and density in this phase. In Phase III trees have established dominance on the site and are the primary plant group influencing ecological processes. The expansion of pinyon-juniper communities has been attributed to the reduced role of wildfire, introduction of livestock grazing, increases in global carbon dioxide concentrations, climate change, and natural recovery from past disturbance (USFWS 2010a).

Table 3-2 [**Appendix 9**] shows PHMA and GHMA acreage found within the percentage of the project area that is covered by conifer species in the states of California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Wyoming., which is also depicted in **Map 3.14**[1] (**Appendix 1**).

Riparian and Wetlands

Riparian vegetation includes plants requiring higher amounts of available water than those found in adjacent upland areas and are generally associated with water courses and wet meadow areas (Decker et al. 2020). Riparian areas, wetlands, and wet meadows provide valuable GRSG late summer brood rearing habitat because these areas provide succulent forbs and insects later in the summer when most forbs in upland habitats have dried out and are senescent (Connelly et al. 2011). These communities make up a small percentage of the vegetation in relation to other types but are important in providing seasonal habitats.

Invasive Annual Grasses

All invasive plant species adversely affect GRSG habitat quality by competing with and displacing native species (Dardis et al. 2016). Invasive annual grasses are the most problematic due to the expense and low success rate in restoration and the dramatic shortening of wildfire frequencies where these grasses dominate. Invasive plants were present on nearly 70 percent of GRSG habitat in 2018 (Herren et al. 2021).

Cheatgrass and medusahead (*Taeniatherum caput-medusae*) are the two most aggressive non-native invasive species found in the planning area and comprise about 15% of vegetation on average (Herren 2021). These species are prolific seed producers and can out-compete native plants for valuable resources such as water and nutrients. These grasses germinate in the fall and early spring and are adapted to thrive in low moisture

[1] The Falkowski et al. 2017 data used to create **Map 3.14** does not cover the entire planning area.

conditions (Tilley 2023). Throughout the west, the number and size of infestations have increased in size and density over the last 20 years.

Cheatgrass is usually matured and cured by early to mid-June, while most native herbaceous species cure in late July and early August. In areas where cheatgrass has replaced native species, earlier and more frequent wildfire can occur, causing further damage to native plant species. With an increased wildfire frequency, conversion to annual grasslands is likely and an increase in other invasive species such as Russian-thistle (*Salsola* spp.) and rush skeletonweed (*Condrilla juncea*), can replace native plants in previously sagebrush dominated ecosystems.

The invasive annual grass ventenata, or North Africa grass (*Ventenata dubia*), is an emerging concern that is spreading quickly through the planning area. Ventenata differs from cheatgrass in that it prefers wetter conditions (Scheinost et al. 2008). Ventenata is beginning to replace perennial grasses and forbs along roadsides and in hay, pasture, rangeland, and fields in the western U.S. It has minimal forage value for wildlife and may cause the soil to be more prone to erosion. Over time, infestations of ventenata will cause a decline of productivity and land value (Scheinost et al. 2008).

3.3.4 Climate

As described in **Section 3.2.1**, Species Background, *Threats*, changing trends in temperature, precipitation, and atmospheric CO_2 over the past century have resulted in changes in the composition and availability of sagebrush. Climate change scenarios for the sagebrush region predict a decline in sagebrush communities across most of its range, although some increases were projected in Wyoming, the Northern Great Basin, and eastern Montana (Rigge et al. 2021). Changing environmental conditions may also favor invasive species (e.g., cheatgrass) expansions and result in increased wildfire sizes and frequencies. In addition, climate change may exacerbate the expansion of woody vegetation (e.g., pinyon (*Pinus* spp.) and juniper (*Juniperus* spp.)) into sagebrush communities (Shriver et al. 2022).

3.4 Wildland Fire Ecology and Management

Wildfires played an important role historically in creating a mosaic of areas of herbaceous species and mature sagebrush. However, human influences have changed wildfire return intervals, altering their historical ranges of variability. Human factors include wildfire ignitions, wildfire suppression, grazing management, and invasive annual grass expansion, which alters the fuel composition. Sagebrush ecosystems have among the most altered wildfire regimes due to these factors (Shinneman et al. 2018).

3.4.1 Role of Wildfire in Sagebrush Vegetation Communities

Wildfire is an important component of all sagebrush-dominated plant communities. Depending on the nature of the site, the wildfire return interval can be between 33 and 130 years (Innes 2019). Historic wildfire seasons in sagebrush communities usually occur between July and September, with the most extreme wildfire conditions being in August (Bunting et al. 1994). Wildfire can be particularly damaging to sagebrush ecosystems. Big sagebrush does not resprout after a wildfire but is replenished by wind-dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish itself within five years of a burn, but a return to a full pre-burn community cover can take 15 to 30 years or longer (Manier et al. 2013).

Following wildfire, mountain big sagebrush reestablishes as the dominant species more quickly than do other sagebrush types, often resuming dense canopy cover after approximately 40 years. Immediately after wildfire, perennial grasses, forbs, and sprouting shrub species dominate for up to 20 years (Innes and Zouhar 2018). The natural wildfire recurrence interval in this sagebrush type is approximately 25 to 75 years. Reduced wildfire frequency in mountain big sagebrush types has allowed for the encroachment of conifer species such as lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*).

In contrast to big sagebrush, silver sagebrush readily resprouts following wildfire, which facilitates post-fire recovery and potential use of prescribed fire as a management tool under favorable spring moisture conditions (White and Currie 1983; Howard 2002). However, any disturbance in the silver sagebrush community may result in less desirable species increasing in prevalence due to the transition of soil types or low-moisture regime. Black sagebrush sites rarely burn, probably because of the low production and shrub cover these sites support. Wyoming three-tip sagebrush (*Artemisia tripartita*) does burn, but because of a lack of fuel continuity, large, resource-damaging wildfires are rare.

3.4.2 Invasive Annual Grasses

Increasing exotic annual grasses, primarily cheatgrass, are resulting in sagebrush loss and degradation (USFWS 2010). Cheatgrass can more easily invade and create its own feedback loop in areas that are dry with understory vegetation cover that is not substantial or that are experiencing surface disturbance, such as road construction. Cheatgrass facilitates short wildfire return intervals by outcompeting native herbaceous vegetation with early germination, early moisture and nutrient uptake, prolific seed production, and early senescence (Hulbert 1955; Mack and Pyke 1983; Pellant 1996). By providing a dry, fine fuel source during the peak of wildfire season, cheatgrass increases the likelihood of wildfire and thus increases the likelihood of further cheatgrass spread (Pellant 1990). Without wildfire, cheatgrass dominance can exclude sagebrush seedlings from establishing. With wildfire, areas can be converted to annual grasslands.

Wyoming big sagebrush communities are one of the most susceptible to cheatgrass invasion (Bunting et al. 1987; Miller and Eddleman 2000; Schlatterer 1972), and tend to be most susceptible to wildfire compared to the other big sagebrush subspecies (Tisdale 1994). Cheatgrass introduction to the big sagebrush ecosystem has increased wildfire frequency about 12 to 22 times (Whisenant 1990). Recent research found that invasive annual grasses are also capable of substantial spreading in the absence of wildfire (Smith et al. 2023).

Another invasive annual grass, ventenata, tends to dry out earlier than associated perennial grasses and remains highly flammable throughout the wildfire season. Ventenata invasion can increase fine fuel loads and continuity by establishing in typically bare interspaces between shrubs and perennial grasses, increasing the risk of wildfire spread in areas that historically had discontinuous fuels. Models suggest that ventenata invasion can increase wildfire severity, annual area burned, wildfire intensity, and burn probability. Similar to cheatgrass, a grass/wildfire cycle may establish in some communities invaded by ventenata, such as sagebrush steppe (Innes 2022).

3.4.3 Climate

Changing climatic conditions have resulted in higher temperatures and more severe droughts, which have led to longer wildfire seasons and larger, more frequent wildfires in the western US (Jolly et al. 2015; Dennison et al. 2014). More wildfires facilitate the spread of invasive annuals, which results in a positive feedback cycle between wildfire and grasses (D'Antonio and Vitousek 1992). Further, potential climatic shifts may enhance the spread of invasive annuals such as cheatgrass into resistant ecosystems (Bradley et al. 2016). The combined interactions of invasive plant species, uncharacteristic wildfire events, and climate change will likely continue to change sagebrush communities (USGCRP 2018).

3.4.4 Resistance and Resilience

The condition of sagebrush vegetation within HMAs can be assessed on the concepts of resistance and resilience (Chambers et al. 2014a, b; see **Table 3-3** [**Appendix 9**]). Resistance relates to a vegetation community's ability to retain its structure, processes, and function when exposed to stresses, disturbances, or invasive species. Resilience relates to a vegetation community's capacity to regain its structure, processes, and functioning after disturbance, such as wildfire (Chambers et al. 2014a, 2014b). At sites in higher elevations with higher precipitation levels and soil moisture content, sagebrush steppe vegetation is more resistant to cheatgrass invasions and wildfires and more resilient to disturbances (Chambers et al. 2014b). Sagebrush shrublands occur at lower elevations and are more arid, resembling deserts with open shrub density, erosive soils, and low herbaceous cover, contributing to the vulnerability for annual plant invasions.

Vegetation types were analyzed by state in **Table 3-3** (**Appendix 9**) to determine the acres of HMAs consisting of sagebrush steppe and sagebrush shrubland and their levels of resistance to disturbances. These levels of resistance to disturbances range from high and medium-high, medium, medium-low, and low, with additional acreage for areas not analyzed in the HMA. Not all acres within HMAs were analyzed by Chambers et al. (2023) and they are noted in a column as such.

3.4.5 Wildfire Occurrence and Risk

Susceptibility to wildfire occurrence, which results from fuel loading, vegetation characteristics, or as a natural condition of the environment (for example, drought). The introduction of invasive grasses such as cheatgrass and the expansion of pinyon-juniper into sagebrush systems have resulted in changes in the frequency, size, and severity of wildfires in some communities. Low-elevation Wyoming sagebrush communities in sagebrush shrublands have been especially susceptible to such changes due to their low resistance to disturbances. Acres burned in areas with low resistance and resilience may not recover after larger wildfires and could be dominated by invasive annuals, resulting in a loss of habitat functions for GRSG. **Figure 3.1** (**Appendix 9**) and **Map 3.15** (**Appendix 1**) show the acres of mapped occupied GRSG habitat between PHMA and GHMA that have burned since 2012 (regardless of land ownership) and between 2012 to 2021 throughout the states of Wyoming, Montana, North and South Dakota, Idaho, California, Nevada, Colorado, Oregon, and Utah.

The data for **Figure 3.2** (**Appendix 9**) were sourced from the National Interagency Fire Center (NIFC) 2023 GIS data regarding acres burned in HMA boundaries. In **Figure 3.2** (**Appendix 9**) acres burned were analyzed by year of total acres burned in PHMA and GHMA boundaries between all states. In both PHMAs and GHMAs, 2012 experienced the most significant impact with 1,500,500 acres burned for PHMA and 949,900 acres for GHMA. In 2013, there was a sharp drop in acres burned with 90,400 acres in PHMA and 304,900 acres in GHMA impacted by wildfire.

3.5 Fish and Wildlife

A wide variety of fish and wildlife occur within the planning area. Species' distributions are influenced by vegetation, cover, elevation, soil, and other factors. Some species have similar habitat requirements as GRSG while others overlap in distribution but require different habitats. A high-level summary of the types of species that may occur in the planning area is presented below but should not be considered a complete list.

3.5.1 Big Game

Primary big game species found in the planning area include elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and pronghorn (*Antilocapra americana*). Moose (*Alces*

alces), bighorn sheep (*Ovis canadensis*), and bison (*Bison bison*), occur in limited numbers throughout the planning area. These big game species are supported by the diversity of habitat and availability of essential resources throughout the planning area. For most big game species in the planning area, habitat management challenges include habitat degradation (particularly browse forage), habitat fragmentation, and loss, invasive annual grasses, impairment of migratory and other seasonal movements by incompatible fences (e.g., excessive wire heights, spacings, wire type, net wire, etc.), incompatible land use practices (land conversion, industrial activities, and intensive recreational activities), incompatible stock management (domestic sheep grazing in or near bighorn sheep habitat that can spread disease to bighorn sheep), and impacts from human disturbance during sensitive periods and barriers to animal movement.

The BLM's Instruction Memorandum 2023-005, Habitat Connectivity on Public Lands, ensure habitat connectivity, permeability and resilience is restored, maintained, improved, and/or conserved on public lands, particularly for big game animals. The BLM is working with state and Tribal wildlife managers as well as other stakeholders to assess data regarding connectivity, permeability, and resilience and, based on that assessment, identify where to focus management that best supports priority species.

3.5.2 Small Mammals

Terrestrial mammals, such as ground squirrels, cottontails, bats, and mice, are common throughout much of the sagebrush range in the planning area. Sagebrush range in good condition supports an abundant understory of protein rich bunchgrasses and forbs providing habitat for by small mammals. Examples of species are associated with sagebrush vegetation communities include black-tailed jackrabbits (*Lepus californicus*), white tailed jackrabbits (*L. townsendii*), desert cottontails (*Sylvilagus audubonii*), mountain cottontails (*S. nuttallii*), deer mice (*Peromyscus* spp.), sagebrush voles (*Lemmiscus curtatus*), Merriam's shrew (*Sorex merriami*), and kangaroo rats (*Dipodomys* spp.) (McAdoo et al. 2003). Bats include the little brown myotis (*Myotis lucifugus*), fringed myotis (*M. thysanodes*), long-eared myotis (*M. evotis*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), and Towsend's big-eared bat (*Corynorhinus townsendii*). Many of these bat species use aquatic and riparian habitats for foraging opportunities (McAdoo et al. 2003).

Some small mammals that rely on pinyon-juniper woodlands within the sagebrush planning area include mountain cottontail, cliff chipmunks (*Tamisas dorsalis*), rock squirrels (*Spermophilus variegatus*), brush mice (*Peromyscus boylii*), pinyon mice (*P. truei*), rock mice (*P. difficilis*), deer mice, white-throated woodrats (*Neotoma albigula*), desert woodrats (*N. lepeda*) and Mexican woodrats (*N. mexicana*) (Findley et al. 1975, in Gottfried et al. 1995). Bat species commonly found in pinyon-juniper habitats include eight species of myotis, big brown bats (*Eptesicus fuscus*), spotted bats, western pipistrelles canyon bats (*Pipistrellus hesperus*), and pallid bats (Findley et al. 1975, in Gottfried et al. 1995). Native mammalian predators in the project area include red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), racoons (*Procyon lotor*), American badger (*Taxidea taxus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and long-tailed weasel (*M. frenata*) (Conover and Roberts 2016; Hagen 2011).

3.5.3 Raptors

Raptors are important indicators of overall ecosystem health because they are keystone species at the top of the food web. Raptors are found throughout the planning area and include bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), peregrine falcons (*Falco peregrinus*), prairie falcons (*F. mexicanus*), red-tailed hawks (*Buteo jamaicensis*), Swainson's hawks (*B. swainsoni*), rough legged hawks (*Buteo lagopus*), ferruginous hawks (*B. regalis*), Cooper's hawks (*Accipiter cooperii*), sharp-shinned hawks (*A. striatus*), American kestrels (*F. sparverius*), northern harriers (*Circus cyaneus*), great-horned owls (*Bubo virginianus*), and burrowing owls (*Athene cunicularia*). Nests of all raptors are protected under the Migratory Bird Treaty Act

(16 U.S.C. §§ 703–712). Bald and golden eagles are also protected under the Bald and Golden Eagle Protection Act.

3.5.4 Migratory Birds

Migratory birds cross international borders to meet seasonal habitat requirements and are protected under the Migratory Bird Treaty Act. Examples include passerine songbirds, flycatchers, vireos, swallows, thrushes, warblers, and hummingbirds. In addition to GRSG, sagebrush-obligate migratory birds include the sagebrush sparrow (*Artemisiospiza nevadensis*), and sage thrasher (*Oreoscoptes montanus*). Other migratory birds associated with sagebrush habitats include Brewer's sparrow (*Spizella breweri*), loggerhead shrikes (*Lanius ludovicianus*), and Cassin's sparrows (*Aimophila cassinii*). Pinyon/juniper expansion into sagebrush alters range structure negatively impacting migratory birds reliant on sagebrush (e.g., GRSG, sagebrush sparrow). However, several species of migratory birds depend on pinyon/juniper habitats, including the pinyon jay (*Gymnorhinus cyanochephalus*) which is being reviewed by the USFWS for potential listing under the Endangered Species Act.

Common ravens (*Corvus corax*) populations have nearly doubled in the past 50 years (USFWS 2023) and extremely adaptable to human-altered environments and disturbance (Howe et al. 2014). Ravens are known to predate GRSG nests and chicks and in some areas they have been documented to influence lek behavior at a similar magnitude as golden eagles, and other predators (Kobilinsky 2021). Raven densities are higher in areas associated with livestock production (Coates et al. 2016) and will readily use anthropogenic structures for nesting (Howe et al. 2014), particularly in areas like sagebrush habitats where features such as power poles were historically uncommon. The continued expansion human-related structures in sagebrush will likely drive increases in common ravens (USFWS 2023).

Waterfowl and Shorebirds

The numerous streams, rivers, reservoirs, ponds, associated riparian areas, and wetlands vegetation provide habitat for a wide variety of waterfowl and shorebirds. Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), pintail (*Anas acuta*), gadwall (*Anas strepera*), green-winged teal (*Anas crecca carolinensis*), American wigeon (*Anas americana*), and other waterfowl species winter along many of the major rivers within the planning area. Waterfowl production also occurs throughout the planning area. Important foraging areas include primarily lakes and ponds found on public or private lands in agricultural areas and within the river corridors.

Wading birds such as great blue heron (*Ardea herodias*), cattle egret (*Bubulcus ibis*), snowy egret (*Egretta thula),* and white-faced ibis (*Plegadis chihi*) are found throughout the planning area. Great blue heron foraging and breeding areas are primarily along rivers, streams, and ponds throughout the planning area. Killdeer (*Charadrius vociferus*), American avocet (*Recurvirostra americana*), willet (*Tringa semipalmata*), and Wilson's phalarope (*Phalaropus tricolor*) are also commonly found within the planning area.

3.5.5 Upland Game Birds

Upland game birds are common within the planning area, but few share the same sagebrush habitats with GRSG. For example, dusky grouse (*Dendragapus obscuru*) are widely distributed throughout higher elevation woodlands, and Merriam's turkeys (*Meleagris gallopavo merriami*) can be found in riparian areas, mixed mountain shrub, and pinyon-juniper woodlands. California quail (*Callipepla californica*) occur in foothill woodlands, chaparral, and sagebrush along the western side of the planning area. Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) while native to GRSG habitat occur primarily in grasslands and shrub-dominated slopes. Small flocks of the non-native chukar (*Alectoris chukar*) can also be found in the western portion of the planning area.

3.5.6 Reptiles and Amphibians

Reptiles in the planning area mostly occur in lower elevations and in dryer habitats, such as semi-desert shrub, sagebrush, greasewood, and pinyon-juniper. The sagebrush lizard (*Sceloporus graciosus),* and short-horned lizard (*Phrynosoma hernandesi*), are two of the most common species associated with sagebrush habitats. Other species found in the planning area include Great basin gopher snake (*Pituophis catenifer),* western terrestrial garter snake (*Thamnophis elegans*), collared lizard (*Crotaphytus collaris*), and the side blotched lizard (*Uta stansburiana*). Predatory snakes, such as gopher snakes, are unable consume GRSG eggs but have been observed constricting and consuming a 19-day juvenile GRSG chick (McIntire 2020).

Amphibians, specifically frogs and toads, are important indicators of ecosystem health because they are highly sensitive to environmental changes. Widespread population declines in the western United States are be attributed to disease, pollution, exposure to toxins from energy development, habitat loss and degradation, and the effects from climate change. Examples of amphibians that may occur in GRSG habitat include Columbia spotted frogs (*Rana luteiventris*) and Great Basin spadefoot (*Spea intermontana*).

3.5.7 Invertebrates

Insects provide important food sources for many species of wildlife, including adult and juvenile GRSG. Although there are thousands of species of insects in sagebrush, and riparian and wetland habitats, species in the Scarabaeidae and Tenebrionidae (beetle) families, Formicidae (ants) family, Tettigoniidae family (including Mormon crickets), and Orthoptera (grasshopper) family are a high protein food source of many wildlife species, including GRSG (Klebenow and Gray 1968; Peterson 1970; Johnson and Boyce 1990; Pyle 1993; Fischer 1994; Drut et al. 1994).

Invertebrates are the primary pollinators of forbs, thus helping to proliferate important components of the GRSG diet. GRSG brood-rearing and chick survival are highly dependent on diverse and abundant forbs and insects necessary for early GRSG development. Insect diversity can be attributed to large, diverse, and relatively undisturbed areas of sagebrush habitat.

3.5.8 Fish

The condition of aquatic habitats and fisheries is related to hydrologic conditions of the upland and riparian areas associated with, or contributing to, a specific stream or water body, and to stream channel characteristics. Riparian vegetation reduces solar radiation by providing shade and thereby moderates water temperatures, adds structure to the banks to reduce erosion, provides overhead cover for fish, and provides organic material, a food source for macroinvertebrates. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Water quality (especially factors such as temperature, sediment, and dissolved oxygen) also greatly affects fisheries and aquatic habitat.

Higher elevation waters support cold water fishes, consisting primarily of brook trout (*Salvelinus fontinalis),* rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and cutthroat trout (*Oncorhynchus clarkii* spp.). Lower elevation waters support primarily cool water and warm water fishes including such species as nonnative northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), and walleye (*Sander vitreus*).

Native warm water fish within the planning area include but are not limited to black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), Johnny darter (*Etheostoma nigrum*), long-nose dace (*Rhinichthys cataractae*), bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*), razorback sucker (*Xyrauchen texanus*), creek chub (*Semotilus atromaculatus*), Colorado pikeminnow (*Ptychocheilus lucius*), plains killifish (*Fundulus zebrinus*), bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*).

3.5.9 Pollinators

Pollinators in the planning area include invertebrates and some bird and bat species. Because of the large diversity of species may serve as pollinators, habitat use by these species is also diverse and are generally described above. A diversity of pollinators is a direct indicator of plant diversity and overall ecosystem health. Declines in native and managed pollinator populations have been linked to habitat loss, fragmentation, invasive species, disease, and pesticides (Xerces Society 2021). North American bumble bee species are generally threatened by habitat loss, pesticides, and climate change. Some species are additionally threatened by pathogens and parasites they may acquire from managed bees.

3.6 Special Status Species

Special status species include both animals and plants requiring specific management due to population or habitat concerns. BLM management obligations are described in the BLM 6840 Manual, Special Status Species Management. Categories of special status species are the following:

- Federally listed threatened and endangered species and designated critical habitats
- Federally proposed species and proposed critical habitats
- Federal candidate species
- BLM sensitive species

The BLM will be consulting per Section 7 of the ESA for any listed or proposed species or designated or proposed critical habitat that may be affected by the RMPA. A summary of consultation is included in **Chapter 4**.

3.6.1 Federally Listed Species

Threatened and Endangered Species

Species are listed as either threatened or endangered under the ESA. Some listed species have critical habitat designated as essential to species conservation, or requiring special management consideration or protection. Under the ESA, all federal agencies must participate in the conservation and recovery of listed threatened and endangered species (USFWS and NMFS 1998). The ESA also states that federal agencies shall ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

The mission of the USFWS is to work with other federal, state, and local agencies to conserve, protect, and enhance fish, wildlife, and plant species and their habitats. USFWS manages threatened and endangered species and designated critical habitat, in cooperation with other federal agencies to support recovery. The BLM cooperates with USFWS identify and properly manage recovery habitats.

ESA-listed species that have been documented to occur in the planning area are included in **Appendix 11**, Special Status Species.

Proposed and Candidate Species

Proposed species are plant and animal taxa proposed in the Federal Register to be listed under the ESA. These are species that USFWS has sufficient data on biological vulnerability or threats to support a potential to list but issuance of a proposed rule is precluded by higher priority listing actions. Proposed and candidate species that have been documented to occur in the planning area are in **Appendix 11**, Special Status Species.

BLM Sensitive Species

The BLM's objectives for special status species are to conserve and recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer necessary, and to initiate proactive conservation measures that reduce or eliminate threats to minimize the need for listing these species under the ESA. The BLM 6840 manual directs the BLM to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals." The 6840 Manual also requires managers to determine to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluate the significance of actions in conserving those species.

All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species. State lists of BLM sensitive species for states in the planning area are available in **Appendix 11**.

Current Conditions

The BLM continues to implement actions that further the conservation, protection, and recovery of ESA-listed threatened and endangered species. Consultation with USFWS under the ESA is a key part of these activities. Habitat for proposed, candidate, and BLM sensitive plant and animal species continue to be managed in such a manner that actions authorized, funded, or carried out by the BLM reduce the likelihood for special status species to become listed under the ESA.

The BLM maintains some spatial data on special status species but mostly relies on state agencies for data stewardship and data are also available from NatureServe for wide ranging species that cross jurisdictional boundaries. State natural heritage programs provide location and natural history information on special status plants, animals, and natural communities. These data help drive conservation decisions, aid in the environmental review of projects and land use changes and provide baseline data helpful in recovering listed species.

Species Accounts

Activities within the decision area will primarily affect sagebrush habitat. Areas of conifer encroachment targeted for sagebrush restoration to benefit GRSG may also be affected. Therefore, special status species dependent on sagebrush habitat or strongly associated with pinyon-juniper woodlands may be directly or indirectly affected by proposed management actions to protect and enhance GRSG habitat. An expanded discussion of several key special status species follows. For other special status species accounts, please see **Appendix 11**.

Mammals

<u>Black-footed ferret</u>

In 1967, the black-footed ferret (*Mustela nigripes*) was listed as endangered in early legislation prior to the ESA; the ferret was officially listed as endangered under the ESA in 1973 (USFWS 2013c). The black-footed ferret is intimately tied to prairie dogs (*Cynomys* spp.) and is only found in association with prairie dog colonies. Historically, the black-footed ferret range overlapped with prairie dog habitat throughout the

North American Great Plains, mountain basins, and grasslands. Declines in occupied prairie dog habitat in the early twentieth century coincided with the rapid decline of the ferret (USFWS 2013c). Black-footed ferrets currently occur in both captive and wild populations. Captive ferrets have been reintroduced at 29 reintroduction sites in the western United States, Canada, and Mexico, including at multiple locations in the planning area (see Table 3 in USFWS 2019). Four primary stressors to black-footed ferrets are disease, drought, declining genetic fitness including increased inbreeding and a reduction in genetic diversity, and prairie dog poisoning and shooting (USFWS 2019). The main disease concern for wild and captive populations is non-native sylvatic plague. The white-tailed prairie dog (*C. leucurus*) is the primary diet for black-footed ferrets in the planning area (USFWS 2017). White-tailed prairie dogs generally inhabit dry landscapes with shrub land vegetation, such as the high desert scrub community of Utah and sagebrush steppe of western Wyoming. Sagebrush management that negatively impacts white-tailed prairie dogs could affect black-footed ferrets.

Pygmy rabbit

On January 25, 2024 the USFWS announced they will conduct a status review of the pygmy rabbit (*Brachylagus idahoensis*) in consideration of listing under the ESA. This BLM sensitive species is patchily distributed throughout sagebrush habitat and alluvial fans in the planning area where plants occur in tall dense clumps (Smith et al. 2019). Deep, crumbly, loamy-type soils are required for burrow excavation (the only native rabbit species in North America to excavate their own burrows) although pygmy rabbits may occasionally use burrows excavated by other species and, therefore, may occur in areas that support shallower, more compact soils (Janson 1946; Weiss and Verts 1984; USFWS 2010c).

Big sagebrush is the primary food and may comprise up to 99 percent of food in winter and 51 percent in summer. Grasses and forbs make up the remaining diet during the summer (Shipley et al. 2009, Schmalz et al. 2014). Pygmy rabbits likely select for percent cover and composition of grasses and forbs at different habitat scales (i.e., patch vs. burrow). Cover and height of woody vegetation appear to be critical habitat features (Green and Flinders 1980) and Larrucea and Brussard (2008) found pygmy rabbits occupied clusters of sagebrush that were taller than the sagebrush shrubs in the surrounding area (i.e., sagebrush islands that range from 4.7 to 46 inches in height).

Pygmy rabbits avoid edge habitats and open areas such as ROWs, roads, and other areas cleared of sagebrush (Crowell et al. 2016, Carr et al. 2016, Edgel et all 2018.) The size of pygmy rabbit home ranges fluctuates seasonally with smaller home ranges during winter and larger home ranges during spring and summer. Annual home ranges in southeastern Oregon and northwestern Nevada differed between the sexes and ranged from 1.2 to 25.8 acres for males and 0.27 to 18.7 acres for females. Juvenile dispersal in Nevada and Oregon was greater than 0.3 mile, with a maximum long-distance movement of 5.3 miles recorded for a juvenile female (Weiss and Verts 1984).

Utah prairie dog

The Utah prairie dog (*Cynomys parvidens*) was listed as an endangered species under the ESA in 1973 and reclassified to threatened status in 1984 (49 FR 22330–22334). Historically, the Utah prairie dog was found in portions of Beaver, Garfield, Iron, Juab, Millard, Piute, Sanpete, Sevier, Washington, and Wayne Counties in Utah (USFWS 2012b). Current dog distribution is now limited to the southwestern quarter of Utah (USFWS 2012b). Significant concentrations of Utah prairie dogs occur in three areas that are identified as recovery units in the Recovery Plan (USFWS 2012b), including the Awapa Plateau, Paunsaugunt, and West Desert recovery units. There are nearly 60,000 acres of Utah prairie dog habitat among the three Recovery Units, and over 48 percent of these acres are BLM-administered or National Forest System lands.

The Utah prairie dog inhabits elevations from 6,200 feet on valley floors up to 9,180 feet (USFWS 2012b) in mountain mesa habitats. Preferred habitats include grasslands and semiarid shrub-steppe. Open habitats are important for foraging and avoiding predators. Livestock grazing practices that reduce shrub height and density or vegetation treatments that remove encroaching conifers may enhance prairie dog habitat.

Since 1976, the Utah Division of Wildlife Resources has performed annual counts of Utah prairie dogs (spring counts) designed to monitor population trends over time. Based on the spring counts, rangewide population trends for the Utah prairie dog are stable to increasing since the time of listing, though populations vary annually and the numbers across the range have decreased in recent years. The rangewide count in 2020 (6,217 dogs) is approximately 54 percent of the count in 2016 (11,478 dogs; USFWS 2021). Population numbers have declined from historic highs primarily due to habitat loss and fragmentation, sylvatic plague, drought, poisoning, and other factors.

Migratory Birds and Raptors

<u>Brewer's sparrow</u>

Brewer's sparrow is a BLM sensitive species strongly associated with sagebrush over most of its range, in areas with scattered shrubs and short grass, though it can also be found in mountain mahogany, rabbit brush, bunchgrass grasslands with shrubs, bitterbrush, and openings in pinyon-juniper (Knopf et al. 1990; Sedgwick 1987). Brewer's sparrow places nests in sagebrush, and may also use other shrubs, from a few inches to about three feet from the ground, though higher nests in taller sagebrush have been documented (Rich 1980). In migration and winter, Brewer's sparrow uses low, arid vegetation, desert scrub, sagebrush, and creosote bush (NatureServe 2023d). Brewer's sparrow is vulnerable to loss and fragmentation of sagebrush habitats, and even though it is typically one of the most abundant songbirds in sagebrush habitats, it is declining across its range (NatureServe 2023d).

<u>Ferruginous hawk</u>

The ferruginous hawk (*Buteo regalis*), a BLM sensitive species, occurs in grassland and shrublands year-round throughout the planning area. Ferruginous hawks often nest on the ground, lone trees, topographic high points, or cliffs. Ferruginous hawks occur in areas with abundant prey, typically small mammals such as rabbits, prairie dogs, and ground squirrels. Ferruginous hawk density and productivity are closely associated with cycles of prey abundance (NatureServe 2023e). Ferruginous hawks are easily disturbed during the breeding season; nest abandonment from disturbance is most likely during early nesting stage (Tesky 1994).

<u>Golden eagle</u>

The golden eagle (*Aquila chrysaetos*) is a BLM sensitive species and is protected under the Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668-668d), which prohibits unpermitted "taking" of bald or golden eagles, including their parts, nests, or eggs. Golden eagles generally inhabit open and semi-open country such as prairies, sagebrush, savannah or sparse woodland, and barren areas, and in areas with sufficient mammalian prey base and suitable nesting sites. Nests are most often on rock ledges of cliffs but sometimes in large trees, on steep hillsides, on electrical transmission towers, or on the ground. While a pair may have multiple alternate nests they may use the same nest in consecutive years (NatureServe 2023f). Diet consists primarily of small mammals (e.g., rabbits, marmots, ground squirrels) but sometimes also includes large insects, snakes, sage-grouse, other bird species, juvenile ungulates, and carrion.

Golden eagle declines in the early 1900s were due to eradication campaigns, frequently encouraged by the use of bounties (eagle was believed to be a major predator on livestock). Golden eagles are also susceptible to powerline electrocution given their large wingspan. Other threats include ingestion of poison intended for coyotes; ingestion of toxic water from mining activities; occasional shootings; habitat loss to agriculture, suburban land uses, and energy development and loss of potential food resources as a result of habitat degradation. Human disturbance or activity may cause nest abandonment, render a nest site less productive, or prevent a suitable nest site from being utilized, but direct disturbance of nests appears to be infrequent (GBBO 2010).

Pinyon Jay

Pinyon jay, a BLM sensitive species, is a resident of the foothills and lower mountain slopes of western and southwestern U.S. and Mexico in pinyon juniper woodland habitats (AOU 1983). Pinyon jays do not migrate but may forage long distances to find food during years with a low pinyon pine seed crop. Flocks may also migrate altitudinally – up or down in elevation – to find food (NatureServe 2023g). Pinyon jay flocks have complex social organization. Flocks are made of multiple breeding pairs and offspring. While flocks tend to have established home ranges, they move in search of food as described above.

Pinyon jays prefer a mixed-age mosaic of woodland interspersed with sagebrush shrubland. Although they roost and nest within relatively dense groves of older trees, they typically locate their nests usually within half a mile of the habitat edge (NatureServe 2023g). Pinyon jays nest when and where enough food is available – food is seeds from pinyon pines. Large expanses of homogenous closed-canopy pinyon-juniper woodland that have become more common over the past century are largely unsuitable for the birds. A GBBO radio-telemetry study found that foraging pinyon jays appeared to favor transitional areas where pinyon/juniper woodland is interspersed with sagebrush, have relatively small flock home ranges (2,500 to 3,700 acres), and make more use of the sagebrush understory than expected. Thinning activities typically done on behalf of greater sage-grouse, fuels reduction, and to increase livestock forage in the pinyon-juniper ecotone between woodlands and sagebrush habitat may be negatively impacting pinyon jay populations.

This species has undergone significant declines over the last 50 years and faces ongoing threats from habitat alteration due to climate change and wildfire suppression (NatureServe 2023g). Pinyon-juniper habitats in the southwest have been impacted by climate change, including widespread pinyon mortality and probable reduction in pinyon seed crops, the primary food source for pinyon jays (Defenders of Wildlife 2022). Further loss and distributional shifts of pinyon juniper woodland habitats in response to climate change are likely (Gaylord et al. 2013, Meddens et al. 2015). Habitat has also been altered through thinning of pinyon-juniper for fuels reduction, and perceived wildlife management benefits, including habitat improvements for GRSG. Breeding Bird Survey data show a decline of 2.1 percent per year from 1966-2021 (Ziolkowski et al. 2023). The pinyon jay status is currently being reviewed by the USFWS for potential listing under the Endangered Species Act.

Sagebrush Sparrow

Sagebrush sparrow habitat is dry brushy foothills, chaparral, and sagebrush and in winter deserts (Audubon 2023). In the northern and eastern part of the range, sagebrush sparrows mainly inhabit stands of big sagebrush, whereas farther southwest, they mainly use saltbush and other low shrubs of arid flats. Nests are either on the ground or in shrubs. In the Great Basin, the species usually nests in living sagebrush, where cover is sparse, but shrubs are clumped (Petersen and Best 1985). Placement may be related to density of vegetative cover over the nest, as sagebrush sparrows will nest higher in a taller shrub (Rich 1980). The species migrates to and winters in arid plains with sparse bushes, grasslands, and open situations with scattered brush, mesquite, and riparian scrub, preferring to feed near woody cover (Audubon 2023; Meents et al. 1982; Repasky and Schluter 1994).

Sagebrush sparrows are negatively affected by factors that fragment sagebrush habitat or alter its basic structure, including wildfire, cheatgrass invasion, heavy livestock use, nest predation, expansion of pinyon/juniper woodland into shrubland, heavy OHV use (GBBO 2010), urban and suburban development, and road and power line ROWs.

Sage Thrasher

Sage thrasher is a BLM sensitive species. In the northern Great Basin, the sage thrasher breeds, and forages in tall sagebrush/bunchgrass, juniper/sagebrush/bunchgrass, mountain mahogany/shrub, and aspen/sagebrush/bunchgrass communities. The species is positively correlated with shrub cover, shrub height, bare ground, and horizontal patchiness and negatively correlated with spiny hopsage, budsage, and grass cover (Rotenberry and Wiens 1980; Wiens and Rotenberry 1981). The species usually nests within 3 feet of the ground in the forks of shrubs (almost always sagebrush) and sometimes nests on the ground (Reynolds 1981; Rich 1980). In winter, the sage thrasher uses arid and semiarid scrub, brush, and thickets. The species feeds on a wide variety of insects, including grasshoppers, beetles, weevils, ants, and bees, as well as fruits and berries. Loss, degradation, or fragmentation of high-quality sagebrush shrubland suitable for sage thrasher is attributed to wildfire, invasive plants, expansion of pinyon/juniper woodland into sagebrush, heavy livestock grazing, and heavy OHV use (GBBO 2010).

Fish

Lahontan Cutthroat Trout (LCT)

LCT (*Oncorhynchus clarkii henshawi*) is an inland subspecies of cutthroat trout (Salmonidae). The species may be either riverine or lacustrine and is endemic to the Lahontan Basin of northeast California, southeast Oregon, and northern Nevada. As with all cutthroat trout, LCT is an obligate riverine spawner. This species spawns in riffles over gravel substrate when water temperatures are between 41 and 60°F. Intermittent tributaries are sometimes used as spawning sites during high-water years. Fry may develop in the tributary stream until flushed into the mainstream during high runoff.

The decline of LCT has been primarily attributed to the loss and degradation of habitat. Agricultural and municipal uses of water from streams and lakes have reduced or altered the stream discharge in this species' range. Grazing has altered the physical characteristics of stream channels and increased the sediment loads in many LCT habitats. Mining, urban development, logging, road construction, and dam building have also been associated with changes in stream channel morphology and water quality (USFWS 1995). LCT competes with nonnative trout species that were historically stocked for recreational fishing opportunities. Updated recovery goals include removing threats from nonnative trout, ensuring ecological functions in habitats, including carrying out restoration and management changes where needed, and maintaining existing isolated populations (LCTCC 2019).

Bull Trout

Bull trout (*Salvelinus confluentus*) occur in the Columbia River and Snake River basins in Washington, Oregon, Montana, Idaho, and Nevada. Other populations outside the planning area include Puget Sound and Olympic Peninsula watersheds in Washington, Saint Mary basin in Montana, and Klamath River basin of south-central Oregon. Historical habitat loss and fragmentation (including from climate change), interaction with nonnative species, and fish passage issues are widely regarded as the most significant primary threat factors affecting bull trout (USFWS 2015).

Of all the native salmonids in the Pacific Northwest of the United States, bull trout generally have the most specific habitat requirements, including cold water temperatures (often less than 54 degrees Fahrenheit), clean water quality conditions, complex stream habitat including deep pools, overhanging banks and large woody debris, and connectivity between spawning and rearing areas and downstream foraging, migration, and overwintering habitats (USFWS 2015).

Invertebrates

Monarch butterfly

The monarch butterfly was identified as a candidate species for listing under the ESA in 2020 (USFWS 2020). Based on past annual censuses, the western North American population has been declining over the last 23 years, despite an increasing number of sites being counted. Primary drivers affecting North American migratory populations are loss or degradation of breeding, migratory, and overwintering habitat, continued exposure to insecticides, and effects of climate change. Milkweed availability is essential to monarch reproduction and survival and reductions in milkweed due to habitat loss and conversion are also a key driver in monarch declines (USFWS 2020).

During the breeding season, monarch butterflies (*Danaus plexippus*) lay their eggs on milkweed host plants (primarily *Asclepias* spp.). In western North America, nectar and milkweed resources are often associated with riparian corridors, and milkweed may function as the principal nectar source for monarch butterflies in more arid regions. Additionally, monarchs rely on mostly native forb species within GRSG habitat that are also GRSG preferred forbs (Dumroese et al. 2015).

Most adult butterflies live approximately 2 to 5 weeks, but overwintering adults enter into reproductive diapause (suspended reproduction) and live 6 to 9 months. In the fall, monarch butterflies west of the Rocky Mountains fly south and west to overwintering groves along the California coast into northern Baja California (USFWS 2020). During breeding and migration, adult monarch butterflies require a diversity of blooming nectar resources, which they feed on throughout their migration routes and breeding grounds.

3.7 WILD HORSES AND BURROS

The Wild Free-Roaming Horses and Burros Act of 1971, as amended by FLPMA and the Public Rangeland Improvement Act of 1978, directs the protection and management of wild horse and burro populations on BLM-administered lands. Responsibility for wild horse and burro management is governed by 43 CFR Part 4700. One of the BLM's top priorities is to ensure the health of the public lands so that the species depending on them, including the nation's wild horse and burro, can thrive. The BLM policies and regulations also direct that wild horses and burros are to be managed as self-sustaining populations of healthy animals.

The 53.8 million acres where wild horses or burros were found when the 1971 Wild Free-Roaming Horses and Burros Act was passed are known as herd areas (HAs). A subset of these areas (approximately 31.6 million acres nationwide) have been determined suitable for long-term management of wild horses and burros and are known as herd management areas (WHB HMAs). Wild horse and burro populations within WHB HMAs are managed with the goal of maintaining sustainable ecological conditions and multiple-use relationships on federal lands. Both HAs and WHB HMAs can include private or state lands, but the BLM has management authority only over public lands.

The BLM periodically evaluates each HA to determine if it has adequate food, water, cover, and space to sustain healthy and diverse wild horse and burro populations over the long-term. The BLM may designate an appropriate management level (AML) and specifies an allowable range in horse numbers for each WHB HMA based upon available forage and other resources necessary to sustain the horse or burro populations, as well as resource objectives and other designated uses of the BLM-administered lands.

The estimated population size of wild horses and burros within each WHB HMA is based on helicopter, fixed-wing, or by ground-based inventories, which occur every 2 to 3 years. These population inventories provide information pertaining to population numbers, foaling rates, distribution, and herd health. When the AML is exceeded, populations of wild horses and burros are examined to determine if population control methods are required. Historically, it has been a challenge for BLM to maintain AML in all herd management areas.

Wild horses and burros are a long-lived species with annual survival or other time period rates estimated between 80 and 97 percent (Wolfe 1980; Eberhardt et al. 1982; Garrott and Taylor 1990). In addition, wild horses are capable of increasing their numbers by 18 percent to 25 percent annually, resulting in the doubling of wild horse populations about every 4 years (Wolfe et al. 1989; Garrott et al. 1991). Wild horse and burro numbers appear to be limited principally by water availability and winter forage, as predation and disease have not substantially regulated wild horse and burro population levels. This has resulted in the BLM shifting program emphasis beyond just establishing an AML and conducting wild horse and burro gathers to including a variety of management actions that further facilitate the achievement and maintenance of viable and stable wild horse and burro populations and a "thriving natural ecological balance" (Public Law 92-195). Methods of herd population control include periodic gathers and removal to short-term holding and adoption or long-term holding, as well as methods of population growth suppression, including treatment with fertility control drugs where approved. Gathering or other population growth suppression activities are based on inventory data, herd health, rangeland health, climatic conditions, and occurrence of catastrophic events such as wildfire and drought.

3.7.1 Current Conditions

In the planning area, there are approximately 15 million acres of WHB HMAs. The BLM administers 168 WHB HMAs within California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Wyoming. Current herd area, herd management areas, and estimated population of wild horse and burro within the project area are listed in **Table 3-4** (**Appendix 9**). Wild horse and burro populations within the planning area continue to grow, often exceeding AMLs. Wild horses and burros can be causal factors for failing to meet applicable Land Health standards. Due to a lack of predators, in the absence of management action, wild horse and burro populations will continue to increase in size. As a result, the agency will continue to remove animals from the range each year and will continue to administer various methods of fertility control.

Currently, the AMLs are being exceeded by an average of 3.6 times greater than the "high" AML value across the planning area (**Table 3-4** [**Appendix 9**]). The total number of AML acres which overlap with GRSG Habitat Management Areas is displayed in **Table 3-5** (**Appendix 9**). Wild horses and burros can be found outside of WHB HMAs as they are not fenced and horses and burros may leave in search of water and forage and enter onto BLM-administered or other lands.

Climate change may affect the availability of wild horse and burro forage or water resources as well as rangeland health; AMLs for herds were established based on past conditions, including vegetation and water resources. Should available forage or water resources be reduced due to a change in climate, current AMLs may no longer be appropriate, rangeland conditions may be impacted, and herd health impacted due to a lack of resources.

3.8 Livestock Grazing

The BLM administers public land grazing primarily in accordance with the 1934 Taylor Grazing Act, 1976 Federal Land Policy and Management Act, and 1978 Public Rangelands Improvement Act. Grazing use on public land is administered through grazing authorizations issued by field offices to qualified applicants, who are assigned grazing preference. Forage use is identified in allotments, which are areas of land designated and managed for livestock grazing. The amount and length of use is described in the terms and conditions of the grazing authorization, which is usually a permit or lease, normally issued for 10 years. More prescriptive management and flexibility may be used to achieve resource and operational goals and objectives through Allotment Management Plans (AMP) or their functional equivalents. When grazing permits/leases expire, they may be renewed based on continued availability of the grazing area, grazing preference, and satisfactory record of performance.

3.8.1 Current Conditions

The species (kind) and age (class) of livestock that graze across the planning area varies across field offices, but are primarily cow-calf pairs or yearling cattle. Some allotments graze other kinds of livestock, including sheep, goats, bison, and horses. Livestock grazing allotments across the planning area range in size, with some less than 1,000 acres, and others exceeding 100,000. Allotments may be completely fenced but are often located along geographic features such as canyons, streams, and rivers that can restrict the movement of livestock in lieu of fencing.

The BLM grazing administration regulations were revised in 1995 to include Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR Part 4180). Standards provide for the conformance with the Fundamentals of Land Health at 43 CFR Part 4180.1 BLM State Directors are responsible for developing or modifying Standards and Guidelines specific to areas under their jurisdiction. This is done in consultation with affected Resource Advisory Councils and in coordination with applicable Indian Tribes, other State/Federal land management agencies, and the public. Standards (of Land Health) are expressions of levels of physical and biological condition or degree of function required for healthy lands and sustainable uses and define minimum resource conditions that must be achieved and maintained. Guidelines are a practice, method or technique determined to be appropriate to ensure that standards can be met or that significant progress can be made toward meeting the standard. Guidelines are tools such as grazing systems, vegetative treatments, or improvement projects that help managers and permittees achieve standards.

In BLM policy, Standards (i.e. Land Health Standards) are applicable to all ecosystems and management actions. They are expressed as goals in the Land Use Plan. Public lands are managed to achieve or make significant progress toward achieving Land Health Standards developed for an area unless specified otherwise in the Land Use Plan. Practices and activities subject to standards and guidelines by regulation include the development of grazing-related portions of activity plans, establishment of terms and conditions of permits, leases and other grazing authorizations, and range improvement activities such as vegetation manipulation, fence construction and development of water.

In accordance with 43 CFR Part 4180, the BLM must take appropriate action as soon as practicable but not later than the start of the next grazing year upon determining that existing grazing management practices or levels of grazing use on public lands are significant factors in failing to achieve the standards and conform with the guidelines. Appropriate action means implementing management that will result in significant progress toward fulfillment of the standards and toward conformance with the guidelines.

The number of allotments with at least 15% PHMA by Land Health Standard Category is shown in **Table 3-6** (**Appendix 9**). Across the planning area, grazing management has been improved by a variety of actions. One example is changing the terms and conditions in grazing permits/leases to improve riparian areas and wetlands through utilization, herding requirements, and strategic placement of salt and supplemental feed.

Furthermore, improvements through additional water developments and pasture fencing, along with following compliance inspections to ensure assigned range improvement maintenance is completed for grazing authorizations. Livestock have also been observed to not impact nest success of GRSG at current grazing levels (Bartholdt 2023).

3.9 LANDS AND REALTY (INCLUDING RENEWABLE ENERGY)

The lands and realty program consists of (1) land use authorizations, including ROWs; (2) land tenure adjustments, including disposals and acquisitions of lands; (3) Official Surveys of Federal Interest Lands, Management of Land Boundary (MLB) Plans, Standards for Boundary Evidence (SBE), Public Lands Survey System Data Set (PLSSDS), Surface Management Agency (SMA), and Land Status Records System; and (4) withdrawals. Changes to land tenure and the cadastral survey are not being considered in this effort and will not be discussed further. The lands and realty program also processes renewable energy applications related to wind, solar, and geothermal energy. Geothermal energy is managed as a fluid leasable mineral (see **Section 3.10.1**, Fluid Minerals [Including Geothermal]). Utility-scale wind and solar resource facilities are permitted with ROW authorizations through the lands and realty program. As a result, management actions related to the lands and realty program and leasable minerals could affect renewable energy resources. Special management designation areas, such as ACECs and WSAs, could also affect the use of renewable energy resources by limiting the location of these facilities.

3.9.1 Conditions within the Planning Area

Land use authorizations include granting ROWs, permits, leases, and temporary use permits (TUPs). A ROW is most often authorized by a grant or lease under 43 CFR Part 2800 and 2880 and are appropriate for facilities constructed for long-term use, generally 30 years. Short-term ROWs are typically used during construction, maintenance, and other seasonal or short duration uses involving minimal improvement and investment. Additional land use authorizations are issued as leases, permits, and easements under 43 CFR Part 2920. Leases are usually long-term authorizations that use public lands for a fixed term involving considerable capital investments. TUPs are authorized under the Mineral Leasing Act (see 43 CFR Part 2881.5(a)) and short-term ROWs may be issued under FLMPA. TUPs can be reauthorized at the discretion of the authorized officer. Easements are authorizations for a non-exclusive interest in lands that specifies the right to the holder the obligation of the BLM to use and manage the lands in a manner consistent with the terms of the easement. A lease grants less than the interest given by an easement and provides for more direct control by the authorized officer. ROW grants are used for wind and solar development and testing.

Granting ROWs

ROW grants are used for oil and gas pipelines, electric transmission and distribution lines, roads, wind and solar development, and communication sites such as telephone and fiber optic. Generally, ROWs are granted for the term of a project. A ROW authorizes the holder to construct, operate, maintain, and/or terminate a new or existing facility over, under, upon, or through BLM-administered lands. The majority of ROWs are authorized under Title V of the FLPMA (90 Stat. 2743; 43 USC 1715, 1761-1771) and the Mineral Leasing Act (Section 28 of the Mineral Leasing Act of 1920, as amended, 43 USC 185). The BLM will authorize ROW applications at the discretion of the authorized officer in a responsible, efficient, and economically feasible manner.

Acres of existing pipelines and transmission lines on BLM-administered lands within the planning area are listed in **Table 3-7** (**Appendix 9**) and **Map 3.16** (**Appendix 1**) shows disturbance associated with roads. Of the approximately 679,300 acres of transmission lines on BLM-administered lands in the planning area, approximately 33 percent are within mapped occupied habitat (**Table 3-7** [**Appendix 9**]).

ROW Avoidance and Exclusion Areas

Areas identified as unsuitable for surface disturbance or occupancy are generally identified as avoidance or exclusion areas for ROWs. Restrictions and mitigation measures could be modified on a case-by-case basis for avoidance areas, depending on impacts on resources, while exclusion areas are prohibited from ROW development with limited exceptions.

Communication Sites

The BLM typically issues communication site ROWs or leases for communication facilities. Communication towers, transmission lines, and other vertical structures that provide additional perching opportunities for ravens and other birds of prey can result in habitat fragmentation, habitat avoidance, and increased vehicle traffic during maintenance operations (USFWS 2013).

Roads and Railroads

Roads and railroads can fragment GRSG habitat (Knick and Rotenberry 1995). Within the BLM-administered lands in the planning area there are 46,600 acres of railroad and 2,197,200 acres of road ROWs, of these 24 percent and 42 percent respectively are located in occupied habitat (**Table 3-8** and **Table 3-9** [**Appendix 9**]).

Solar Energy

Acres of solar facilities and ROWs in the planning area are presented in **Table 3-10** (**Appendix 9**). For ROW applications to support non-utility-scale solar facilities (i.e., less than 5 MWs), the BLM will consider requests on a case-by-case basis, and may require a land use plan amendment to analyze an otherwise nonconforming proposal.

Wind Energy

Based on 2023 U.S. Energy Information Agency data, sites with an average annual wind speed greater than 5.8 meters per second are candidates for utility-scale generation (EIA 2023a). Acres of wind turbines and wind ROWs in the planning area are listed in **Table 3-11** (**Appendix 9**). Acres of wind potential in mapped occupied habitat within the planning area are listed in **Table 3-12** (**Appendix 9**). See **Map 3.17** (**Appendix 1**) for an overview of existing wind potential within the planning area.

3.9.2 Trends within the Planning Area

Land Use Authorizations

Land use authorization requests are customer driven. Within the planning area most authorizations processed are primarily for roads, electric distribution lines, and communication sites. Renewable energy land use authorization requests including wind and solar development have increased and are expected to continue to increase due to the growing demand for renewable energy.

3.10 MINERAL RESOURCES

3.10.1 Fluid Minerals (Including Geothermal)

Fluid leasable minerals include oil, gas, coalbed natural gas, and geothermal resources. Oil and gas are most often found in the porous spaces of sedimentary rocks (e.g., sandstone and limestone), having migrated there from source rocks (e.g., marine shales) rich in organic material. Coalbed natural gas is methane gas that can be extracted from coal seams. Since most coalbed natural gas is associated with coals at shallow depth, exploration, well drilling, completion, and production costs are considerably lower than for conventional deep gas production. Geothermal resources are a source of energy that uses the natural heat of the Earth's interior, carried to the surface by steam or hot water.

Leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. Geothermal is also governed by the Geothermal Steam Act of 1970, as amended. The rights to explore for and produce fluid minerals on public land may only be acquired through leasing. Leases are issued through a competitive process and are offered through a bid in areas nominated by interested parties. The BLM issues competitive leases for oil and gas exploration and development on lands owned or controlled by the Federal government. Currently, the BLM holds quarterly competitive sales but not in every state. Leases are issued for a term of ten years and expire unless they are extended, suspended, or held by production. If the lessee establishes hydrocarbon production, leases are held as long as oil or gas is produced.

During the leasing process, the BLM may apply lease stipulations to leases in order to protect other resource values or land uses (e.g., cultural resources, boundary line markers and corners and wildlife) by establishing authority for timing delays or the denial of operations in the terms of the standard lease contract. There are four types of additional stipulations defined as follows:

- No Surface Occupancy (NSO). On lands covered by the NSO stipulation, use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values. Fluid minerals could be leased, but the leaseholder/operator would have to use off-site methods, such as directional drilling to access the mineral resource.
- Controlled Surface Use (CSU). Under the CSU stipulations, use and occupancy is allowed (unless restricted by another stipulation) but identified resource values require special operational constraints that may modify the lease rights. While less restrictive than an NSO, a CSU stipulation allows the BLM or surface managing agency to require special operational constraints, to shift the surface-disturbing activity, or to require additional protective measures (e.g., special construction techniques for preventing erosion in sensitive soils) to protect the specified resource or value.
- Timing Limitations (TLs). A TL stipulation prohibits surface use during specified periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need and that less stringent, project-specific mitigation measures would be insufficient.
- Protection of Survey Corner and Boundary Line Markers. Under the boundary marker protection stipulation, the responsible party will identify and protect evidence of Federal interest land boundary markers.

Most but not all stipulations attached to leases at the time of sale have a provision, specified in the individual Land Use Plans, for granting exceptions, modifications, or waivers. An exception is a case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites in the leasehold to which the restrictive criterion applies. A modification is a fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may, therefore, 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 in the leasehold to which the restrictive criteria applied. A waiver is a permanent exemption from a lease stipulation. The stipulation no longer applies anywhere in the leasehold.

The issuance of a lease does not, in and of itself, authorize any surface-disturbing activities. If a lessee wishes to conduct exploratory drilling, an application for permit (APD) to drill must be submitted to the BLM for approval. These protections are accomplished through the attachment of Conditions of Approval (COA) to each project in conjunction with the NEPA process and during review. For geothermal resources, some exploratory drilling can be done under a Notice of Intent and does not require an APD.

The federal fluid mineral regulations do not allow the BLM to attach new stipulations to a lease after its issuance, without the consent of the lessee. Similarly, the BLM may not apply COAs and other post-leasing restrictions that result in a de facto application of a new lease stipulation.

Existing Conditions in the Planning Area

Oil and Gas

Major oil and gas producing basins in the planning area are located primarily in Colorado, Utah, Wyoming, Montana, and the Dakotas. The most prolific oil and gas producing basins include the Powder River, Greater Green River, Unita-Piceance, North Park, and Williston, and are described further below.

The Powder River Basin, with an area of 43.5 thousand square miles, covers northeastern Wyoming and southeastern Montana (EIA 2023b). The Powder River Basin is a deep, northerly trending, asymmetric, mildly deformed trough, approximately 250 miles long and 100 miles wide. The thickness of the sedimentary section exceeds 17,000 feet along the basin axis (Lawrence 2010). The Eastern Powder River Basin in northeast Wyoming is one of the most prolific oil producing basins the Rocky Mountains. Coalbed natural gas is one of the largest contributors to total natural gas production in Wyoming, and coals of the Powder River Basin are the largest source of coalbed natural gas (WOGCC 2023).

The Greater Green River Basin, with an area of 25.9 thousand square miles and the largest oil shale deposits, covers areas in southwest Wyoming, northwest Colorado, and northeast Utah (EIA 2023b). Oil and gas exploration of the Overthrust Belt dates back to the 1890s. This area has been the focus of intense exploration, including seismic and drilling programs, since the mid-1970s (BLM 2003).

Uinta-Piceance Basin, which encompasses an area of 29.2 thousand square miles, extends from eastern Utah into northwestern Colorado and currently has production in conventional gas, tight sands, shale gas and oil (EIA 2023b). The Piceance Basin within the greater Unita-Piceance Basin is an elongated structural depression trending northwest - southeast located in western Colorado. The basin is more than 100 miles long and has an average width of over 60 miles, encompassing an area of approximately 8.6 thousand square miles (EIA 2023b). The Piceance Basin contains six of the top one hundred natural gas reserves in the US one of the top one hundred oil reserves (Colorado Geological Survey – online).

The North Park Basin occupies approximately 1.3 in thousand miles in north-central Colorado (EIA 2023b) and includes oil and natural gas resources primarily in the form of coalbed natural gas, carbon dioxide, and recent interest in the resource potential of the Niobrara shale formation.

The Williston Basin, with an area of 69.8 thousand square miles extending from northwest South Dakota to western North Dakota and eastern Montana (EIA 2023b), has a long history of oil and gas production. Conventional oil production from the Williston Basin became significant during the 1970s, peaking in the mid-1980s, and then declining in the 1990s. Technological advances in horizontal drilling and hydraulic fracturing in the early 2000s have allowed development of unconventional zones (methane-bearing coal zones, oil or gas bearing shale zones, gas hydrates or "tight gas" in low porosity or low permeability traditional zones), that were once considered as uneconomic. As a result, oil and gas production in the region increased beginning in early 2000 and peaking in 2008. While production has slowed, interest and potential continue to exist in the region.

In addition to the above regions, Railroad Valley and Pine Valley in Nevada have areas of high and moderate potential for petroleum. Railroad Valley is an elongated valley trending north to south, approximately 80 miles long and up to 20 miles wide. The Grant Canyon No. 3 well in Railroad Valley was one of the most prolific onshore oil wells in the continental United States, flowing up to 4,300 barrels of oil per day (Nevada Bureau of Mines and Geology, undated). Pine Valley is an elongated valley, trending north to south, approximately 30 miles long and 15 miles wide, in Eureka County. Production of oil in Pine Valley has been declining over recent years. Oil and gas operators have not indicated an interest in drilling new wells there.

Swings in the natural gas market are the likely driver in the industry's interest for oil and gas leases and the resulting requests for leasing and for filing of application for permit to drill (APD). As demand rises, more interest in oil and gas development is expected (BLM 2009). In areas with moderate to high potential in several areas in the planning area, drilling is expected to increase.

Geothermal

Geothermal resources are a source of energy that uses the natural heat of the Earth's interior, carried to the surface by steam or hot water. Most of the geothermal power plants in the US are in western states, where there are large areas with medium to high potential for geothermal resources. More than 90 percent of the US geothermal power generation is from California and Nevada, with additional contributions from plants in Idaho, New Mexico, Oregon, and Utah (as well as Alaska and Hawaii; NREL 2021).

In Nevada, geothermal resources are significant in portions of the planning area. Based on US Geological Survey (USGS) data, there is particularly high potential in northeastern Nevada (Williams et al. 2008). Nevada currently has 26 operating geothermal power plants in 17 locations (State of Nevada Commission on Mineral Resources 2023). Between 2015 and 2019, geothermal project development growth in Nevada surpassed all other states with 5 new geothermal plants (NREL 2021). Nevada's geothermal electricity generation is the second highest in the US, after California. In 2021, geothermal power plants in Nevada collectively produced 825 megawatts of electricity (State of Nevada Commission on Mineral Resources 2021).

Geothermal resources in Utah are plentiful in the middle and northwest portions of the state, although a lack of transmission capacity may hinder development. Geothermal resources in Utah have the potential to supply 15,000 MW of electricity. As of 2019, there were four geothermal power plants in Utah with capacity of 90 MW (NREL 2019). Currently, there are no geothermal energy production facilities within GRSG habitat in the planning area in Utah. Future development of geothermal resources within GRSG habitat in the planning area is also highly unlikely.

In 2019, Oregon and Idaho had 4 and 1 operating geothermal power plants with a total capacity of 38 MW and 18 MW, respectively (NREL 2021). Between 2016 and 2019, Oregon had 4 developing projects and Idaho had 5 (NREL 2021).

3.10.2 Nonenergy Leasable Minerals

Nonenergy solid leasable minerals may include sodium, phosphate, potassium, sulfur, and gilsonite. Similar to fluid leasable minerals (discussed above), nonenergy leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. A prospecting permit provides the exclusive right to prospect and explore for leasable mineral deposits. There are three ways to obtain a mineral lease for nonenergy solid leasable minerals:

- Competitive lease: A competitive lease can be issued where there is an existence of a valuable mineral deposit. The BLM can designate such lands as Known Leasing Areas.
- Preference Right Lease: This is a noncompetitive lease. A prospecting permit is applied for and an exploration plan is approved. The plan must show how the existence and workability of a valuable

deposit will be determined. If a valuable mineral deposit has been discovered, and other mineral-specific determinations are made in the positive, the BLM may issue a Preference Right Lease.

- Fringe Acreage Lease: This is a noncompetitive lease. A Fringe Acreage Lease can be applied for if the applicant has control over adjacent lands. The leased area must meet certain requirements, including demonstration that the deposit continues from the lands controlled by the applicant and that the mineral deposit is not in an area of competitive interest.

Existing Conditions in the Planning Area

The discussion of nonenergy leasable mineral resources in the planning area focuses on gilsonite, phosphate, and sodium. Although the discussion for these minerals is planning area wide, each of these resources exists primarily in limited areas, described in detail below.

Sodium

The world's largest known trona deposit, a hydrous sodium carbonate mineral refined into soda ash, sodium bicarbonate, sodium sulfite, sodium tripolyphosphate, and chemical caustic soda (Gregory 2014) is located in southwestern Wyoming. Soda ash is the trade name for sodium carbonate, a chemical obtained from trona and sodium-carbonate-bearing brines. Primary uses are by the glass and chemical industries (USGS 2023a). The trona is found in the Green River Formation of Eocene age. The Wilkins Peak Member of the Green River Formation includes at least 42 trona beds, occurring from 400 to 3,500 feet below the surface. Trona is Wyoming's top export and in the US, 90 percent of trona production comes from southwestern Wyoming. At current production rates of approximately 18 million tons per year Wyoming's estimated recoverable reserves would last over 2,000 years (Wyoming Mining Association 2023). A federally designated Known Sodium Leasing Area covering a 1,085 square mile area almost entirely in Sweetwater County, Wyoming overlaps part of the planning area.

The Piceance Basin of northwestern Colorado and adjacent states contains the world's largest and most economically significant deposit of a nahcolite, an evaporite mineral consisting of naturally occurring sodium bicarbonate. Within the planning area in Colorado, all of the sodium resources are found in the Parachute Creek Member of the Green River Formation. The sodium resource in the basin was estimated at 32 billion short tons (Dyni 1974) and 29 billion tons by Beard et al. (1974; Brownfield et al. 2010).

In Utah, there are approximately 175,200 acres of federal mineral estate in the population areas on which sodium occurs. All sodium deposits in the population areas are within the Rich and Box Elder population areas. The Rich Population Area has 158,900 acres with sodium deposits, all of which is within the decision area. The Box Elder Population Area has 16,300 acres of federal mineral estate on which sodium occurs, of which 2,500 acres (16 percent) is within the decision area. In Utah, there are no federal sodium leases in the planning area (BLM 2015).

Phosphate

Phosphate is primarily contained in phosphate rich sedimentary rock deposits, typically deposited in shallow marine or low energy environments (Delaney 1998). Phosphate is primarily used in ammonium phosphate fertilizers and animal feed supplements (USGS 2023b). The BLM manages phosphate leasing and development on most public land.

Phosphate is currently mined in North Carolina, Florida, Idaho, and Utah. Production from Idaho and Utah has been steady while eastern production has been decreasing, leading to an increasing reliance on western deposits for domestic production. In the west, the richest phosphorite accumulations are found in southern Idaho and northern Utah. A deposit does exist in Wyoming but is currently unavailable due to existing withdrawals. Mining for phosphate occurs using surface mining methods where large quantities of waste rock are typically moved to extract the ore. Lands known to have a valuable phosphate resource have been designated as Known Phosphate Leasing Areas and are leased through a competitive leasing process. Lands outside a Known Phosphate Leasing Area may also be leased, but the existence of a valuable phosphate resource must first be demonstrated, through prospecting. Leasing is a discretionary action; however, when issued, a federal phosphate lease conveys to the lessee the exclusive rights to explore for and extract the phosphate resources contained in the lease, subject to existing laws and regulations.

Idaho has 8 known phosphate leasing areas, totaling 80,168 acres and approximately 86 federal leases covering approximately 43,000 acres. Approximately half of the leases have been mined. There are currently 3 active producing phosphate mines; 2 permitted mines under construction that will replace producing mines as they are depleted; and 1 mine being permitted. The phosphate industry has been an important industry in southern Idaho since about 1907. As a result average wages in Caribou County are among the highest in the State of Idaho. The ore produced from the federal leases is an important source of phosphate fertilizer and elemental phosphorus produced at industrial plants in Pocatello and Soda Springs, Idaho. Currently, 10 unmined leases and one mine in permitting, encompassing 4 of the unmined leases, are located in GRSG HMA.

Gilsonite

Gilsonite is a solid hydrocarbon formed in veins or dikes that is mined primarily underground. Gilsonite is a unique industrial mineral found only in the Uinta Basin in eastern Utah. The main markets for gilsonite are the oilfield and printing ink industries. In the oilfield industry, gilsonite is used as a fluid loss control agent and shale stabilizer for oil-based drilling fluids and water-based drilling fluids. It is also used as a loss circulation material and slurry density reducer for cementing fluids (Boden and Tripp 2012).

3.10.3 Coal

Leasing and developing federal coal resources is described in the federal regulations at 43 CFR Part 3400. Coal leases are made available for sale through a competitive bidding process in each BLM state office. Provisions of the lease documents in relation to surface and subsurface resources and resource uses are dictated by the current RMPs for each field office within which leases are offered. In general, these RMPs specify types of restrictions on coal leasing within each field office boundary based on identification of lands with potentially developable coal resources and determination of lands found suitable for coal leasing using the 20 criteria listed in Section 522 of the Surface Mining Control and Reclamation Act

Coal leases are subject to readjustment of their stipulations. The first readjustment could occur 20 years after the initial date of issuance and then every 10 years thereafter. For lands found suitable for leasing, analysis of acceptability for leasing would consider protective measures identified in the then-current RMP. Depending on the field office, these protections may include design, reclamation, and mitigation of proposed measures.

Most but not all protections are attached to leases at the time of sale, and the protections may identify exception criteria for granting temporary or permanent relief from a specific measure. In addition, federal regulations give the BLM the authority to ensure coal is developed in a manner that minimizes impacts on other resources and uses and is protective of human health and safety. These protections are accomplished through the attachment of COAs to each project in conjunction with the NEPA process and during review of individual permit application.

BLM-administered lands are acceptable for coal leasing only after the lands have been evaluated through the BLM's multiple-use planning process (43 CFR Part 3420.1-4). In areas where development of coal resources may conflict with protection and management of other resources or land uses, the BLM may identify mitigating measures as either lease stipulations or operational restrictions.

Existing Conditions in the Planning Area

Coal resources within the planning area are primarily found in eastern Utah, northwestern Colorado, southwestern and northeastern Wyoming, and many parts of Montana.

Wyoming has the largest federal coal program in the BLM and is the nation's largest producer of coal at 34% of national production. Most Wyoming coal is used for steam generation in the electrical utility industry. The planning area contains bituminous and sub-bituminous deposits. The Powder River Basin, which extends into northern Converse County, contains some of the largest low-sulfur coal deposits in the world. In 2022, Wyoming produced a total of 244 million short tons of coal with 237 million short tons produced from the Powder River Basin on federal and non-federal Lands (Mine Safety Health Administration 2023).

Other coal formations and fields in Wyoming with significant historic and projected coal production include Adaville, Evanston, and Frontier formations in southwest Wyoming, and the Hanna Field in southcentral Wyoming. Reserves in the Adaville Formation are estimated at 1 billion tons, and currently is being mined at Chevron Mining, Inc.'s surface mine near Kemmerer. Within the Rawlins Field Office, there are six significant coalfields containing coal resources of sub-bituminous to bituminous rank: Hanna Basin, Carbon Basin, Great Divide Basin, Rock Creek, Kindt Basin, and Little Snake River (Berryhill et al. 1950).

Colorado coal has the second highest quality (low impurity content) in the nation. Most Colorado coals are bituminous and subbituminous. The Green River Coal Region, which occupies most of Moffat County and the western portion of Routt County, is the largest coal-producing region in Colorado (Carroll 2005).

A recent USGS report determined that more than 162 billion short tons of available coal resources are within the Montana portion of the Powder River Basin with about 35 billion short tons recoverable by surface mining methods. An additional 42 billion short tons of underground coal resources are within the Montana portion of the Powder River Basin and 80 percent (34 billion short tons) are within 500 to 1,000 feet of the surface, (Haacke et al. 2012). Four mines (Absaloka, Decker, Rosebud, and Spring Creek) mine sub-bituminous coal beds within the Tongue River member of the Fort Union formation in the Montana portion of the Powder River Basin. Most of the coal mined in the planning area is shipped out of state and the remainder of the coal is burned at local power plants. A small amount of coal is trucked in state to power plants and manufacturing facilities.

Coal resources occur throughout Utah, with an estimated 15 billion tons of recoverable coal. The most important coal-bearing formation in the planning area is the Blackhawk Formation in central and eastern Utah, a lower middle unit of the Mesaverde Group. Coal beds in this formation are up to 25 feet thick, with most mined seams in the 6- to 13-foot range. The high quality coal in this formation is bituminous with a relatively high heat content and low sulfur content. The Ferron Sandstone member of the Mancos Shale in central and eastern Utah also contains coal beds. Coal in the Ferron Sandstone member is bituminous but has higher sulfur and ash contents and slightly lower heat content than coal in the Blackhawk Formation. There are significant reserves of sub-bituminous C to high-volatile A bituminous coal in the Kiaparowits Plateau Late Cretaceous Straight Cliffs Formation (USGS 2002). Much of the coal in central Utah has been extracted, and the remaining coal resources in this area are difficult to access or extract and some is of lower quality. The Dakota Formation in southern Utah contains coal beds up to 27 feet thick with subbituminous coal. These coal beds are higher in sulfur and ash contents and lower in heat content than coal mined in the Blackhawk Formation. The Carbon Population Area contains most of the coal operations in the planning area. Most mines in that area are deep underground mines, primarily in the Wasatch Plateau and Book Cliffs region.

3.10.4 Locatable Minerals

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

Acquisition of locatable minerals is done by staking a claim over the deposit and acquiring the necessary permits to explore or mine, or the mineral rights can be acquired by purchase. For operations other than casual use, the claimant is required to submit a Notice or a Plan of Operations. Regulations require the claimant to prevent unnecessary or undue degradation of the land. The BLM may petition the Secretary of the Interior to withdraw areas from further location of mining claims or sites. Mining claims located after the Surface Resources Act of July 23, 1955, remain open to the public for other multiple uses which do not materially interfere with exploration, mining, and reasonably incident activities.

Existing Conditions in the Planning Area

Locatable mineral exploration and production occurs throughout the planning area. Locatable minerals found in the planning area are listed in **Table 3-13** (**Appendix 9**). Because locatable minerals are governed under the requirements of the Mining Law of 1872, as amended the BLM has limited information regarding the existing conditions of locatable mineral development. Many locatable mineral prospecting and exploration activities fall under the definition of casual use and thus can occur without notifying the BLM, Required filings of claims, notices of intent or plans of operations do not require the identification of the particular locatable minerals being sought or developed. There is also no requirement to report the locatable mineral commodities produced or amounts produced each year. As a result, information regarding the existing conditions of locatable minerals in the planning area is not available.

3.10.5 Mineral (Salable) Materials

Salable minerals, also referred to as mineral materials, include common construction materials and aggregates, such as, sand, gravel, limestone aggregate, building stone, cinders, moss-covered rock (moss rock), roadbed, decorative rock, clay, and ballast material. The Materials Act of 1947, as amended (61 Stat. 681) authorizes disposal of mineral materials on BLM-administered lands through a sales system, and provides for free use of material by government agencies, municipalities or nonprofit organizations, if the material is not used for commercial purposes. Permitting removal or extraction (i.e., disposal) of mineral materials on BLM-administered lands is a discretionary activity. An operator and permittee may request use of mineral materials, but the BLM has no obligation to provide mineral materials for commercial and free use operations. The BLM will not authorize the disposal of mineral materials if it is determined that the damage to BLM-administered lands and resources would exceed the public benefits expected from the proposed disposal; nor will the BLM dispose of mineral materials from areas identified in Land Use Plans as not appropriate for mineral materials disposal (43 CFR Parts 3601.11 and 3601.12).

Sand and gravel is an extremely important resource and its extraction varies directly with the amount of development nearby – road building and maintenance, and urban development. The proximity of both transportation and markets are key elements in the development of a deposit. Future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. One major driver of construction activity is road and well pad construction for oil and gas exploration and development and residential and commercial construction projects. As new oil and gas development continues to occur, it is expected that mineral materials activity will continue.

Community pits are sites established by governmental agencies for the public to acquire mineral materials through sales contracts. Local government agencies and nonprofit organizations may obtain these materials free of cost for community purposes. County and State Road construction divisions are the significant users of gravel and sand resources through free use permits. A negotiated sale is an exclusive site proposed by a single party, often commercial, and the party must pay for the BLM to process the permit.

The number of sales out of a community pit varies by site, from less than one to more than 50 per year. Most of these sales are for less than one ton. Free Use Permit sites are used sporadically and may be scattered throughout a field office or district office, to reduce hauling costs. A pit may be inactive for several years before it is needed for a road project in the area.

A gravel pit is initially developed by scraping off the vegetation and topsoil, which is then stockpiled for future reclamation. Most gravel pits are 5 to 15 acres in size. No infrastructure other than an access road is generally needed for mineral materials disposals. Most mineral material removal activity occurs during the summer months and during daylight hours.

Existing Conditions in the Planning Area

Mineral materials are the largest single mineral resource present across all the states with the largest potential for development. The volume of material sold and used varies by state. Specific closures of areas to salable mineral materials, such as ACECs or crucial or essential wildlife habitat, exist throughout much of the planning area. Some Land Use Plans apply use and development restrictions in terms of seasonal timing limitations to protect GRSG habitat and leks, similar to oil and gas leasing; however, this is not consistent across the planning area. Many of the LUPs in the planning area encourage the use of existing disposal sites until the material is depleted.

3.10.6 Oil Shale and Tar Sands

Oil shale is an organic-rich sedimentary rock consisting of calcareous shale with a large amount of organic material consisting of shale with a large amount of mixed organic compounds known as kerogen. Kerogen may be converted to oil through destructive distillation and exposure to heat. The US holds more than half the world's oil shale, with the largest deposits located in the Green River Formation in Colorado, Utah, and Wyoming. The Mineral Leasing Act of 1920, as amended, authorizes the leasing of federal lands for the development of oil shale and tar sands and the Energy Policy Act of 2005 authorizes the BLM to accelerate development of oil shale and tar sands in those states. Pursuant to Section 369 of that Act, the BLM issued a Final PEIS in 2008 amending 10 RMPs in Utah, Colorado, and Wyoming to make approximately 2 million acres of public lands potentially available for commercial oil shale leasing and development and 430,000 acres potentially available for tar sands leasing and development. Because of litigation, the BLM released another Final PEIS/Proposed RMP Amendment in November 2012 and accompanying ROD in March 2013. The ROD reduced the areas available in Utah, Colorado, and Wyoming for potential development of federal oil shale and tar sands to approximately 800,000 acres. Areas open to oil shale leasing are for research, development, and demonstration leases only. The BLM would issue a commercial lease when the lessee satisfies the conditions of its research, development, and demonstration leases and applicable regulations. Preference right acreage in addition to the research, development, and demonstration lease acreage may be included in the commercial lease if specified. The Oil Shale and Tar Sands ROD removed federal mineral estate within all GRSG HMAs in Utah from potential oil shale and tar sands leasing, subject to valid existing rights.

Existing Conditions in the Planning Area

The most prospective oil shale deposits in the US are within the Green River Formation in the greater Green River Basin (including Fossil Basin and Washakie Basin) in southwestern Wyoming and northwestern Colorado, the Piceance Basin in northwestern Colorado, and the Uinta Basin in northeastern Utah (BLM 2013a). The resource potential of these shales is estimated to be the equivalent of 1.5 to 1.8 trillion barrels of oil in place (Bartis et al. 2005). Although resource potential within the Piceance Basin totals approximately 1.2 trillion barrels of oil in place, only part of it can be recovered depending accessibility of the oil shale for development and method of mining used (Taylor 1987). The Green River Basin, which covers a large area in southwest Wyoming, northwest Colorado, and northeast Utah, contains an estimated 244 billion barrels of shale oil in the Tipton Shale Member, Wilkins Peak Member, and Laney Member of the Green River Formation. Oil shale occurs throughout most of the Green River Basin and in thin beds (less than 4 feet thick) in Fossil basin. The beds in the upper part of the Tipton Shale are up to 75 feet thick and yield up to 24 gallons of oil per ton. Other important oil shale beds in the Wilkins Peak Member and the Laney Member are slightly to the east of the southeast border of the Kemmerer Field Office.

Oil shale areas of interest in southwestern Wyoming lie within the Green River and Washakie Basins. These areas are presently withdrawn from locatable mineral entry to protect the oil shale resource. Although the oil shales within these basins are of lesser quality than Colorado oil shales some of these contain several trillion barrels of oil per square mile (Trudell et al. 1973). The Green River and Washakie Basins contain approximately 476 billion barrels of in-place oil within the shale. These oil shale deposits have not been leased, nor have they received major attention from industry, primarily due to high development costs of underground and surface mining methods. Several in-situ research projects and tests conducted west of Rock Springs more than 30 years ago suggested marginal results for extraction of this mineral resource. Final federal regulations governing oil shale leasing and development were published in the Federal Register on November 18, 2008 (43 CFR Parts 3900, 3910, 3920, and 3930). There are currently no federal oil shale leases in the Green River and the Washakie Basins. There are no expressions of industry interest to explore for or to develop oil shale resources in this area.

3.11 ACECs and RNAs

Areas managed under Special Designations are regulatory or congressionally mandated and are designed to protect or preserve certain resource qualities or uses. Only ACECs and RNAs are included for analyses in this effort - other designated areas were not carried forward. FLPMA mandates prioritizing designation and protection of ACECs in the development and revision of land use plans (43 USC 1712(c)(3)). Specific regulations governing this process are outlined in 43 CFR Part 1610.7-2(b). These regulations ensure careful consideration and prioritization of environmental concerns during land use planning and management. Regulatory mandates for ACECs do not necessarily correspond to special designations imposed by the President or Congress. The Special Designations within the planning area include ACEC and Resource Natural Areas (RNAs) and are specific to GRSG.

3.11.1 Greater Sage-Grouse ACECs

An ACEC is defined in the FLPMA, Section 103(a), as an area on BLM-administered lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and ensure safety from natural hazards. BLM regulations for implementing the ACEC provisions of the FLPMA are found in 43 CFR Part 1610.7-2(b). In addition, ACEC Interim Guidance (*Clarification and Interim Guidance for Consideration of Areas of Critical Environmental Concern Designations in Resource Management Plans and Amendments, IM-2023-013*) highlights the need for evaluation of relevant values contributing to landscape intactness, climate resiliency, habitat connectivity, and opportunities for conservation or restoration within ACECs.

ACECs differ from some other special management designations as the designation does not automatically prohibit or restrict other uses in the area. The special management attention is designed specifically for the relevant and important values and, therefore, varies from area to area. Restrictions of an ACEC designation are determined at the time of designation is made and are designed to protect the values or serve the purposes for which the designation was made. The BLM identifies goals, standards, and objectives for each proposed ACEC and general management practices and uses, including necessary constraints and mitigation measures (ACEC Interim Guidance, IM-2023-013). In addition, ACECs are protected by the provisions of 43 CFR Part 3809.11(c), which requires an approved plan of operations for activities resulting in more than five acres of disturbance under the mining laws. However, regulations and requirements may vary based on specific locations and jurisdictions. While a plan of operations is generally required for mining activities, certain activities, such as casual use or small-scale exploration, may have different regulations and thresholds.

For this planning effort the assumption is managing to protect GRSG would be compatible with other designated and overlapping ACECs managed to protect other relevant and important values. Guidance in BLM Manual 1613, Areas of Critical Environmental Concern, informs the public has an opportunity to submit nominations or recommendations for areas to be considered for designation. Nominations may be made at any time and must receive a preliminary evaluation to determine whether they meet relevance and importance criteria to warrant further consideration. Within a planning process, the BLM solicits requests for nominations with the Notice of Intent and then analyzes any nomination for relevance and importance. Any ACECs that meet at least one relevance criteria and at least one importance criteria must be brought forward for consideration in at least one alternative.

Existing Conditions

Within the planning area, several portions of both existing ACECs and nominated ACECs overlap mapped occupied GRSG habitat. The BLM also called for and received nominations for ACECs to protect GRSG. A BLM interdisciplinary team reviewed nominations during scoping to determine which areas met the relevance and importance criteria, as defined by 43 CFR Part 1610.7-2(a)(1) and 43 CFR Part 1610.7-2(a)(2), and guidance in BLM Manual 1613, Areas of Critical Environmental Concern. This process identified potential candidates for designation to protect GRSG habitat. Detailed information on each state's ACEC review process and determinations can be found in the respective state's 2015 GRSG EIS process.

None of the existing ACECs were identified as potential candidates for designation solely for the purpose of protecting GRSG habitat. In Oregon, however, there are two ACECs, High Lakes ACEC and Red Knoll ACEC, in GRSG habitat where the relevant and important values specifically identified GRSG and GRSG plant communities. Together, these cover over 50,000 acres of GRSG habitat. GRSG and GRSG plant communities are commonly considered in relevant and important values screenings.

3.11.2 Research Natural Areas (Oregon Only)

RNAs are a unique type of ACEC created to preserve examples of all significant natural ecosystems for comparison with those influenced by humans, provide educational and nondestructive research for ecological and environmental studies, and preserve gene pools of typical and endangered plants and animals. RNAs are areas that are part of a national network of reserved areas under various ownerships that contain important ecological and scientific values and are managed for minimum human disturbance. RNAs are intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations, and provide an essential network of diverse habitat types that will be preserved in their natural state for future generations. Under certain circumstances, deliberate manipulation may be used to maintain the unique features for which the RNA was established. RNAs in the planning area have important biological or physical attributes that are identified and designated in cooperation with the Pacific Northwest RNA Committee (Forest Service, BLM, and Washington and Oregon) following the Oregon Natural Areas plan (Oregon Natural Heritage Advisory Council 2010). Under current BLM policy, research natural areas must meet the relevance and importance criteria of ACECs and are therefore designated as ACECs. Under current guidelines, ACEC procedures also are used to designate outstanding natural areas.

One of the guiding principles in managing RNAs is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes or conditions. Permitted activities that could impair scientific or education values of the RNAs (e.g., energy development, logging, road building, livestock grazing, and recreation) are generally limited, restricted, or not allowed. These areas can be used for long-term baseline plant community monitoring; they are areas where few management activities have influenced the plant community for which the RNA was established. While management practices necessary to maintain or restore ecosystems may be allowed and perhaps are necessary to sustain values, such as invasive plant control, it is crucial to align these practices with the overall goals and considerations outlined in the alternatives. Notably, certain alternatives may incorporate specific language allowing juniper treatment, and any allowance or necessity for such practices should be consistent with the chosen alternative and its objectives.

Existing Conditions

In Oregon, there are thirteen RNAs with important GRSG conservation values. All thirteen RNAs were designated in the underlying district RMPs and were labeled as key RNAs in the 2015 GRSG ARMPA. Five of the existing RNAs included GRSG and GRSG habitat relevance and importance values prior to the 2015 GRSG ARMPA. Two of the RNAs (Foster Flats and Guano Creek-Sink Lakes) were closed to livestock grazing prior to the 2015 GRSG ARMPA. Neither the 2015 nor 2019 GRSG plan amendments changed management or decisions on these RNAs. See **Table 3-14** (**Appendix 9**). The 2015 GRSG ARMPA made all or portions of the other key RNAs unavailable to livestock grazing. BLM Oregon districts with key RNAs have closed some portions of them through the required grazing regulations and NEPA processes, as indicated in **Table 2-26**. The 2015 GRSG Final Environmental Impact Statement estimated that approximately 21,957 acres in these key RNAs would be unavailable to livestock grazing. During the 2019 GRSG amendment process that number was corrected to 21, 959 acres. **Tables 3-15 and 3-16** (**Appendix 9**) show the vegetation types by the key RNAs.

3.12 Social and Economic Conditions (Including Environmental Justice)

This section includes a summary of social and economic conditions, including identified environmental justice communities, and provides a discussion on updates and changes to key social and economic factors for the relevant states and counties, including population, employment, and income data and trends. Detailed information is included in **Appendix 13**, Socioeconomic Baseline Report. Updated information is also provided for BLM resources, including an overview of nonmarket values pulling from the 2015 discussion with updates from more recent literature. In addition, screening of environmental justice populations at the county level throughout the planning area has been updated based on 2022 BLM guidance (BLM 2022a). The economic data presented in this discussion include annual averages for the most recent reporting periods. These include the widespread economic effects of the recession brought about by the 2020 global COVID-19 pandemic, which might have impacted local and regional economies through short-term reductions in employment and industry output. Effects may be ongoing and may not be evenly distributed across industries.

The planning area includes portions of California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming, regardless of jurisdiction. Due to the nature of social, economic, and environmental justice conditions, the analyses use a different study area than is used for other resources. Socioeconomic analysis areas and environmental justice analysis areas have been determined for each state to include counties that contain GRSG habitat on BLM-administered lands or minerals and within which social and economic conditions might reasonably be expected to change based on alternative management actions. An overview of counties included in each state analysis area is included in **Appendix 13**.

3.12.1 Baseline Demographic and Economic Conditions

Historical and projected population growth are important socioeconomic indicators because they aid in estimating future demand for public lands and potential shifts in demand for various land uses. They also provide context for how land use planning changes could affect the local population, further informing associated economic analyses. Appendix 13 provides an overview of population changes since 2010 and provides a summary of economic data, including trends and current conditions for per capita income and unemployment. The unemployment rate is a key indicator measuring the percentage of unemployed people to the number of people in the labor force, and is often used as an indicator of economic health and conditions. A high unemployment rate is a concern for the general economy and likely indicates that many individuals in the labor force are unable to find employment, which could lead to economic distress (Bondarenko 2024). Changes in the unemployment rate from year to year provide a good picture of the relative health of the economy over time. Appendix 13 also identifies and describes major economic sectors in the socioeconomic study area that can be affected by public land management actions. Economic activities that rely on or could rely on BLM-administered lands, such as livestock grazing or energy development, are the most likely affected. Differences in major sectors since the publication of the 2015 Sage-Grouse Plan Amendment EISs are highlighted below; for all other sectors, please refer to the respective 2015 Sage-Grouse Plan Amendment EIS.

3.12.2 BLM Land and Resource Use Revenue

Details are provided below for revenue and economic contributions associated with BLM lands and resources in the analysis area. Additional details for current and historic levels of resource use are included in the respective resource sections of this document.

Leasable Minerals

Fluid Minerals (Oil and Gas)

Oil and gas extraction is important for supporting the local economies in many communities in the analysis area, especially where a large percentage of employment comes from the fluid mineral industry on federal lands. These areas include northwestern Colorado, southeastern Idaho, southeastern Montana, northeastern Nevada, southwestern North Dakota, central to eastern Utah, and northeastern and southwestern Wyoming. Oil and gas extraction provides funding outside these areas for public services through royalties and taxes distributed to the states where the extraction occurred. The government collects revenues from leasable mineral extraction on public lands through bonuses, royalties, and rents paid by producers which are subsequently distributed to the federal and state government. The Department of the Interior, through the Office of Natural Resources Revenue (ONRR), collects a set percentage of the sales value of federal leasable minerals; this is known as a royalty.

Wyoming had the highest disbursement from oil and gas extractions, in 2022, with about $615 million. From 2018 to 2019, oil and gas disbursements made to the states increased in California, Colorado, Montana, North Dakota, and Wyoming, but decreased in Idaho, Nevada, South Dakota, and Utah. From 2019 to 2021, oil and gas disbursements declined for all states in the planning area. In 2022, disbursements increased and returned to 2019 levels or higher; however, disbursements in 2022 were lower than 2018 levels in Idaho, Nevada, and South Dakota.

Over the 5-year time period, Wyoming and North Dakota saw the largest magnitude increase in oil and gas disbursements, with an increase of about $260 million and $117 million, respectively. Nevada and South Dakota saw the largest magnitude decrease in disbursements of about $123,000 and $98,000, respectively. These decreases in disbursements could impact the local economies and public services such as education. If oil and gas disbursements continue to decline in Nevada and South Dakota, public services that are funded through oil and gas disbursements could be impacted.

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of fluid mineral extraction and disbursements.

Coal Mines and Production

Although coal accounts for a small percentage of total economic contributions and employment in local communities, jobs associated with coal mining tend to be high paying compared with other types of employment in rural communities. All states, except North Dakota, saw a decline in coal production from 2018 to 2022, with the largest percentage decline occurring in Colorado (with a reduction in production of about 77.9 percent over the 5-year period). This reduction of coal production was observed globally and was largely driven by the reduction in natural gas prices that increased the demand for natural gas and reduced the demand for coal (EIA 2021).[2]

Due to the reduction in demand for coal-fired generation, many economies throughout the socioeconomic analysis area could face significant financial impacts from loss of the associated coal mining jobs and tax revenue in the next decade. For example, Moffatt County, Colorado, received over $12 million in ad valorem taxes in 2018 from coal power plants and mines in the county (Mesa University, undated). In Wyoming, continued revenue decreases from coal production have spurred the review of funding mechanisms for state school systems and education services (Wyoming Legislative Service Office 2022; Wyoming Consensus Revenue Estimating Group 2023).

All states in the planning area, except Montana and Utah, had stagnant disbursements from coal extraction over the last 5 years. Utah experienced a decline in disbursements of about 48 percent. Montana had a decline in disbursements from 2018 to 2021, but then disbursements increased from 2021 to 2022. See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of coal extraction and disbursements.

[2] Coal and natural gas are substitute goods and compete for the same demand for energy (Abraham 2018). This means that when the demand for one energy source increases (due to factors such as a decrease in price), the demand for the other energy source decreases.

Nonenergy Mineral Extraction

Similar to oil, gas, and coal, the government collects revenue from nonenergy minerals. The BLM determines and discloses the royalty rate for nonenergy minerals before the lease is offered; the minimum royalty rates are 5 percent of gross value of output for phosphate and sulfur and 2 percent of quantity or gross value of output for sodium and potassium, and 25 cents per ton for asphalt. Gilsonite and hard-rock minerals have no minimum royalty rate. A portion of the revenues collected by the government are disbursed to the states, and the states allocate a portion of the disbursements to counties, local governments, municipalities, and school districts. Wyoming had the highest disbursement from nonenergy mineral extractions, in 2022, with about $8.4 million (all of which came from sodium-based minerals such as trona). However, these disbursements in Wyoming declined from 2019 to 2022 by over $7.7 million, which was the largest decline in magnitude across the planning area. All states, except Idaho and Utah, had either a decline in disbursements or stagnation in disbursements over the 2019–2022 period. Idaho has large deposits of phosphate, and disbursements to Idaho over the last five years ranged from about $3.5 million in 2019 to $5.1 million in 2022. Disbursements to Idaho decreased from 2018 to 2019 but increased from 2019 to 2022, which raised the disbursements above 2018 levels by $863,000. Utah disbursements, which are largely from potassium and gilsonite, fluctuated between a low of about $739,000 in 2018 and a high of about $1.4 million in 2019. In addition to the public services that nonenergy leasable minerals help support, nonenergy leasable mining jobs tend to be some of the highest paying jobs in rural communities, especially in Idaho.

California receives disbursements for nonenergy minerals produced in the state. However, minerals are extracted outside the California socioeconomic analysis area so changes in BLM management decision on GRSG HMAs would likely not impact disbursements for nonenergy minerals in California.

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of nonenergy mineral extraction and disbursements.

Locatable Minerals

The value of minerals and their contribution to local and regional economies vary based on market conditions and volume extracted. Within the planning area, all the states, except South Dakota and North Dakota, impose taxes on locatable hard-rock mining activities. The taxes in most states are collected regardless of landownership. The type of taxes and amount collected vary across states; however, the distributions of the taxes are important in supporting public services and infrastructure by providing funds for schools; local counties, cities, and towns; highways and road construction; and water infrastructure (State of Wyoming Legislature 2021). In addition to the public services supported by locatable minerals, hard-rock mining jobs tend to be some of the highest paying jobs in rural communities, especially in Nevada.

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of locatable minerals on federal land.

Mineral Materials

Because mineral materials generally do not represent scare commodities, they can be found throughout the analysis areas, on and off GRSG HMAs. Sand and gravel, used often as construction aggregate, are an extremely important resource and extraction directly with the amount of development—road building and maintenance, and urban development—nearby. The proximity of both transportation and markets are key elements in the potential for deposits to be developed, even more so than for other types of mineral deposits (Burgex Mining Consultants 2023).

Future demand for mineral materials will vary depending on market conditions, which differ according to economic conditions and construction activity. One major driver of construction activity is road and well pad construction for oil and gas exploration and development and residential and commercial construction projects. As new oil and gas development continues to occur, it is expected that mineral materials activity will continue. Another driver is to improve road access for wildfire suppression activities. The construction, maintenance, and effectiveness of fuel breaks can be impacted by availability of mineral material pits.

Community pits are sites established by governmental agencies for the public to acquire mineral materials through sales contracts. Local government agencies and nonprofit organizations may obtain these materials free of cost for community purposes. County and state road construction divisions are the significant users of gravel and sand resources. A negotiated sale is an exclusive site proposed by a single party, often commercial, as the party must pay for the BLM to process the permit. The number of sales out of a community pit varies by site, from less than one to more than 50 per year. Most sales are for less than 1 ton. Free-use permit sites are used sporadically and may be scattered throughout a field office (FO) or district office. A pit may be inactive for several years before it is needed for a road project in the area.

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of mineral materials on federal land.

Renewable Energy

Geothermal Energy

Industry surveys show geothermal power plants employ about 0.74–1.17 people per MW to maintain and operate a facility; an additional 0.96 secondary jobs per MW are generated for every power plant built. Additionally, there are temporary jobs in the manufacturing and construction sectors created by the construction of new power plants. Over the 17–33 months in which an average plant is constructed, about 3.1 people per MW of full-time employment are needed to construct the plant, and 3.3 people per MW are needed to manufacture the plant equipment (Geothermal Energy Association 2015).

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.10**, Mineral Resources, for more information on current conditions of geothermal production and disbursements.

Wind and Solar

As of 2021, five wind projects were operating on public lands in the analysis area (in Nevada, Oregon, Utah, and Wyoming), and one project (in Wyoming) was pending construction (BLM 2021). As of 2022, there were only two solar projects operating on public lands in the analysis area (in Nevada and Wyoming), and one project (in Utah) was pending construction (BLM 2022).

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.8**, Lands and Realty (Including Renewable Energy), for more information on current conditions of wind and solar on federal land.

Livestock Grazing

The BLM-administered lands and other public and private lands support values to the local economies across the socioeconomic study area by providing forage to permitted ranchers at a price below that of private land forage or purchased feed. Seasonal use of public land forage can offset higher feed cost incurred at other times of the year and lower overall input costs associated with producing livestock for market. These animals can make up a significant portion of farm sales and provide food to the ranchers, their families, and the surrounding communities. Grazing fees paid by ranchers under their federal grazing permits also generate revenue which is returned to the states or counties where the fees were generated. Under the Taylor

Grazing Act, a portion of BLM grazing revenue is returned to the county of origin; 50 percent of Section 15[3] fees collected are returned to counties, and 12.5 percent of Section 3[4] fees are returned to counties. Grazing revenue and the disbursement that is returned to the county vary by county and may have a higher level of importance at the local level for some communities. In addition, the lands provide value through the social and cultural connections between public land grazing and ranching lifestyles in the analysis areas.

For the purposes of examining how the BLM-management decisions in this effort will affect different ranches in the analysis area, a discussion on the different types of ranches in the analysis area is provided. The USDA Economic Research Service developed a classification, or "typology", of farms and ranches based on annual gross cash farm income (the farm's revenue prior to deducting expenses), primary occupation of the operator, and ownership of the farm or ranch. Ranches are broadly categorized into family and non-family ranches based on whether the majority of the ranch business is owned by the primary operator and relatives of the primary operator (non-family ranches are those where the operator and individuals who are related to the operator do not own a majority of the business). Family ranches are further categorized by size and primary occupation of the operator as described below (USDA Economic Research Service 2024):

- Small family ranches are those that have gross cash farm income of less than $350,000 per year. These ranches are broken into four types based on the primary occupation of the operator and size of the farm: retirement ranches (where the operators are retired but continue to ranch on a small scale), off-ranch primary occupation (where the operators report a primary occupation other than farming or ranching), ranch primary occupation with low sales (where the operators report that farming or ranching is their primary occupation and the gross cash farm income of their ranch is less than $150,000), and ranch primary occupation with moderate sales (where the operators report that farming or ranching is their primary occupation and the gross cash farm income of their ranch is at least $150,000 but less than $350,000).
- Midsize family ranches are those that have gross cash farm income of at least $350,000 but less than $1 million.
- Large family ranches are those that have gross cash farm income of at least $1 million but less than $5 million.
- Very large family ranches are those that have gross cash farm income of at least $5 million.

The BLM-management decisions that impact livestock grazing would likely have a greater effect on small family ranches where ranching is the primary occupation than other types of ranches. This is because small family ranches where ranching is the primary occupation rely more heavily on income from their livestock than small family ranches with other sources of income and they tend to have less flexibility and resources to operate on smaller margins or modify business practices based on the BLM-management decisions than ranches with higher sales or supplemental forms of income (for example, they have less ability to absorb higher costs, if ranching costs were to increase). See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.8**, Livestock Grazing, for more information on current conditions of livestock grazing on BLM land.

[3] Section 15 lands are public lands that lie outside a grazing district administered by the BLM under Section 15 of the Taylor Grazing Act. The BLM authorizes livestock grazing on these lands by issuing leases to private parties.
[4] Section 3 of the Taylor Grazing Act concerns grazing permits issued on BLM-administered lands within the grazing districts established under the act. It gave leasing preference to landowners and homesteaders in or adjacent to the grazing district lands.

Wild Horse and Burros

In the planning area, there are approximately 15 million acres of wild horse and burro WHB HMAs. The BLM administers 168 WHB HMAs within California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Wyoming. Current conditions within the planning area show that wild horse populations continue to grow, often exceeding AMLs. As wild horse and burro populations exceed AMLs, wild horses and burros can be causal factors for failing to meet applicable standards.

Wild horses are often termed "living symbols of the historic and pioneer spirit of the West." (16 U.S.C. § 1331). As such, some stakeholders place a social value on horses related to this symbolism. Wild horses may also hold value for some due to an emotional connection related to the long history of human-horse interactions throughout civilization (Scasta et al. 2018)

Concerns over increasing wild horse and burro populations and program costs have prompted discussions, studies, and proposals. The BLM uses wild horse and burro funding for a variety of activities, including off-range holding activities, gathers, and other activities. For fiscal year 2021, expenditures totaled an estimated $122.2 million (CRS 2022).

See **Appendix 13**, Socioeconomic Baseline Report, and **Section 3.7**, Wild Horses and Burros, for more information on current conditions of wild horses and burros management and social values associated with wild horses and burros on BLM land.

Public Finances

State and local governments collect a variety of revenues related to the use of natural resources. Many western states and local governments are heavily dependent upon these mineral revenues for a significant portion of their annual budgets and rely on dollars generated from mineral development to fund schools, roads, and other public services. These revenues could be indirectly impacted by BLM management decisions on GRSG HMAs, if the decisions affect the level of use of natural resources. The following is a description of major sources of revenue and the potential link to BLM resources and resource uses.

Tax revenue at the state level is collected from various sources, including the following:

- State business income taxes and personal income taxes on employee earnings are collected for earnings on employment and industries in certain states (there is no state income tax in Wyoming).
- Severance tax is imposed on nonrenewable natural resources that are removed from the earth. Natural resources that are subject to severance taxation include metallic minerals, molybdenum, oil and gas, oil shale, and coal. Rates of taxation vary by mineral resource and state (see **Appendix 13**, Socioeconomic Baseline Report, for more information on the severance tax, including severance tax rates on oil and gas production for each state in the planning area).
- State sales tax is imposed on purchases directly or indirectly associated with BLM-administered lands and resource uses (for example, purchases of household goods by livestock operators on BLM-administered lands).
- Other state revenue sources include sources such as State Conservation Fees or Wyoming's Impact Assistance Tax Program, which require developers on public lands to pay impact assistance payments as warranted by the application/plan of development approval (State of Wyoming 2021).

Tax rates can vary widely across local taxing entities within a state, and a county often includes many different taxing entities (e.g., counties, school districts, municipalities, special districts). At the local level, taxes that can be impacted by BLM-administered land uses include the following:

- Local sales tax is imposed at a variable rate based on jurisdiction. It is imposed on purchases directly or indirectly associated with BLM-administered lands and resource uses.
- Ad valorem and other property taxes, which are determined based on local mill levy rates, property valuations, and the gross value of minerals produced within their jurisdiction (including federal minerals located within their jurisdiction).

PILTs are federal payments to local governments that help offset losses in property taxes due to nontaxable federal lands within their boundaries.[5] PILTs are not guaranteed and are subject to annual congressional budget appropriations. PILTs are transferred to county or local governments, as applicable, and are in addition to other federal payments, including those from grazing fees. Counties in the Utah analysis area received about $38.2 million in PILTs in 2023 for nearly 27.9 million acres of federal lands. About 70.5 percent of the federal land in the Utah analysis area was BLM-administered land. After applying the calculated payment per acre of federal land for each county to the BLM acres, the estimated BLM-related portion of PILT revenue in the Utah analysis area was about $24.7 million. This was the highest BLM-related portion of PILT revenue to counties across all states in the analysis areas.

3.12.3 Social Setting and Nonmarket Values

Social Conditions and Community Interests

The 10-state planning area encompasses a diverse landscape of social conditions, including both rural and urban populations. The socioeconomic analysis areas for each state where GRSG HMAs are located tend to be more rural; however, attitudes, beliefs, values, opinions, and perceptions about BLM-managed public resources and effects of policies and actions can vary substantially across social and geographic groups around and associated with the socioeconomic analysis area. These views and beliefs of residents, visitors, commercial users, traditional or subsistence users, Tribes, and interest-based or place-based groups reflect different cultural and economic linkages people have with BLM-administered lands. Those with common interests can typically be defined by communities of place or communities of interest, or both. Discussion of communities of place and communities of interest is included in **Appendix 13**.[6]

Nonmarket Values

BLM-administered lands provide a range of goods and services that benefit society in a variety of ways. Some of these goods and services, such as solid and fluid minerals, are bought and sold in markets and have a readily observed market value. Others have a less clear connection to market activity, even though they provide society benefits. In some cases, goods and services have both market and nonmarket values. This section provides an overview of several nonmarket values associated with GRSG management.

For the purposes of this effort, the BLM defines "value" as the combination of all benefits that people receive from BLM-managed lands and resources. Total value is the sum of market value from economic activities

[5] Public Law 94-565, dated October 20, 1976, was rewritten and amended by Public Law 97-258 on September 13, 1982, and was codified at 31 US Code 69. The law recognizes that local governments' inability to collect property taxes on federally owned land can create a financial impact. PILTs are in place to help mitigate the financial impact. See Public Law 94-565 and Public Law 97-258 for more details on limits and appropriations.

[6] Additional information on social characteristics of counties in Nevada can be found in the county-level socioeconomic baseline reports published by the Nevada Economic Assessment Project, accessed here: https://extension.unr.edu/neap/about-neap-program.aspx.

and nonmarket value. However, nonmarket values, in the discussion below, are not directly comparable to the previous sections that describe various resource uses and revenue on BLM-administered lands. The market indicators discussed above describe the effects on economic (market) activity in the region, and the market values of many of the activities are monetized. However, nonmarket values tend to differ across groups and individuals based on preferences, creating challenges with monetizing nonmarket values. Therefore, nonmarket values are discussed qualitatively.

The nonmarket values associated with GRSG management on BLM-administered lands include both use (direct and indirect) and nonuse values (such as existence values and bequest values held by the general public from self-sustaining populations of GRSG; BLM 2013b). Nonmarket values associated with GRSG and GRSG habitat can also be viewed through the lenses of ecosystem services. Ecosystem services, or the benefits that people receive from nature, are commonly classified within four major categories: regulating, provisioning, cultural, and supporting (Millennium Ecosystem Assessment 2005). Sagebrush environments, which support GRSG populations, provide numerous ecosystem services, such as providing services associated with food products from livestock production; hunting; other recreational opportunities; and the provision of water for municipal, industrial, and irrigation uses. In addition, intact sagebrush ecosystems reduce wildfire return intervals and host many species of wildlife, including game animals and other sensitive, threatened, and endangered species. Healthy sagebrush ecosystems sequester carbon, which can be enhanced through conservation efforts on public lands (Bennett and Pierce 2020). Additional details are included in **Appendix 13**.

People also receive intrinsic benefits from nature that are diverse in inspiration but consistently highly valued. These include benefits from seeing or knowing a flourishing, biodiverse sagebrush ecosystem exists; benefits from feeling secure such habitats will exist for the enjoyment and health of future friends and family members; or benefits from preserving ancestral/heritage/cultural connections established through sagebrush ecosystems and the GRSG species. Comparatively, there are others whose non-market values associated with public lands, including intrinsic and bequest values, are threatened by land use restrictions associated with GRSG HMAs.

3.12.4 Environmental Justice

Environmental justice embodies the principle of fair treatment and meaningful involvement for all individuals, regardless of their race, color, national origin, or income, in relation to the formulation, execution, and enforcement of environmental laws, regulations, and policies. It underscores the essential concept that no specific group, whether defined by race, ethnicity, or socioeconomic status, should disproportionately bear the adverse environmental impacts arising from industrial, municipal, or commercial activities, or the implementation of federal, state, local, and tribal programs and policies (BLM 2005).

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994), mandates federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States. The EO mandates that each federal agency "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (59 *Federal Register* 7629 [1994]). EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, enacted on April 21, 2023, complements EO 12898.

Furthermore, the BLM Land Use Planning Handbook (BLM 2005) and Instruction Memorandum 2022-059, reinforces the BLM's dedication to environmental justice. This commitment is evident in providing substantial opportunities for low-income, minority, and American Indian and Alaska Native populations to meaningfully participate and considering these populations when developing mitigation measures. Details of the Environmental Justice Screening Criteria and results, including maps and tables of identified communities are included in **Appendix 13**.

Identified populations that met the criteria for further consideration as environmental justice communities are:

- Both counties included in the California analysis area
- Seven of the eight counties in the Colorado analysis area
- In the Idaho analysis area, 25 of the 27 counties
- In the Montana analysis area, 18 of the 26 counties
- The entire Nevada analysis area
- No county in the North Dakota analysis area
- Seven of the eight counties in the Oregon analysis area
- In South Dakota's analysis area, Butte County
- Across the Utah analysis area, 18 of the 23 counties
- In the Wyoming analysis area, 15 of the 21 counties

The findings of areas containing environmental justice populations in the analysis areas for each state were instrumental in evaluating potential disparities in the impacts of various alternatives on minority, low-income, and American Indian and Alaska Native populations. Because counties were identified as containing environmental justice populations, as discussed above, the BLM management decisions on GRSG HMAs could impact environmental justice populations disproportionately.

Environmental Justice Issues of Concern

In 2012, the BLM and the Forest Service conducted an economic strategies workshop to identify public concerns related to potential social, economic, and environmental justice impacts resulting from management alternatives. Additionally, the BLM reviewed the scoping report for the current EIS to identify comments related to environmental justice issues. The BLM also had government-to-government consultation and outreach with Native American Tribes (BLM and Forest Service 2012; BLM 2013d; see Section 5.2.1 of the 2024 Greater Sage-Grouse Draft Resource Management Plan Amendment and Final Environmental Impact Statement for more details on tribal consultation for this effort).

A key issue relating to environmental justice populations for many states, including California, Nevada, Colorado, Idaho, Montana, Oregon, South Dakota, and Utah, pertained to the interests of those who identify as American Indian, the cultural significance of the GRSG to American Indian populations, and the importance of hunting and subsistence. Some concerns revolved around the viability of GRSG populations. Historical records highlight the importance of GRSG to individuals who identify as American Indian across the planning area who traditionally relied on GRSG as a vital food source. GRSG has played a vital role in traditions and customs, and it has served as inspiration for ceremonial dances.

The preservation of GRSG habitat would have beneficial effects for those who identify as American Indian who hold cultural value for the bird (BLM and Forest Service 2012). American Indian populations across the planning area engage in hunting and subsistence activities on federal lands outside the boundaries of their reservations. Access to hunting and subsistence resources is a concern for many environmental justice populations within the state analysis areas, especially for tribal members. The profound connection between the GRSG habitat and American Indian populations underscores the importance of considering these aspects in the planning and decision-making processes. On the other hand, some comments expressed concern that habitat conservation in some alternatives could negatively impact road realignment projects near their reservation and plans to expand their reservation boundaries where reservations are surrounded by PHMAs.

Another issue are the economic impacts on environmental justice populations from greater restrictions on livestock grazing and mineral, oil, and gas development. This issue was especially of concern in counties with high poverty rates and declining economic opportunities (BLM 2013b). However, there is a lack of evidence that individuals employed in sectors most likely to be impacted by BLM management decisions (such as the farming, ranching, and mining sectors) have a higher percentage of people who identify as a minority, low-income, or American Indian and Alaska Native. Therefore, economic impacts on environmental justice populations will not be carried forward in the impacts analysis on environmental justice populations, but will be included in the impacts analysis on social and economic conditions. The loss of economic activity stemming from the closure of GRSG PHMA or making PHMA unavailable for authorized uses, in terms of affected jobs and labor income, may result in some additional communities meeting low-income criteria for consideration as potential future environmental justice communities. Additional screening and consideration of environmental justice populations and disproportionate impacts will occur at the implementation stage at a scale commensurate with the scope and scale of management actions being considered to provide additional protections for local GRSG populations.

Concerns were identified about impacts on food prices and availability due to restrictions on grazing and mineral development (especially trona mining) in Wyoming and Idaho. These comments were in the context of economic conditions, however, increases in food prices and decreases in food availability tend to disproportionately impact low-income individuals who have more limited means for finding alternatives. This issue will be carried forward and examined in the impacts analysis on environmental justice populations.

The 2015 EISs identified issues that were not brought up in public comments but were considered important issues for analyzing impacts on environmental justice populations. One was the impact on environmental justice populations from changes in availability for firewood permits. The current BLM management decisions, however, will not change the availability for firewood permits; therefore, this concern will not be carried forward in the impacts analysis.

Visual and auditory impacts on environmental justice populations from mining development and operations and travel management decisions were other issues considered in the 2015 EISs. The 2015 plans included specific management decisions that could impact areas used for spiritual and religious practices, but these types of site-specific decisions are not included in the current effort. Therefore, impacts on environmental justice populations from visual and auditory disruptions will not be carried forward in the impacts analysis. Impacts on visual and auditory resources will be considered for potential inclusion in the implementation-level NEPA analysis.

In addition to issues raised by the public, as discussed above, the BLM will consider and analyze other concerns for environmental justice populations. These issues include impacts from potential changes in water quality, air quality, and climate change from mineral development under alternatives with less restrictions. These issues were not analyzed in the 2015 EISs but are considered important to the analysis in the current efforts.

3.13 Air Resources and Climate

This planning effort is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of air quality will be made. Impacts on air quality and climate from the alternatives being analyzed are presented in **Section 4.3**.

3.13.1 Air Resources

Air resources involve ambient air quality (measured by the concentration of air pollutants) and air quality-related values such as visibility and atmospheric deposition. Air quality indicators include concentration of criteria air pollutants, hazardous air pollutants (HAPs), and sulfur and nitrogen compounds, which could contribute to visibility impairment and atmospheric deposition.

Regulatory Framework

Clean, breathable air, expansive vistas, and minimal acidification of the lands, streams, and lakes are goals pursued by the BLM air resources program. The Clean Air Act and FLPMA require the BLM to comply with local, state, Native American tribal, and other federal agency air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands (Section 302 (b)), and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 (a)(8)). Air resources management is accomplished by establishing desired outcomes (goals and objectives) and allocations for allowable resource uses (management direction) that, at a minimum, must ensure authorized activities are in compliance with regulatory standards.

The US Environmental Protection Agency (EPA) which has the primary responsibility for regulating air quality, has established national ambient air quality standards (NAAQS) under the Clean Air Act for six criteria air pollutants which include: carbon monoxide, lead, nitrogen dioxide, ozone, two classes of particulate matter (particulate matter with an aerodynamic diameter less than or equal to 10 microns [PM_{10}] and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns [$PM_{2.5}$]), and sulfur dioxide. NAAQS include primary standards established to protect public health, including the sensitive populations (e.g., children, the elderly, or asthmatics), and secondary standards to provide public welfare protection, including protection against decreased visibility and damage to the environment (e.g., crops, vegetation, animals, buildings).

The Clean Air Act requires federal, state, tribal, and local agencies to work in partnership to manage and regulate air quality. Local governments are responsible to comply with NAAQS but also may establish local air quality standards that are no less restrictive than the NAAQS. The Clean Air Act has established permitting programs, generally implemented by states and local agencies, to carry out the goals of the Act. States are responsible for development of a state implementation plan to ensure standards are met.

In addition to criteria pollutants, the EPA and state air quality management agencies are responsible for controlling air toxics, or hazardous air pollutants, at all major sources and some area sources in specific source categories (40 Code of Federal Regulation 51). Hazardous air pollutants are those known or suspected to cause cancer or other serious health problems (e.g., respiratory problems, birth defects, or reduced fertility) or environmental effects (e.g., mercury deposition).

In addition to improving air quality, the Clean Air Act addresses maintaining clean air. This program, known as the Prevention of Significant Deterioration program, maintains clean air by limiting emissions of air pollutants so that significant deterioration of air quality will not occur. The program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Class I air quality areas include National Parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that existed or were authorized as of August 7, 1977. They receive the highest degree of air quality protection under the Clean Air Act.

Current Conditions and Trends

The Clean Air Act requires each state to identify areas with ambient air quality in violation of the NAAQS using monitoring data collected through state monitoring networks. Areas that violate the NAAQS are designated as nonattainment areas for the relevant criteria air pollutants, while areas that comply with the NAAQS are designated as attainment areas for the relevant criteria air pollutants. Areas of uncertain status due to insufficient monitoring data are generally designated as unclassifiable but are treated as attainment areas for regulatory purposes. Most of the planning area is in attainment/unclassifiable for the NAAQS. As shown in **Table 3-17** (**Appendix 9**), portions of the planning area in California, Colorado, Idaho, Montana, Utah, and Wyoming are nonattainment for one or more of the NAAQS.

In conducting a thorough general conformity applicability review, the BLM has determined that conformity is not applicable. This conclusion is underpinned by the comparison of the RFD outlined in **Appendix 12**, which indicates that the projected development associated with the actions is either the same or less than the No Action alternative. As a result, net emissions are anticipated to remain unchanged.

Areas that have been redesignated from nonattainment to attainment are considered maintenance areas. **Table 3-18** (**Appendix 9**) shows the areas that were redesignated from nonattainment to maintenance areas and the dates of the redesignation. These areas have current attainment of the NAAQS, showing air quality in the planning area has improved over the last two decades.

Emission Inventory

The EPA, in collaboration with state, local, and Tribal agencies, compiles a National Emissions Inventory every 3 years. The total criteria pollutant emissions reported from the planning area counties in the most recent (2020) National Emissions Inventory[7] (EPA 2023b) is shown in **Table 3-19** (**Appendix 9**). Although there is no NAAQS for volatile organic compounds (VOCs), they contribute to ozone formation in the atmosphere. As shown in the table, in the planning area counties, wildfires were the primary emitter of carbon monoxide (72.7 percent) and $PM_{2.5}$ (62.1 percent) and the second highest emitter of VOCs (35.9), sulfur dioxide (35.5 percent), and PM_{10} (27.0 percent). Biogenics were the number of one source of VOCs (48.3 percent), while point sources were the number one source of sulfur dioxide (57.5 percent) and area sources were the number one source of PM_{10} emissions (70.2 percent). Nitrogen oxides' emissions were highest from point sources (23.1 percent), followed by on-road mobile sources (22.6 percent).

Air Quality Monitoring Data

The EPA compiles air monitoring data from state monitoring networks and presents annual air pollutant concentration values by county in its Air Quality Statistics Report (EPA 2023b). **Table 3-20** (**Appendix 9**) presents air pollutant concentration values, which are key indicators in assessing air quality and represent a calculated measure that reflects the highest long-term concentrations of pollutants. This information helps evaluate the overall air quality trends and compliance with standards for planning area counties in California, Colorado, Idaho, Montana, Nevada, Oregon, South Dakota, Utah, and Wyoming. There are no monitoring stations in the planning area counties in North Dakota. While monitoring data are available for the range of criteria pollutants, depending on location, **Table 3-20** (**Appendix 9**) focuses on the pollutants of most concern in the planning area, including ozone, PM_{10}, and $PM_{2.5}$, based on the county nonattainment status.

[7] First released version of the 2020 National Emissions Inventory.

Values in bold indicate a level above the NAAQS for that pollutant. However, these bolded values are not direct design values and serve as general indicators. The EPA determines attainment status, and this disclaimer is included for clarity.

All planning area states except Idaho have recorded concentrations for one or more pollutants above the NAAQS in some counties in some years (**Table 3-20** [**Appendix 9**]). In some areas, the elevated concentrations may reflect urban conditions where monitoring stations are located, potentially not accurately representing air quality conditions in more rural BLM-administered lands.

Ozone. Ozone is formed by photochemical reactions of precursor air pollutants, including volatile organic compounds and nitrogen oxides. These precursors are emitted by mobile sources, stationary combustion equipment, and other industrial sources. Ozone formation is enhanced by increased sunlight and higher air temperatures. Ozone exposure can lead to respiratory issues and aggravate pre-existing conditions such as asthma and chronic obstructive pulmonary disease. Elevated ozone concentrations may also occur during winter in snow-covered rural areas. Since 2000, ozone concentrations have decreased by 16 percent nationally (EPA 2023c). The West (including California and Nevada) has seen a decrease in ozone concentrations of 11 percent, while the Southwest (including Utah and Colorado) has seen a decrease of 2 percent. Conversely, ozone concentrations in the Northern Rockies and Plains have increased 14 percent since 2000, while the in the Northwest (including Oregon and Idaho) concentrations have increased by 2 percent (EPA 2023c).

Particulate Matter (PM_{10} and $PM_{2.5}$). Particulate matter is a complex mixture of small particles and liquid droplets found in the air. $PM_{2.5}$ consists of both primary particulate matter, generated mostly from combustion-related activities, and secondary particulate matter, which is formed from atmospheric chemical reactions of precursor emissions. Sources of particulate matter include agricultural activities, industrial processes, smoke from wildland fire, fossil fuel development, physically disturbed soils, and dust from unpaved roads. $PM_{2.5}$ emissions are primarily generated by internal combustion diesel engines, soils with high silt and clay content, and secondary aerosols formed by chemical reactions in the atmosphere. Particulate matter affects deposition on plants and surfaces (including on snow, which can contribute to climate change) and visibility. PM10, consisting of larger particles, can irritate the eyes, nose, and throat and may exacerbate respiratory conditions. PM2.5, comprising finer particles, poses health risks as it can penetrate deep into the lungs, potentially causing or worsening respiratory and cardiovascular problems.

PM_{10} concentrations have decreased by 36 percent nationally since 2000 (EPA 2023d). This decrease is observed in annual PM10 concentration averages. Over this same period, the West (including California and Nevada) saw a decrease of 66 percent and the Southwest (including Utah and Colorado) saw a decrease of 22 percent. Conversely, PM_{10} concentrations in the Northern Rockies and Plains increased 9 percent since 2000, while in the Northwest (including Oregon and Idaho) concentrations increased 21 percent (EPA 2023d). $PM_{2.5}$ concentrations have decreased by 37 percent nationally since 2000 (EPA 2023e). Concentrations decreased 28 percent in the West (including California and Nevada), 23 percent in the Northwest (including Oregon and Idaho), 16 percent in the Northern Rockies and Plains, and 13 percent in the Southwest (including Utah and Colorado) since 2000 (EPA 2023e).

Climate Change and Greenhouse Gases

The Intergovernmental Panel on Climate Change (IPCC) describes climate change as “a change in the state of the climate that can be identified (for example, by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC 2013, 2021). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases, which may persist for decades or even centuries. Although largely invisible to the short wavelength incoming solar radiation that heats the earth's surface, greenhouse gases absorb a portion of the outgoing long wavelength infrared heat radiated back from the surface, preventing it from escaping out into space. As a result, the buildup of greenhouse gases since the start of the industrial revolution has increased the global mean temperature and has altered the earth's climate in complex ways.

Greenhouse gasses exhibit different speciation characteristics, with each gas having unique properties. CO2, primarily released from fossil fuel combustion and deforestation, is a major contributor to global warming. Methane, emitted from livestock, agriculture, and energy production, is a potent but short-lived greenhouse gas. Nitrous oxide, originating from agricultural and industrial activities, has a longer atmospheric lifespan. While greenhouse gasses primarily influence climate patterns, they also have direct and indirect health impacts. Climate change resulting from greenhouse gas emissions contributes to extreme weather events, altered disease patterns, and impacts on air and water quality. Additionally, certain greenhouse gasses, like methane, can indirectly affect human health by contributing to ground-level ozone formation (IPCC 2013, 2021).

Warming of the earth's climate since the industrial revolution has been observed to coincide with widespread effects throughout the earth-atmosphere system, including reductions in the extent and duration of polar sea ice and mountain winter snowpack, rising sea levels, increases in mean nighttime minimum temperatures, shifts in historical rainfall patterns, and changes in the frequency, severity, and duration of weather events. These effects, in turn, have affected natural and human systems regardless of cause, implicating the sensitivity of natural and human systems to changing climate (IPCC 2013, 2021).

The IPCC (2021) has concluded that human activities such as the burning of fossil fuels have caused greenhouse gas concentrations to increase since the mid-18th century and that "it is unequivocal that human influence has warmed the atmosphere, ocean and land." The IPCC's (2021) best estimate of the human-caused increase in global surface temperatures between 1850-1900 to 2010-2019 is 1.93 degrees Fahrenheit (°F), and it is "very likely" that well-mixed greenhouse gases were the main driver of this warming since 1979. Evidence of the observed change and the human influence in extreme events such as heat waves, heavy precipitation, and droughts has strengthened since the IPCC Fifth Assessment Report (IPCC 2013). For example, it is "virtually certain" that the frequency and intensity of extreme heat events have increased across most regions since the 1950s, and cold extremes have become less extreme and less severe; there is "high confidence" that human-induced climate change is the main driver of these changes (IPCC 2021).

Across the United States, annual average temperatures have increased by 1.8 °F since the beginning of the 20th century and by 1.2°F over the last few decades (BLM 2020; US Global Change Research Program 2018). According to the National Climate Assessment (US Global Change Research Program 2018), the largest increases in annual average temperatures since the beginning of the 20th century were observed in the western United States, while the southeastern United States had the least warming. Annual precipitation has increased in the northern and eastern United States since the beginning of 20th century and decreased in most of the southern and western United States (US Global Change Research Program 2018). The frequency and intensity of heavy precipitation have increased in most parts of the United States since the 20th century (US Global Change Research Program 2018).

Over the contiguous United States, annual average temperature is expected to increase by 2.5°F over the next few decades compared to present-day, regardless of future emissions (US Global Change Research

Program 2018). By the end of the 21st century, the annual average temperature for the contiguous United States is expected to increase by 3 to 12°F depending on future emissions scenarios, and high temperature extremes are expected to increase accordingly (US Global Change Research Program 2018). The frequency and intensity of heavy precipitation are projected to continue increase over the coming century in the United States, and winter and spring precipitation are projected to increase significantly over the Northern Great Plains, the Upper Midwest, and the Northeast (US Global Change Research Program 2018).

The 2021 BLM Specialist Report on Greenhouse Gas Emissions and Climate Trends (BLMb 2022) presents climate trends for many of the western states. Information from that report is incorporated by reference and summarized in **Table 3-21** (**Appendix 9**). Climate trend information is further supplemented by the National Oceanic and Atmospheric Administration's State Climate Summaries (NOAA 2022), among other sources. In the Planning Area greenhouse gas emissions come primarily from the combustion of fossil fuels in energy use. Energy use is largely driven by economic growth, with short-term fluctuations in its growth rate created by weather patterns that affect heating and cooling needs and changes in the fuel used in electricity generation. In 2020, carbon dioxide emissions from combustion of fossil fuel for energy production in the US were equal to 73 percent of total United States anthropogenic greenhouse gas emissions (US Energy Information Administration 2022). Other major greenhouse gases that are caused by human activity include methane (11 percent) and nitrous oxide (7 percent; United States Energy Information Administration 2022). In 2021 oil- and gas-related greenhouse gas emissions from BLM-administered lands in Wyoming had the highest emissions (107.5 megatonnes of CO_2e) followed by Colorado (45.7 megatonnes of CO_2e) and North Dakota (36.3 megatonnes of CO_2e; **Table 3-22** [**Appendix 9**]). Estimates include direct emissions from extraction and indirect emission from transportation and processing along with end-use estimates. While processing, transport, and downstream combustion emissions may or may not occur in the state where oil and gas was extracted, for calculation purposes, indirect emissions are attributed to the state minerals originated. Different greenhouse gases have different impacts on Earth's warming based on their ability to absorb energy and how long they stay in the atmosphere; therefore, total greenhouse gas estimates use carbon dioxide equivalent (CO_2e) which takes the radiative power of each gas for a given timeframe.

Greenhouse gas emissions are offset to some degree by carbon that is sequestered in terrestrial ecosystems. Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide (e.g., in vegetation and soils). Historically, natural carbon sequestration in plants and soils has been able to lock up about 29 percent of all human-caused emissions on a global scale (Merrill et al. 2018). Terrestrial ecosystems on federal lands were estimated to have sequestered an average of 195 megatonnes of CO_2e per year nationally between 2005 and 2014, which would offset emissions from extraction and end-use combustion of fossil fuels on federal lands by approximately 15 percent (BLM 2020).

3.14 Soil Resources

BLM's Rangeland Health Standards determine properly functioning physical conditions of soil resources in a planning area. This helps the BLM with soil management because determination on conditions will guide management adjustments and provide direction to make significant progress toward achieving the stated Standards. Since GRSG are dependent on sagebrush, and sagebrush viability is dependent on soil health, soils are a crucial element of GRSG habitat. Soil health is also integral to the BLM's mandate to sustain the health, diversity, and productivity of BLM-administered lands. Many resources and resource uses, including livestock grazing, wildlife habitat, riparian habitat, special status species, fisheries, recreation, water quality, and forestry, depend on suitable soils. Consequently, soil attributes and conditions are important to BLM management direction.

Soils are defined by the interaction of the processes that form them, including parent material (geology), climate, topography and biologic organisms. Through time, these processes form unique soil types and influence what plants may grow upon them. Soil surveys indicate that climate and topography are the primary influences on soil formation. Soil development processes, such as rock weathering, decomposition of plant materials, accumulation of organic matter, and nutrient cycling, are controlled largely by climate. Soil moisture and temperature strongly affect the rates of addition, removal, translocation, and transformation of material within the soil. Topography influences site conditions such as precipitation amounts and effectiveness, drainage, runoff, erosion potential, and temperature (Weltz et al. 2017).

Soils play an integral part in vegetation community development. Plants, including sagebrush, use soil as an anchor, a means to provide water for growth, and a storehouse for the nutrients needed for growth. Plant communities are most noticeably influenced where soil texture and thickness of soil horizons change, depth to restrictive layers including abrupt soil horizon boundaries exist, and by soil drainage, moisture holding capacity, or depth to the water table. Native plant communities require management considerations that include the ability of soil to produce a healthy ecosystem over the long term. Reducing the risk of erosion from water and air processes, limiting compaction from traffic source or grazing, and allowing water to infiltrate at a normal rate for the given soil texture will allow vegetative communities to thrive and further protects the soil resources (Weltz et al. 2017).

3.14.1 Existing Conditions

The discussion of existing conditions contains a description of soil resources for the planning area, regardless of landownership.

Conditions of the Planning Area

Soil Productivity

Soil productivity within the planning area varies widely due to the diversity of soils and site characteristics, including varying climatic, vegetative, topographic, and geologic conditions. The planning area landscape varies greatly from broad valleys to mountains. Average annual precipitation and temperature in the project area varies by elevation and aspect (NOAA 2022). Due to low soil temperatures in high elevations and rugged mountains, the chemical reactions that release plant nutrients from minerals take place slowly. The rate of biologic activity is also limited by temperature, resulting in a slow rate of biologic decomposition, seed germination, and root growth. These factors combine to give the soils low fertility (Weltz et al. 2017).

Some of the most productive soils in the planning area are found in well drained valley bottoms, toe-slopes, benches, and broad ridge tops. On uplands where rainfall is moderate to low, medium-textured soils may produce favorable conditions, depending on land uses such as livestock grazing. Favorable conditions arise because medium-textured soils have the capacity to retain moisture, supporting vegetation even in less rainy environments. Livestock grazing, as a land use, plays a role by influencing the composition and health of vegetation. The interaction between livestock grazing and vegetation affects soil stability and water retention, contributing to overall suitability of medium-textured soils in uplands with limited rainfall. Soils that feature shallow clay pans, hardpans, or salts pose substantial constraints to land use and land use management. Shallow clay pans and hardpans limit root penetration and water drainage. Additionally, the presence of salts can lead to soil salinity, affecting the suitability of the land for various land uses. Soils in the planning area vary from calcareous to alkaline and surface texture ranges from strongly alkaline loams, sandy loams, loams, to clay loams underlain by sandy loam to clay textures, and rock outcrop complexes. Permeability ranges from very slow to moderately rapid, and erosion hazard for most soils is moderate, with some ranked as severe. Some of these soils are highly saline. Due to the salt content in these soils, vegetative cover can be sparse, resulting in soil particles not being anchored in place; thus, the soil is easily eroded by wind and water (Weltz et al. 2017).

Biological soil crusts are an important component of a broad range of ecological sites in the planning area. They function as a living mulch by retaining soil moisture, increasing organic matter, and discouraging annual weed growth (Belnap et al. 2001). Biological soil crust communities are more prevalent at lower elevations, compared to higher elevations with greater precipitation, where vascular plant growth precludes biological crust development (Belnap et al. 2001). Biological crusts are well adapted to severe growing conditions, but are extremely susceptible to physical disturbances, domestic livestock grazing, and recreational activities. Wildfire can also damage the crust. Shrub presence and cheatgrass may increase wildfire intensity, thereby decreasing the likelihood of early vegetative or crust recovery after a burn (Brooks and Chambers 2011).

Management practices affect the ability of soils to maintain productivity because of displacement, compaction, erosion, and alteration of organic matter and soil organism levels. For instance, when vegetation is removed for specific management purposes, it alters organic matter levels, influencing productivity content of the soil. When soil degradation occurs in semiarid, high desert regions, natural processes are slow to return site productivity. This is because conditions in these areas, with limited water and harsh climates, slow down natural recovery of the soil. The lack of sufficient moisture and the challenging environment make it difficult for the soil to bounce back quickly after degradation. Prevention of soil degradation is far more cost-effective and time effective than remediation or waiting for natural processes. Management practices, such as proper stocking rates for livestock, rotation of grazing, periodic rest from grazing, improved site design, construction and maintenance of roads, selective logging, rehabilitation of unneeded surface disturbance, restricting vehicles to roads and trails, rehabilitating mined areas, and control of concentrated recreational activities, can reduce erosion effects and improve soil conditions. This encompasses efforts to create a more favorable environment for sustainable and productive soil.

Soil Erosion

Erosion is a continuing natural process that can be accelerated by human disturbances. Factors influencing soil erosion include soil texture, structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by wind or water are typified by bare or sparse vegetative cover, incohesive soil particles with slow infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angle but are highly influenced by wind intensity. Semi-arid regions of much of the planning area have a low percentage of natural plant community ground cover, allowing the soils to erode naturally in wind and during infrequent rain events (Al-Hamdan et al. 2015).

While erosion occurs under natural conditions, rates of soil loss may be accelerated if human activities are not carefully managed. Soils are affected by surface uses that loosen topsoil and damage or remove vegetation or other ground cover. Surface-disturbing activities include any authorized actions that disturb vegetation and/or surface soil, thereby increasing erosion potential above normal site conditions. Surface-disturbing activities include construction of well pads and roads, pits and reservoirs, pipelines and power lines, mining, vegetation treatments, livestock grazing, and concentrated OHV cross-country travel.

Soil erosion rates can be controlled by managing vegetation, plant residues, and soil disturbance. Vegetative cover is the most significant factor in controlling erosion because it intercepts precipitation, reduces rainfall impact, restricts overland flow, and improves infiltration (Weltz et al. 2017). Biological soil crusts are especially important for protecting the soil and controlling erosion in desert regions, but are easily disturbed by various factors, including human activities (Weltz et al. 2017).

Wind erosion is particularly hazardous when surface litter and vegetation are removed by wildfire or other disturbances. Soils are considered fragile or of high erosion hazards if they contain the following characteristics: (1) Soils rated as highly or severely erodible by wind or water, as described in soil survey reports; (2) landslide areas, as identified in soil survey reports; and (3) Soils on slopes greater than thirty-five percent (Weltz et al. 2017).

Trends

The overall guidance for soil resources is to maintain or improve the ability of the soil to support vegetation and allow water and nutrients to be cycled by either macro or microorganisms, all of which promote and improve the health of the land. Degradation by excessive grazing, recreation, erosion, or land developments have caused a reduction in soil function as one or perhaps many of the soil properties are changed thereby affecting the functions necessary for healthy soils. These essential functions include maintaining adequate fertility, supporting plant growth, promoting water retention, and sustaining a diverse ecosystem. The interconnectedness of soil properties and functions underscores the significance of preserving soil health for overall ecosystem well-being. BLM's rangeland health standards work toward conditions in which vegetation and ground cover maintain soil conditions that can sustain natural biotic communities. By implementing sustainable practices like controlling grazing rates, these standards aim to strike a balance that supports both the health of the land and the diverse ecosystems it sustains.

In the planning area, impacts on soil resources have resulted from various factors, including increasing temperatures, changing precipitation patterns, wildfire seasons, infestations like pinebark beetle, juniper and cheatgrass invasion, compaction from livestock grazing, mineral and energy development, long-term increases in outdoor recreation, as well as natural processes like erosion and weathering, and other activities influencing the soil (NOAA 2022). The potential for maintaining or restoring these ecological communities and conserving the soil resource depends on specific soil types and how resource programs are managed. Different soil types, like sandy or clayey soils, have varying abilities to retain water and nutrients, affecting restoration. Resource program management, involving practices like erosion control, directly influences the success of conserving and restoring the soil.

3.15 Water Resources

Water quality on public lands is regulated by the Clean Water Act, Safe Drinking Water Act, Public Land Health Standards, the Watershed Conservation Practices Handbook and other laws, regulations, and policy guidance at the federal, state, and local levels. The Clean Water Act (33 USC 1251 et seq.) mandates the protection, monitoring, and restoration of the physical, biological, and chemical integrity of waters in the United States. Sections 208 and 319 of the Clean Water Act specifically address the importance of implementing control strategies to address nonpoint source pollution. On BLM-administered lands, soil and water conservation practices, such as erosion control and watershed management, along with best management practices like proper grazing management, aim to prevent soil erosion and runoff. These practices reduce transport of pollutants into water bodies, effectively mitigating nonpoint source pollution on BLM-administered lands. The US EPA supports this perspective in their guidance (EPA 1987). The Safe Drinking Water Act presumes aquifers are underground sources of drinking water, unless they are specifically exempted or if they have been shown to fall outside the definition of underground sources of drinking water (Safe Drinking Water Act 1996).

As a designated management agency, the BLM must: (1) implement and enforce natural resource management programs for the protection of water quality on federal lands under its jurisdiction; (2) protect and maintain water quality where it meets or exceeds applicable state and Tribal water quality standards; (3)

monitor activities to assure they meet standards and report the results to respective states; and (4) meet periodically to recertify water quality BMPs (Weltz et al. 2017). BMPs include methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and nonstructural controls, operations, and maintenance procedures. BMPs are applied as needed to projects. BMPs work by using various strategies such as physical barriers and operational changes to prevent water pollution. Each project receives customized BMPs to ensure effective application.

3.15.1 Existing Conditions

The discussion of existing conditions contains a description of water resources for the planning area, regardless of landownership. Where specific to BLM-administered lands the description is limited to describing water resources associated with GRSG and their habitats. Wetlands and livestock water developments are important sources of water that influence GRSG and their habitat. Apart from wetlands and livestock water developments, other important water sources for GRSG include natural springs, creeks, and seasonal ponds.

Conditions within the Planning Area

Within the planning area, major water features are streams, lakes, wetlands, playas, and dry lakes. Streams can be ephemeral, intermittent, or perennial. Ephemeral streams do not flow during an average water year, but they do flow in response to large precipitation events. Intermittent streams flow during spring runoff for an average water year, but they generally dry up later in the summer. Perennial streams contain some water all year. Lakes can be permanent or temporary. Wetlands and floodplains vary in extent on water inundation onto a floodplain and depth (degree of saturation) throughout the year. Permanent waters can also be in the form of ponds and reservoirs developed for human or livestock consumption. Additionally, snow melt contributes to recharge surface waters, influencing intermittent stream flow. Springs also serve as a source for surface flows.

Stream channels and floodplains play a vital role as their shape and condition significantly impact key aspects of river systems. The configuration and health of these components influence speed of water flow, determining how quickly water moves through the system. Additionally, their morphology contributes to water storage capacity within basins, affecting the retention and release of water. Furthermore, shape and condition of stream channels and floodplains have implications for water quality, as certain features can filter pollutants. The interplay of these factors also connects to erosional impacts, with shape and condition influencing the extent of erosion within the river system. Consequently, these factors have far-reaching effects on fish and wildlife habitat, agriculture, recreation, and the hazard and risk of local communities and landowners to floods. Hazard and risk, or vulnerability of streams and floodplains, also include impacts on water availability (i.e., how much water is stored within the basins) and water quality.

Surface Water

The United States is divided and sub-divided into successively smaller hydrologic units called regions, sub-regions, accounting units (basins), and cataloging units (sub-basins). Each hydrologic unit is identified by a unique hydrologic unit code consisting of two to eight digits. The fourth level of classification (sub-basin) is represented by an eight-digit hydrologic unit code, indicating a more detailed and specific identification compared to the other hydrologic units mentioned above.

Due to the semi-arid nature of BLM-administered lands within the planning area, surface waters are extremely valuable. Surface water flow volumes differ greatly throughout the year and across the planning area. Most surface runoff in the planning area comes from snowmelt or rainfall, producing peak discharges in the spring and early summer. Many streams in lower elevation semi-arid areas are either intermittent, with segments of perennial flow near springs, or ephemeral, with flow only during spring runoff and intense summer storms.

Springs and seeps occur in areas where water from aquifers reaches the surface. Many springs form the beginning of stream channels; others flow into small ponds or marshy areas that drain into channels. Some springs and seeps form their own channels that reach flowing streams, but other springs lose their surface expression and recharge alluvial fill material or a permeable layer. Springs and seeps are important to aquatic habitats because of the perennial base flow they provide to a stream. The outflow from springs in summer usually helps to maintain lower water temperatures because groundwater is of lower temperature by nature. In winter, especially in small streams, base flow helps to maintain an aquatic habitat in an otherwise frozen environment (Weltz et al. 2017).

Riparian areas are ecosystems that exist along rivers, streams, or waterbodies. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. The BLM uses proper functioning condition assessments for evaluating riparian-wetland areas. These assessments provide a comprehensive understanding of the health and functionality of these ecosystems. Proper functioning condition assessments consider factors like vegetation cover, soil stability, and hydrological processes to determine ecological health of riparian-wetland areas.

The historic scarcity of stream flow in the planning area has led to increased flow regulation by the states. Projects for irrigation, livestock, human use, and flood control have significantly altered natural flow regimes. This has changed habitat conditions, channel stability and timing of sediment, and organic material transport. Stream flow has been altered by management activities such as water impoundments, water withdrawals, road construction, energy and mining development, vegetation manipulation, grazing, wildfire suppression, and timber harvesting (Weltz et al. 2017). Water developments are also influential sources of water for GRSG. Water developments can function for multiple uses. They provide additional and alternative sources of water for wildlife and livestock, and can decrease use of riparian areas (Connelly and Doughty 1989). Within the planning area, the BLM maintains an unknown number of water developments.

Groundwater

Groundwater resources in the planning area include local basin-fill aquifers, deep, regional aquiferss and, in some areas, geothermal aquifers. Basin-fill aquifers are typically located within local basins, serving as sources of groundwater. Deep, regional aquifers extend over larger areas, providing a broader regional water source. Geothermal aquifers, found in specific areas, contain water with elevated temperatures suitable for geothermal energy extraction. Groundwater recharge primarily occurs at higher elevations where precipitation exceeds evapotranspiration. Excess precipitation either remains at the surface as overland flow or goes beneath the surface, recharging groundwater systems. Groundwater is used for irrigation, domestic use, and livestock use.

Quality of the groundwater is a function of the chemical makeup of the underground formation containing the water. Aquifer properties, such as hydraulic conductivity (the ability of an aquifer to transmit water) and primary and secondary porosity (open spaces in rock or soil), also influence water quality based on the residence time of the groundwater in the subsurface. Longer residence time means more interactions with the surroundings, influencing water quality. In the planning area, much of the geology consists of consolidated sedimentary formations with water-bearing properties that are largely dependent on secondary porosity from faults, fractures, and joints. The mineral content of several sedimentary formations underlying the planning area includes relatively high amounts of soluble minerals and salts. Most of the planning area contains water that is typically suitable for common uses; however, it is considered hard, indicating a higher concentration of minerals like calcium and magnesium. Additionally, it contains moderate levels of dissolved minerals, which may include substances such as bicarbonates, sulfates, and chlorides.

Groundwater near the land surface is available for plants and can contribute to the alluvium of stream systems. This occurs as plants draw water from shallow groundwater and release moisture into the atmosphere. This water movement through plants, known as transpiration, helps transport minerals and sediment from the groundwater into the soil. Over time, these transported materials contribute to the composition of alluvial deposits in stream systems. Alluvial aquifers are found along larger perennial, intermittent, and interrupted flow segments. Interrupted flow segments refer to areas where the continuous flow of water is intermittently disrupted or broken, potentially due to factors such as topography, geological features, or human activities. These interruptions in the flow contribute to the formation of the alluvial aquifers, which are typically composed of alternating coarse sand and gravel deposits with layers of clay, silt, and sand. The alluvial aquifers also serve as either a recharge or discharge zone for underlying bedrock aquifers. Springs and seeps occur in areas where water from aquifers reaches the surface. Such activities as livestock or wild horse grazing and watering, recreation use, mining, road construction, and vegetation management have affected spring systems in the past by disturbing soil, vegetation, and natural drainage patterns, altering water flow, quality, and overall spring conditions. Well drilling or blasting can affect springs by reducing the volume of water in their aquifers or by affecting subsurface flow patterns. Moreover, when wells are drilled or blasting occurs, natural permeability of the aquifer may be disturbed, potentially causing a reduction in water volume by affecting the ability of the aquifer to store and release water.

Water Quality

Water quality, as defined by the Clean Water Act, includes the physical, biological, and chemical characteristics affecting existing and designated beneficial uses. Beneficial uses in the planning area are public and private domestic water supplies, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, and aesthetic quality. Section 303(d) of the Clean Water Act is utilized to identify waters which are water quality impaired because they fail to meet standards for criteria. Section 303(d) requires each state develop a list of water bodies that fail to meet water quality standards, along with delineation of those segments and associated listing criteria. The 303(d) list of impaired waters is updated biannually, and each state is required to develop a total maximum daily load allocation for each pollutant of concern.

Water quality typically varies as a function of flow conditions. During high flow conditions, dilution may result in lower concentrations of pollutants. Conversely, low flow conditions can result in higher pollutant concentrations. This variability can be impacted by water uses (e.g., agriculture, oil and gas development, and surface disturbance), vegetation, groundwater interaction, and pollutants discharged into water bodies from point and non-point sources. The quality of runoff in ephemeral and intermittent stream channels is largely dependent upon the amount of salts, sediments, trace elements, and organic materials that accumulate in dry stream channels between flow periods. Periodic flushing of accumulated salts, trace elements, organic materials, and sediments occurs during peak flow events, which often represent the only time water quality samples can be collected. Factors that govern the accumulation of salt, trace elements, organic materials, and sediments include physical properties of the watershed (e.g., topography, geology, and climate), land use, and seasonal fluctuations in temperature and precipitation. Topography influences flow of water, determining the potential for sediment transport. Geology contributes to the types and amounts of minerals in the water. Climate affects the overall hydrological cycle, influencing precipitation patterns and evaporation rates. Land use practices can introduce pollutants and alter natural drainage patterns. Seasonal fluctuations in temperature and precipitation impact the rate of weathering and erosion processes, influencing composition of materials entering streams.

The major water quality concern for streams in the planning area has been water temperature (Danforth et al. 2016), which correlate to the beneficial use of fish spawning and rearing habitat. Conditions that affect stream temperature, such as the amount of near-stream vegetation, channel shape, and hydrology, operate through complex interactions. Near-stream vegetation helps regulate water temperature by providing shade. The type and density of vegetation influence the extent of shade. Channel shape plays a role in sunlight exposure; narrower channels may receive more direct sunlight, potentially leading to higher temperatures. Hydrology, which involves water flow rate and patterns, affects temperature dynamics. Some conditions vary daily or seasonally. In the planning area, conditions affecting stream temperature, such as the amount of near-stream vegetation, channel shape, and hydrology, are most associated with land use practices. Livestock grazing has been identified as a significant factor (Weltz et al. 2017). Other land uses associated with degraded streams include roads, trails, water withdrawal, reservoir storage, and release, which can contribute to stream degradation through mechanisms such as increased sedimentation, altered drainage patterns, and potential pollution. Construction and use of roads and trails, along with large-scale water withdrawal and reservoir operations, may disrupt natural flow patterns, impacting streambed stability, water quality, and overall stream health. (Weltz et al 2017).

Other water quality stream impairment in the planning area is due to a variety of causes, including pathogens, biological integrity, oxygen depletion, flow and habitat alterations, nutrients, toxic inorganics, metals, mineralization, and pH conditions. Lake and reservoir impairment is attributed to a variety of factors, including oxygen depletion, high temperatures, phosphorus, polychlorinated biphenyls and mercury in fish tissue, total dissolved solids, and acidic conditions. These impairments can be linked to activities such as animal feedlots, crop production, livestock grazing, habitat alterations, construction activities, permitted discharges from industrial, municipal, and stormwater sources, and lesser so from channelization, sewage disposal, mine tailings, hardrock mining, industrial forestry, and recreation and tourism. Not all areas with such activities resulted in water quality impairments as they are generally site specific in nature (Weltz et al. 2017).

Water Quantity

Water availability can vary annually, depending on the volume of water recharged and the volume of water used in the planning area. Since most water in the planning area originates from precipitation, yearly climatic conditions play an important role in the volume of water available. This, in turn, determines available riparian habitat and conditions, particularly in systems that are more dependent on snowmelt and local precipitation events (Weltz et al. 2017).

Peak flow times relate to spring runoff and snow melt, with a decrease to near base flow in later summer months, depending on winter accumulations of snow and other factors such as precipitation. Seasons, referring to periods such as summer or dry seasons, and years of low water yield are particularly crucial periods for most of the beneficial uses of water in the planning area.

States issue water rights for various beneficial uses for both groundwater and surface water. Consumptive water uses in the planning area are agricultural, municipal, mining and milling, industrial, stock watering, and wildlife. The BLM authorizes development of water-related infrastructure, such as ROWs, on BLM-administered lands, enabling applicants to apply water to beneficial use. When the United States reserves public land for Indian reservations, military reservations, national parks, forests, or monuments, it also implicitly reserves sufficient water to satisfy the purposes for which the reservation was created. The date of priority, or seniority, of a federal reserved right is determined by the date the reservation was established.

Trends

As early land management reduced vegetation in the watershed, overland flow of water increased, and stream channels deepened. Channel incisions eventually lead to bank failures and subsequent channel widening. This process alters the natural dimensions and morphology of the channel. As channel widening and bank failures continued, new low flow channels began to form in the debris from bank failure. Many of the stream channels in the planning area were in the process of this initial buildup in the 1980s. This process was influenced by factors such as changes in land use, natural sedimentation processes, or alterations in hydrological conditions. New channels are usually lower than pre-disturbance channels, and the old floodplain now functions primarily as a terrace (a flat or gently sloping elevated area next to a stream). This shift in elevation is a consequence of the sedimentation and changes in channel morphology during the build-up process. Some terraces may be the result of climatic variations and associated changes in flow and sediment supply. Climatic variations influence river flow and supply of sediment. The resulting changes in sediment transport and deposition contribute to the formation of terraces along streambanks. Terraces, in this context, serve as indicators of past climatic and hydrological conditions. The stage of channel evolution results in a new bankfull channel (when a river is filled to its highest point without spilling onto nearby land) and active floodplain (the area next to a river that gets flooded regularly) at a new, lower elevation, which is observed in many stream channels in the planning area.

Existing climate change impact models in the planning area predict less water and water availability, a difference in timing of delivery, and increased stress on vegetation (Weltz et al. 2017). In particular, the models indicate longer and more severe droughts, changes in precipitation runoff and potential for changes in flooding patterns, increased wildfires, changes in the relationships among plants, water, nutrients, and soils on grazed lands, and increased susceptibility of ecosystems to invasion of nonnative species. Certain areas among the various states may experience trends that are not necessarily consistent with the rest of the range.

Activities associated with recreation, energy development, and grazing have resulted in significant impacts on water supply and quality within GRSG habitat. These include changes in stream morphology and vegetation, affecting the trends of water resources (Beck and Mitchell 2000). Within GRSG habitat, recreation activities have resulted in surface disturbance, such as erosion, sediment production and gully creation that require mitigation to prevent water resource damage (Weltz et al. 2017). OHV activity has increased significantly in more easily accessible wildland urban interface boundaries as well as more remote areas, due in part to population growth. Expansion of the wildland urban interface is anticipated to have long-term impacts on surface water quality and flow, including increased runoff, changes in nutrient levels, and altered sedimentation patterns.

Demands on water resources have increased over the past few decades. Although most early water rights were established for irrigation and mining, today's demand includes municipal water supplies, commercial and industrial supplies, and maintenance of adequate streamflow for fish, recreation, and water quality. These changes, driven by shifts in demand for water right uses, may significantly impact the hydrology of streams, riparian areas, and wetlands on BLM-administered lands. Alterations in water usage patterns can lead to changes in flow regimes, affecting the ecological balance of these ecosystems. The limited availability of water in much of the planning area may pose challenges for additional developments that depend on water, potentially impacting GRSG habitat and associated ecosystems. Water scarcity can influence the feasibility and sustainability of projects affecting the natural environment.. Changing and persistent drought conditions have also significantly impacted water availability and conditions (Weltz et al. 2017). Future water development for wildlife, recreation, and livestock would require a State water right before project implementation could occur. This crucial step ensures compliance with regulations and addresses potential impacts on GRSG habitat.

3.16 Cultural Resources

A cultural resource is a definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence (BLM Manual 8100). The term cultural resources is inclusive and has been adopted and widely used to refer to the diverse human record found in sites, structures, objects and places created and/or used by people. These may comprise archaeological, historic, or architectural sites, structures, objects, or places, and may include locations of traditional cultural or religious importance to a particular social and/or cultural group, often referred to as Traditional Cultural Properties (See **Section 3.17**, Tribal Interests). The term includes "historic properties," as defined in the National Historic Preservation Act of 1966, as amended (NHPA), and the implementing regulations found at 36 CFR Part 800. Historic properties are cultural resources determined to be eligible for listing on the National Register of Historic Places (NRHP). The term also includes "archaeological resources" as defined in the Archaeological Resources Protection Act of 1979, and other sites, structures, objects, items, and places as addressed in other statutes/regulations (e.g., American Indian Religious Freedom Act of 1978, the Antiquities Act of 1906, NEPA, and the Native American Graves Protection and Repatriation Act of 1990). "Historic property" has a specific meaning under the NHPA, referring only to those properties determined to be eligible for or listed in the NRHP regardless of property type or period of use (e.g., traditional cultural property or archaeological site, and historic or prehistoric).

Cultural resources are represented by the full temporal range of human occupation of the continent, from the first known peoples' arrival and settlement in the planning area more than 12,000 years ago (Jenkins et al. 2012), possibly much longer (Davis et al. 2019), and subsequent expansion of tribal groups throughout to more recent incursions of fur trappers, homesteaders, miners, and ranchers of the last 200 years. Cultural resources can include surface and buried artifacts and cultural features made and left by human cultures in archaeological sites; items built by past cultures (e.g., houses/house remains and activity areas); and places associated with traditional cultural uses (See **Section 3.17**, Tribal Interests).

3.16.1 Considering Effects on Cultural Resources Pursuant to Section 106 of the NHPA

Cultural resources are most frequently identified and recorded through federal compliance with Section 106 of the NHPA (now recodified as 54 USC 305108) and subsequent consultation with Native American Tribes and State Historic Preservation Offices (SHPOs). Section 106 requires federal agencies that fund, approve, authorize, license, or permit actions or undertakings to consider effects on "historic properties" that could occur due to proposed undertakings.

Federal regulations define specific criteria for NRHP eligibility and provide the measures for evaluating cultural resources for their eligibility (36 CFR Part 60.4). Once a cultural resource has been determined to be eligible for the NRHP, the agency must consider potential effects of the proposed action on the historic property and provide measures to either avoid, minimize, or mitigate any adverse effects. Compliance with Section 106 provides a primary mechanism for federal agencies to assess and take into account effects of proposed federal actions or undertakings on cultural resources during NEPA reviews.

The BLM follows alternative procedures, defined in state specific protocols, for meeting Section 106 obligations allowed for and pursuant to the implementing regulations of the NHPA (36 CFR Part 800.14). In collaboration with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers, the BLM developed alternative procedures that define how the agency will comply with Section 106 of the NHPA. These procedures are defined in a national Programmatic Agreement, revised in 2012, between the three parties. The Programmatic Agreement procedures are implemented by state specific protocol agreements with each state's SHPO. The protocols further define how the BLM will coordinate with the SHPO in each state to fulfill Section 106 responsibilities.

Prior to initiating proposed actions for protection and enhancement of GRSG and GRSG habitat, the responsible manager shall determine the area of potential effect, review existing information on known and anticipated historic properties that could be affected, seek information (in coordination with environmental review and land use planning processes) from Native American Tribes and other parties likely to have knowledge of or concern with historic properties (including places of traditional cultural and religious significance), determine need for field surveys or other actions to identify historic properties, make a good faith effort to identify and evaluate historic properties, assess and determine effects on historic properties, and identify measures to avoid, lessen or mitigate adverse effects on historic properties.

3.16.2 Conditions of the Planning Area

Given the vast planning area (see **Map 1.1**, Greater Sage-Grouse West-Wide Planning Area [**Appendix 1**]) types of cultural resources as well as the types and amount of data available about them vary greatly. Therefore, information about current conditions of cultural resources is high level and qualitative. The majority of the planning area has not been inventoried since resource inventories are driven by project-based cultural resource. New discoveries are documented regularly through regulatory compliance actions.

Some well-known historic properties and districts do occur across the planning area. These properties, along with other properties eligible for listing on the NRHP in the planning area, would need evaluation for the effects of proposed undertakings related to GRSG habitat improvement prior to implementation. Formal determinations of eligibility have not been completed for most known cultural sites in the planning area but known resources are treated as eligible until determined otherwise. Areas not previously inventoried would be subjected to full cultural resources analysis for ground-disturbing actions.

Cultural areas are often correlated to physiographic regions, with the current planning area falling within the Great Basin, Plateau, and Plains culture areas (d'Azevedo 1986). These cultural areas roughly correspond to distinctly different Indigenous groups with different languages and resource-based economic systems and social structures. While these areas are associated with cultural groups and distinct Tribes, cultural boundaries are fluid and overlapping. Tribes with interest in the planning area are listed and further discussed in **Section 3.17**, Tribal Interests.

3.16.3 Trends

Cultural resources are subject to deterioration over time due to both anthropogenic and natural processes. BLM-administered lands are currently and will continue to be managed for the protection and preservation of cultural resources, pursuant to pertinent regulation and policy. More concerted government-to-government consultation with Tribes is occurring to address tribal interests and concerns, including those regarding cultural resources. For example, the 2021 Secretary's Order 3403: *Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters* furthers these interests. Efforts have also increased in public education and outreach to create awareness about our nation's cultural heritage and tribal contributions. These efforts continue to improve public understanding and awareness, resulting in increased preservation of cultural resources. Cultural resource inventories continue to regularly document previously unknown resources. Trends relevant to cultural resources and more specific to the planning area include increasing recreation use and demand (see **Section 3.19**, Recreation and Visitor Services), grazing (by livestock as well as wild horses and burros), and continued development like that related to mineral resources, renewable energy development, and utilities (**Section 3.9**, Lands and Realty [Including Renewable Energy], and **Section 3.10**, Mineral Resources).

3.17 Tribal Interests

Tribal interests include economic rights such as Indian trust assets, resource uses and access guaranteed by treaty rights. Traditional cultural resources or properties include areas of cultural importance to contemporary communities. These areas can encompass sacred sites, resource gathering areas, locations tied to historical reenactment, or places significant to various communities, such as those related to Japanese internment, among others. While this section addresses traditional cultural resources or properties in the context of Tribal interests, it is important to recognize that traditional cultural resources or properties extend beyond Tribes and can hold significance for diverse ethnic and cultural groups.

The federal government has a unique and distinctive relationship with federally recognized Native American Tribes as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, judicial decisions, and agreements. This relationship is different from the federal government's relationship with state and local governments or other entities. The United States government has a trust responsibility to federally recognized Native American Tribes that covers lands, surveys, boundary risk assessments, resources, money, or other assets held by the federal government in trust, and the ability of those Tribes to exercise their rights. Tribal members use BLM-administered lands to gather plants or other native materials (e.g., stone for flint-knapping), hunt animals, and fish. The United States recognizes Native American Tribes as sovereign nations. The Tribes maintain active interests in the planning area.

Native American treaties are negotiated contracts made pursuant to the Constitution of the United States and are considered the "supreme law of the land." They take precedence over any conflicting state laws because of the supremacy clause of the Constitution (Article 6, Clause 2). Treaty rights are not gifts or grants from the United States, but are bargained for concessions. These rights are grants-of-rights from the Tribes rather than to the Tribes. The reciprocal obligations assumed by the federal government and Native American Tribes constitute the chief source of present-day federal Native American law.

The BLM and other federal agencies have the responsibility to identify and consider potential impacts of project alternatives identified for GRSG planning on Native American trust resources, including fish, game, and plant resources, and on off-reservation, treaty-reserved fishing, hunting, gathering, and similar rights of access and resource use on BLM-administered lands. This also includes rights of access and use for ceremonial and other traditional cultural practices. The BLM, as lead federal agency, also has the responsibility to ensure meaningful consultation and coordination concerning GRSG planning is conducted on a government-to-government basis with federally recognized Tribes to consider tribal treaty rights and trust resources. BLM-administered lands retain social, economic, and traditional value for tribal people, as well as contemporary and ongoing spiritual and cultural uses. Through consultation with the Tribes, the BLM is aware of their treaty and trust obligations and the Tribes' desire to capitalize on opportunities that maintain or enhance resources critical to the exercise of treaty rights, traditional customs, subsistence, and cultural uses of the land.

BLM consultation with Native American Tribes, as it pertains to tribal interests, treaty rights and trust responsibilities, is conducted in accordance with the following direction:

- Executive Order No. 13175 – Consultation and Coordination with Indian Tribal Governments, November 6, 2000
- Secretarial Order 3317 – Department of Interior Policy on Consultation with Indian Tribes, December 1, 2011
- Bureau Manual Handbook H-1780-1 – Guidelines for Conducting Tribal Consultation (Transmitted 12/03/04)
- The National Historic Preservation Act of 1966 as amended (PL 89-665; 80 Stat. 915; 16 USC 470; recodified as 54 USC 305108).
- Archaeological Resources Protection Act of 1979 (PL 96-95; 93 Stat. 721; 16 USC 470aa et seq.) as amended (PL 100-555; PL 100-588)
- American Indian Religious Freedom Act of 1978 (PL 95-431; 92 Stat. 469; 42 USC 19960
- Native American Graves Protection and Repatriation Act of 1990 (PL 101-601; 104 Stat. 3048; 25 USC 3001)
- Executive Order No. 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994
- Executive Order No. 13007 – Indian Sacred Sites, May 24, 1996
- Executive Order No. 13084 – Consultation and Coordination with Indian Tribal Governments, May 14, 1998
- Government-to-Government Relations with Native American Tribal Governments (Memorandum signed by President Clinton; April 29, 1994)
- Tribal Consultation and Strengthening Nation-to-Nation Relationships (Memorandum signed by President Biden on January 26, 2021)
- Uniform Standards for Tribal Consultation (Memorandum signed by President Biden on November 30, 2022)
- Order No. 3175 – Departmental Responsibilities for Indian Trust Resources (Section 2 of Reorganization Plan No. 3 of 1950 – 64 Stat. 1262; November 8, 1993)
- USDA Department Regulations 1340-007 and 1350-002
- Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters (SO 3403)
- Departmental Manual Part 303: Indian Trust Responsibilities, Chapter 7: Standards for Indian Trust Lands Boundary Evidence (303 DM 7)

In the planning area, there is extensive geographic, environmental, historic, economic, social, ethnic, and religious diversity reflected in tribal interests and traditional cultural resources that may be valued by American Indian communities. There is no comprehensive way to define all of the resources on this broad scale, especially where confidentiality is often required.

Known topics of interest or concern to tribal communities with interest in this planning effort include GRSG population and habitat condition, cultural practices related to the GRSG, ethnographic resources (locales and sites, structures, objects, and landscapes assigned cultural significance by traditional users), grazing, and energy or mineral development (BLM and Forest Service 2015). The effects of this planning effort on tribal interests would largely be tied to implementation level actions. The BLM continues to inform and consult with interested federally recognized Native American Tribes as the BLM implements projects. Federally recognized Native American Tribes that are located within or have cultural ties to the planning area are listed in **Table 3-23** (**Appendix 9**).

Traditional cultural resources or properties are places associated with cultural practices or beliefs of a living community. They can be considered a subset of the broader category of cultural resources discussed in **Section 3.16**. Traditional cultural properties are rooted in the community's history and are important in maintaining cultural identity. Examples include natural landscape features, aboriginal title lands, ceremonial and worship places, plant gathering locations, traditional hunting and fishing locations, ancestral archaeological sites, artisan material locations, rock art and communal resources such as community-maintained irrigation systems. The boundaries of these resources and impact areas are often difficult to assess. Resources tied to particular locations and that meet the criteria for eligibility can be listed on the National Register of Historic Places. Some traditional cultural resources have values that do not have a direct property referent and may not manifest themselves by distinguishable physical remains, but still are subject to consideration in planning. It is the continuity of their significance and importance to the maintenance of contemporary traditions that is important.

While many traditional cultural resources are well known, some locations or resources may be privileged information that is restricted to specific practitioners or clans. For Tribes, maintaining confidentiality and customs regarding traditional knowledge may take precedence over identifying and evaluating these resources, resulting in information being unavailable for inclusion in the NEPA analysis.

Resource-gathering areas are a broad category that can include trust assets; treaty and subsistence rights and resources; and culturally significant plants, animals, fish, and minerals. Plant resources can include foods that were established as part of a traditional seasonal round. Examples include traditions of gathering pine nuts, berries, and a variety of seed plants. Other examples include fibers used for basketry and weaving, and wood for building, carving, and fuels. Many plants are gathered for medicinal and religious use. Plant gathering is often a communal activity with cultural and religious significance. Loss of access to these plants or gathering locations, or losing the ability to maintain their habitats, can affect religious and ceremonial uses.

Most Native American Indian Tribes and individual tribal members conceive of spirituality, or sacred sites and daily activities, as interconnected (Forest Service 1997). Many of the resource uses and use areas also have a spiritual or sacred dimension. Sacred sites can also include places that are an expression of belief systems in the land or nature. For some sacred areas, there may be no observable cultural function to an outsider or even to tribal members who have not been entrusted with the information. Locations such as landscape features, mountain tops, trails, water courses, springs, caves, offering areas, shrines, and rock art sites often figure in these groups' oral traditions concerning their origins, mythology, and nature of the world. There are frequently active or ancestral ceremonial locations that are treasured. Archaeological sites, burials, and historic sites are often seen as important ties to ancestors and traditions that are not to be disturbed (Bengston 2003).

Tribal resources would experience trends similar to those experienced by cultural resources. Similar to cultural resources, tribal resources are expected to move away from desired conditions over time unless management actions exist to protect these resources. The status of the local ecosystem, including but not limited to vegetation composition and any wildlife, is integral to many native cultures. Potential changes in local ecosystems associated with effects of climate change may alter the availability of plants, wildlife, or other natural resources for traditional uses.

3.18 Lands with Wilderness Characteristics

Section 201 of FLPMA requires the BLM to maintain on a continuing basis an inventory of all public lands and their resources and other values. This inventory requirement includes maintaining information regarding wilderness characteristics. Section 202 of FLPMA requires the BLM to rely on resource inventories in the development and revision of land use plans, including inventory information regarding wilderness characteristics. Lands with wilderness characteristics inventories will be updated for any site-specific project NEPA analyses conducted in the planning area to determine if a project will have impacts to lands with wilderness characteristics identified in accordance with BLM Manuals 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands (BLM 2021a) and 6320 – Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process (BLM 2021b). These revised policies do not address or affect policy related to Congressionally designated Wilderness or existing Wilderness Study Areas (WSA) pending before Congress. The Wilderness Act of 1964 requires the BLM to preserve the wilderness character of each designated wilderness area while FLPMA mandates that BLM manage WSAs so as not to impair their suitability for wilderness preservation until Congress either designates them as wilderness or releases them for other uses. No such statutory authority exists with regard to non-wilderness, non-WSA lands possessing wilderness characteristics. Although lands with wilderness characteristics share the same criteria used to identify wilderness and WSAs, they are not subject to protective requirements prior to a planning or project-level management decision, though consideration for protection opportunities is part of the land use planning process.

3.18.1 Current Conditions

Within the planning area, there are approximately 14,246,000 acres outside of existing designated Wilderness Areas and WSAs the BLM has identified as having wilderness characteristics. Of these lands with wilderness characteristics units, approximately 2,673,600 acres include PHMA, approximately 2,515,700 acres include GHMA, and approximately 88,000 acres include OHMA (**Table 3-24** [**Appendix 9**]).

The portions of the planning area within the state of California contain approximately 2,400 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap with GRSG PHMA. The Eagle Lake Field Office and Surprise Field Office in California completed their RMPs in 2008. These field offices did not include an inventory of wilderness characteristics or make management decisions regarding wilderness characteristics in their land use planning. However, LWC inventories will be updated for any site-specific NEPA analyses of the planning area to determine if a project will have impacts on wilderness characteristics identified through previous or updated inventorying.

The portions of the planning area that are within the state of Colorado contain approximately 673,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap with GRSG habitat, 261,000 in PHMA and 392,000 in GHMA and 20,000 in OHMA. Within the Colorado River Valley Field Office and Grand Junction Field Office, the BLM is currently completing lands with wilderness characteristics inventories but is deferring determinations of management actions for lands with wilderness characteristics until the release of the revised RMPs for those field offices.

The portions of the planning area that are within the state of Idaho contain approximately 417,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap with GRSG habitat - 283,000 in PHMA, 89,000 in GHMA, and 45,000 in OHMA. The BLM has completed lands with wilderness characteristics inventories in the Bruneau, Jarbidge, Salmon, and Pocatello Field Offices. The Upper Snake Field office has a draft inventory, and partial inventories have been completed in the Owyhee, Shoshone, and Burley Field Offices. The Pocatello Field Office has no lands with wilderness characteristics. The Bruneau, Salmon, Owyhee, Burley, Shoshone, and Jarbidge Field Offices found areas that do contain lands with wilderness characteristics. Currently no Field Offices have taken their lands with wilderness characteristics through a complete planning process to determine how they will be managed.

The portions of the planning area within the state of Montana contain approximately 18,900 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap with GRSG habitat, 9,200 in PHMA and 9,700 in GHMA. Currently no field offices have taken their lands with wilderness characteristics through a complete planning process to determine how they will be managed.

Portions of the planning area that are within the state of Nevada contain approximately 167,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap with GRSG habitat - 87,000 in PHMA, 57,000 in GHMA and 23,000 in OHMA. Seven units were found to possess wilderness characteristics within the Winnemucca District Office during the most recent RMP revision in 2015 and are currently managed to meet multiple use and sustained yield objectives. Within the Battle Mountain, Elko, Ely, and Winnemucca Districts, the BLM is currently completing updated lands with wilderness characteristics inventories. The Carson City District and Southern Nevada District have recently updated inventories for lands with wilderness characteristics. Other than the seven units within the Winnemucca District which have decisions from the 2015 RMP revision how to manage lands with wilderness characteristics, the BLM is deferring determinations of how all other inventoried areas will be managed until updated RMP revision processes are undertaken.

As part of the original FLPMA Section 603-mandated inventories, inventories were conducted for the North Dakota Field Office beginning in 1978. The initial phase of inventories resulted in all lands within North Dakota being dropped from further wilderness consideration (the only solid block of BLM-administered lands within the planning area acres is also a developed oil and gas field).

Portions of the planning area within the state of Oregon contain approximately 3,001,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap GRSG habitat, 1,360,000 in PHMA and 1,641,000 in GHMA. Eastern Oregon is currently completing lands with wilderness characteristics inventories but is deferring determinations of management actions in the Burns, Lakeview, Prineville, and Vale Field Offices for lands with wilderness characteristics until the release of revised RMPs.

Portions of the planning area within the state of South Dakota contain approximately 73,000 acres of BLM-administered lands within 4 units that have been inventoried for lands with wilderness characteristics. None of these areas were found to possess wilderness characteristics.

Portions of the planning area within the state of Utah contain approximately 986,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap GRSG habitat. Of these areas, 13 units totaling approximately 52,000 acres are natural areas managed for wilderness characteristics in the Uintah Population area where some land uses are restricted or prohibited under the Vernal RMP. The remaining lands with wilderness characteristics areas that overlap GRSG habitat do not currently have determinations made in an RMP for the specific management of these areas.

Portions of the planning area within the state of Wyoming contain approximately 12,000 acres of BLM-administered lands that have been inventoried for lands with wilderness characteristics that overlap GRSG habitat - all are in GHMA. The Newcastle Field Office has not identified any parcels potentially meeting the 5,000-acre roadless requirement nor have any citizen’s groups nominated parcels that may contain wilderness characteristics. Thus, no inventory forms have been produced to date. One unit in the Buffalo Field Office has wilderness characteristics and is currently managed for their protection. Within the Casper Field Office the BLM is currently completing lands with wilderness characteristics inventories, but is deferring determinations of protection for lands with wilderness characteristics until the next RMP revision for those field offices. The Cody and Worland Field Offices identified 45 units for lands with wilderness characteristics, but no specific management for retention of wilderness characteristics was carried forward. Lander Field Office identified 8 potential units for lands with wilderness characteristics, but management was only carried forward for one unit. Kemmerer Field Office, Pinedale Field Office, Rawlins Field Office, and Rock Springs Field Office are not managing the inventoried lands with wilderness characteristic areas in their RMPs for Wilderness Characteristics. However, those inventories are considered and reviewed in all site-specific NEPA analyses.

3.18.2 Trends

As the BLM completes its inventories of wilderness characteristics, more units might be determined to contain wilderness characteristics. Until an inventory can be completed for all lands in the decision area, lands not yet inventoried for wilderness characteristics will be evaluated when any surface disturbing activity is proposed. Any lands with wilderness characteristics found in an inventory update will be considered in alternatives formulation and impacts of the proposal on their wilderness characteristics will be analyzed and disclosed in individual NEPA analyses. Absent specific management direction for protecting wilderness characteristics, the BLM anticipates that some characteristics may degrade over time depending upon BLM-administered activities, which will be subject to project-level NEPA analyses.

3.19 Recreation and Visitor Services

The BLM's Recreation and Visitor Services Program manages recreation resources and visitor services to offer the greatest benefits possible to individuals and communities and to better enable communities to achieve their own desired social, economic, and environmental outcomes (BLM 2019a). The planning area offers abundant settings for a wide range of recreational opportunities requiring no permits and no or minimal fees on BLM-administered lands. Most recreation users on BLM-administered lands participate in dispersed recreation activities, including hunting, fishing, camping, biking, hiking, horseback riding, skiing, off-highway vehicle (OHV) use, snowmobiling, rafting/floating, swimming, photography, rock climbing, boating on area lakes and rivers, pleasure driving, and wildlife viewing. Users often participate in these activities individually or in small groups. In parts of the planning area where recreation is a primary resource management consideration, the BLM designates and manages recreation management areas.

The BLM issues permits for a variety of organized activities, such as commercial river permits, big game hunting permits, and permits for organized groups, competitive events, or other types of commercial recreation outfitters such as bike tours. The BLM manages organized, commercial, and competitive recreation activities on BLM-administered lands and related waters with special recreation permits (SRPs). Issuance of an SRP is discretionary, with proposed activities subject to NEPA compliance and mitigation requirements specific to the proposed activity. The BLM may deny a permit request for several reasons, including if an assessment indicates unacceptable impacts, if an approved moratorium or restricted allocation system exists for the proposed activity, location, or timeframe, if there are serious health and safety concerns, or if past performance by an applicant has been deemed unacceptable and problematic.

3.19.1 Trends

Five key drivers are causing changes to recreation in the planning area:

1. Changing public expectations and demand for outdoor recreation opportunities, especially for dispersed recreation (BLM 2019b).
2. Continued growth in the recreation and tourism industries (BLM 2019c).
3. Increased energy development in portions of the planning area, which can lead to potential conflicts with recreation associated with placement and design of industrial infrastructure, concerns regarding visitor safety, as well as noise, smell, and air quality concerns (BLM 2022a).
4. Close proximity of BLM-administered lands to private property, and the growing use of BLM-administered lands as a community-based recreation asset (BLM 2019c).
5. Technological advances, such as all-terrain or utility vehicles and e-bikes, affordable global positioning system (GPS) units, as well as better outdoor equipment and clothing.

These drivers will impact the activity opportunities that can be offered and the recreation experience and opportunities that can be produced by land managers and partners.

3.20 Travel and Transportation

Visitors to BLM-administered lands use roads and trails for a variety of activities involving various modes of travel. Most roads in the planning area are not managed by the BLM. Motorized travel in the planning area ranges from standard passenger vehicles driving on maintained roads to OHVs operating on primitive roads and trails. Transportation routes are mainly concentrated around urban areas or where surface activities, such as mineral extraction, require access. Portions of the planning area are remote and rugged, limiting motorized travel on roads and trails in those areas.

An OHV is any vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain. OHVs include dirt motorcycles, dune buggies, jeeps, four-wheel drive vehicles, and snowmobiles (43 CFR Part 8340.0-5(a)). Executive Order 11644 and CFR (43 CFR Part 8340) both require the BLM to designate all BLM lands nationally as open, closed, or limited for OHV use, defined as:

- **Open -** areas where there are no special restrictions, or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.
- **Limited -** areas where travel must be restricted in order to meet specific management objectives. For areas classified as Limited, the BLM must consider a full range of possibilities, including travel that will be limited to types or modes of travel (such as foot, equestrian, bicycle, motorized, etc.); existing roads and trails; time or season of use; certain types of vehicles (i.e., wheeled versus nonwheeled); licensed or permitted vehicles or users; or BLM administrative use only.
- **Closed -** areas where the BLM restricts all motorized travel and transportation for all or a portion of the year. The BLM designates areas as Closed where a prohibition on motorized travel is necessary to protect resources, promote visitor safety, or reduce use conflict.

3.20.1 Trends

Overall trends in travel management on BLM-administered lands within the planning areas include an increase in OHV use, hiking, and mountain biking as human populations increase within and adjacent to the project boundaries, and throughout GRSG habitats. Many areas currently designated as open to cross-country travel will need to be changed to limited or closed designations to minimize resource impacts in the future.

However, changing areas from OHV to OHV limited or closed may not be possible due to RS 2477 rights associated with existing roads.

Construction of new routes for underground mining and renewable energy projects are also expected to increase as minerals, oil and gas, solar, and wind resource demands increase with energy demands in areas surrounding the project areas. New energy and mining developments will require new roads for transportation of resources. Previously constructed roads may also require upgrading in width and ROW as drilling operations are transported to collection and production facilities. Recreationists will also use these routes even though they are not designed for improved recreational experiences.

Private properties adjacent to BLM-administered lands will likely continue to be subdivided. Subdivision of private property has increased the number of adjacent properties owners and the number of new access routes to public lands within planning zones. This may result in continued unauthorized social trails that are unmanaged and user-created routes that will impact GRSG resources as they cut through habitat. However, the remoteness of many areas within GRSG habitat may be beneficial for these areas as they have not experienced significant changes from travel disturbances.

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Chapter 4. Environmental Consequences

4.1 INTRODUCTION

This chapter, which is organized by topic area, identifies and discloses environmental impacts resulting from selection of the alternatives presented in **Chapter 2**. Each topic area includes a method of analysis section that identifies indicators and assumptions (see **Appendix 10**). Management actions proposed in **Chapter 2** are planning-level decisions that do not result in direct on-the-ground changes. However, the analysis in this chapter focuses on impacts that would likely result in on-the-ground changes as the decisions in this plan are implemented.

This analysis identifies impacts that may benefit, enhance, or improve a resource because of management actions, as well as those that have the potential to impair a resource. If an activity or action is not addressed in a given section, either no impacts are expected or the impact is expected to be negligible. The projected impacts on land use activities and the associated environmental impacts of land uses are characterized and evaluated for each of the alternatives. Some management actions may affect only certain resources. Baseline is the current condition or situation, as described in **Chapter 3**. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.2 GREATER SAGE-GROUSE

4.2.1 Nature and Types of Effects

Habitat Designation and Management

Management issues addressed during the land use planning process include adjustments to designated HMAs, habitat objectives, disturbance caps, and mitigation strategies, all of which may vary by alternative. Changes to these issues are reflected in actions related to management of other resources, such as minerals. For example, adjusting HMA boundaries could lead to fewer or greater acres managed as PHMA, and subsequently, fewer or greater areas subject to restrictions on mineral resource management. Permitted activities within HMA boundaries may also vary by alternative. Therefore, impacts from GRSG management are incorporated into the impacts discussion for management of other resources (see subsections below).

Habitat management and designations impact GRSG by influencing the level of activities and associated disturbances can occur in GRSG habitat. Impacts to GRSG resulting from GRSG habitat disturbances can vary depending on proximity to important GRSG seasonal habitats, type and quality of the habitat disturbed (e.g., good quality nesting habitat), type of disturbance (e.g., road, oil and gas wells, mining operation, wind turbines, and pipeline), associated indirect impacts (e.g., one-time human presence and noise disturbance or on-going maintenance and human presence), how the disturbance is distributed on the landscape (e.g., spread out or consolidated), other existing threats, and disturbance density. In general, any impacts that decrease nesting success and chick and adult female survival can impact population growth and viability (Taylor et al. 2012). Analyses of disturbance thresholds found GRSG began negatively responding to disturbances at approximately 4.5% disturbance and did not use habitats when surface disturbance exceeded 8% (Kirol 2012). Other research reported almost all occupied leks (99%) in the western portion of the range had less than 3% disturbance from urbanization within 3.1 miles of the lek (versus extirpated leks, Knick et al. 2013). Similarly, rangewide lek trend analyses suggest that aggregated human influences on the landscape are associated with negative GRSG lek count trends (Johnson et al. 2011) and population persistence (Aldridge et al. 2008; Wisdom et al. 2011; Kirol et al. 2020). Varied methodology precludes direct comparisons of these studies. Similarly, the BLM would use different criteria for calculating disturbance caps for some alternatives, as described in the Alternatives subsections below.

Habitat fragmentation can result in lower tolerance to disturbance (Doherty et al. 2016), increased movement distances, reductions in lek persistence, lek attendance, population recruitment, yearling and adult annual survival, female nest site selection, nest initiation, and complete loss of leks and winter habitat (Schroeder and Robb 2003; Aldridge and Boyce 2007; Walker et al. 2007a; Doherty et al. 2008). Large-scale disturbances, such as agricultural conversions, within surrounding landscapes affect GRSG habitat selection and population persistence (Aldridge et al. 2008; Knick and Hanser 2011; Wisdom et al. 2011). Habitat loss and fragmentation also decrease the connectivity between seasonal habitats, potentially resulting in population isolation or loss (Knick and Hanser 2011; Doherty et al. 2008) and decreased genetic connectivity (Row et al. 2018; Oyler-McCance et al. 2022).

Because GRSG habitat use varies by season (see **Chapter 3**), the impacts of disturbance may vary due to different life stages being affected and may result in changes to vital rates. Research has found negative responses of GRSG to ex-urban development on brood-rearing habitats (Westover et al. 2016), well pads and roads on nesting habitat (Zabihi et al. 2017), and human disturbance on all habitats once sagebrush landscape cover is reduced to a level where GRSG occupancy is negatively affected (Doherty et al. 2016). These effects are intensified in highly fragmented habitats with low sagebrush landscape cover. Considering the spatial area of disturbances in relation to seasonal habitats and different GRSG life history stages is important (Reinhardt et al. 2017; Doherty et al. 2016).

Disturbances due to land use activities vary by geographical areas. For example, open plains, prairies, and plateaus may be suitable for wind and solar energy development, whereas mountainous regions may be more suitable for recreation. Because rangewide lek persistence is related to environmental factors, including topography and landscape configuration (Wann et al. 2023), impacts from disturbance likely varies by geographical area. Activities in higher quality habitat may have a greater impact on GRSG. Additionally, activities contributing to habitat fragmentation may interfere with gene flow and population persistence, particularly since GRSG may already avoid dispersal areas of rough terrain or steepness (Row et al. 2018).

Under some alternatives a disturbance and energy facility density cap is included to limit aggregated disturbance and impacts within GRSG management areas. Setting caps influence allowable level of disturbance within a GRSG HMA, which varies by alternative. A lower level of allowable disturbance would have fewer impacts to GRSG, including both habitat and individuals. Adaptive management is included in some alternatives if habitat or populations continue to decline to the point that thresholds are met. In that event, more restrictive measures could be applied. The goal of adaptive management is to detect effects on GRSG habitats and populations and act in an appropriate time frame to effectively offset impacts.

Baseline data show a total of 330,285 acres of disturbance on PHMA/IHMA in fine scale HAF units rangewide (excluding WY, for which fine scale HAFs have not yet been mapped), and the amount of disturbance in PHMA/IHMA within fine scale HAF units does not currently exceed 3% (BLM data 2023). However, the targeted annual warning system (TAWS), which identifies local populations exhibiting asynchronous decline relative to regional population patterns (Coates et al. 2021), estimated 2.9% average annual declines in GRSG populations across their geographical range over a 29-year time period (Coates et al. 2023). Similarly, a rangewide analysis conducted by the BLM showed that sagebrush availability declined by approximately 3% between 2012 and 2018, and 16 habitat triggers were tripped between 2015 and 2020 (Herren et al. 2021). Forty-two GRSG population triggers were tripped in the same time period (Herren et al. 2021). Most of the habitat triggers were the result of wildfires and the associated loss of sagebrush habitats. For population triggers, management changes were identified as needed to address the causal factor in almost half of the areas evaluated. These data indicate that similar trends may continue even with a 3% (or higher) disturbance cap. However, these trends were calculated rangewide, whereas disturbance caps would be calculated at smaller scales (see the Alternatives sections). Additionally, not all the alternatives incorporate wildfire into the disturbance calculations, and since wildfire is a primary driver of sagebrush habitat loss, there may be differences in the total amount of disturbance needed to stay within the cap by alternative (see Alternatives sections).

Minerals Management

Mineral extraction of all types in GRSG habitat may result in habitat loss from construction of infrastructure, surface or underground mines, and other associated facilities. GRSG population reestablishment in reclaimed areas may take upwards of 30 years (Braun 1998). The use of reclaimed areas is likely influenced by whether the sagebrush systems are mesic or arid, with GRSG more likely to use reclaimed mesic sagebrush systems which recover more quickly (Walker 2022). Where compromised by invasive grasses, reclamation may be only minimally effective, without additional intervention.

Necessary infrastructure, including location, construction, and use of ancillary facilities, staging areas, roads, railroad tracks, buildings and power lines cause additional direct and indirect impacts on GRSG (Fedy at al. 2015; Kirol et al. 2015a, b; Edmunds et al. 2017; Spence et al. 2017; Green et al. 2017). These may also result in noise and light pollution, fugitive dust, human disturbance, increases in predator perch sites, and weed proliferation, any of which leads to habitat degradation (Hanser et al. 2018).

Fluid Mineral Resource Management

Industrial activity associated with oil and gas development disrupts the habitat and life cycle of GRSG, resulting in negative impacts to populations and habitats (Naugle et al. 2011; Taylor et al. 2012; Smith and Dwyer 2016; Green et al. 2017). GRSG populations typically decline following oil and gas development (Holloran 2005; Walker et al. 2007a; Doherty et al. 2008), and impacts have been observed when leks occur within 2.5 miles of a producing well, when greater than eight active wells are within 3.1 miles of leks, or when more than 200 active wells are within 11 miles of leks (Johnson et al. 2011). Other studies reported increasing density of oil and gas wells correlated with decreasing lek attendance with effects observed at 3.98 miles from leks. Abundance was also negatively affected for a distance of between 3 and 4 miles (Holloran 2005). Before implementation of Wyoming's Core Area Strategy, lek attendance was negatively correlated with density of oil and gas wells (Green et al. 2017; Hanser et al. 2018). In some instances, impacts have been directly attributed to features associated with energy development (e.g., roads, power lines, noise, and associated infrastructure; Walker et al. 2007a; Doherty et al. 2008; Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Aldridge and Boyce 2007). A one mile buffer from energy development in Wyoming and Montana resulted in a lek persistence of approximately 30%, whereas lek persistence in areas without oil and gas development averaged 85% (Walker et al. 2007a). Three miles was recommended as a minimum buffer to protect GRSG from energy development impacts in the Bi-State area (Coates et al. 2013). Other impacts have been documented within varying distances from energy infrastructure and at different well densities (Manier et al. 2014).

A one- to four-year time lag between oil and gas development and lek decline can occur, possibly because this activity negatively affects recruitment rather than causing avoidance or decreased survival (Green et al. 2017). Lags are potentially explained by avoidance and reduced survival and fecundity in GRSG generations produced following the onset of development (combined with adult philopatry, Holloran et al. 2010).

Direct, indirect, and residual impacts from energy development accrue both locally and cumulatively at the landscape scale. GRSG populations typically decline following oil and gas development (Holloran 2005; Walker et al. 2007a; Doherty et al. 2008). Indirect effects are habitat degradation or utilization displacement and are estimated to occur out to 11.8 miles from leks (Naugle et al. 2011). Population impacts have been observed when leks occur within 2.5 miles of a producing well, when greater than eight active wells are within 3.1 miles of leks, or when more than 200 active wells are within 11 miles of leks (Johnson et al. 2011). Other impacts have been documented within varying distances from energy infrastructure and at different well densities (Manier et al. 2014).Noise from industrial activity may disrupt GRSG communication potentially interfering with acoustical signals that attract females to leks (Gibson and Bradbury 1986; Gratson 1993; Blickley et al. 2012). Noise associated with oil and gas development may have played a factor in habitat selection and a decrease in lek attendance by GRSG in western Wyoming (Holloran 2005). Recent studies in oil and gas areas suggest that GRSG avoid leks exposed to human noise (Blickley et al. 2012; Blickley and Patricelli 2012) and may cause declines in GRSG (Ambrose et al. 2021). Chronic noise pollution can also cause GRSG to avoid otherwise suitable habitat (Patricelli et al. 2013) and can cause elevated stress levels in the birds that remain in noisy areas (Blickley et al. 2012).

Interaction and intensity of effects of habitat loss from energy development could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005). This could negatively impact lek persistence and attendance, winter habitat use, recruitment, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007a; Doherty et al. 2008, 2016).

To address impacts identified, stipulations would be associated with new fluid mineral leasing (e.g., oil, gas, and geothermal) in GRSG HMAs including NSO, CSU/disturbance caps, and TL stipulations on new leases. These stipulations are intended to reduce or avoid direct disturbance, protect HMAs from surface-disturbing activities, and conserve habitat and population connectivity contributing to genetic diversity. NSO stipulations on new leases would limit impacts to HMAs from surface-disturbance, ensure connectivity between leks, and minimize habitat fragmentation. However, NSO stipulations can push infrastructure to surrounding private and state lands which may still result in GRSG habitat fragmentation. Waivers, exceptions, and modifications (WEMs) could be applied to stipulations and could void or modify the stipulation depending on the alternative.

Other Mineral Resource Management (Salable, Nonenergy Leasable, Locatable, and Coal)

Impacts from management of other mineral resources would be similar to those described for fluid mineral resources, and include disturbance, habitat loss/degradation. Infrastructure for mining is like that required for oil and gas but is more localized in extent, but mines may have a large footprint. Direct habitat loss can occur from removing vegetation and soil to access mineral resources and storage of overburden (soil removed from mining activities or the formation of mine shafts) in undisturbed habitat. Construction of ancillary facilities (e.g., air vents, fans, and shafts), staging areas, roads, railroad tracks, and structures such as buildings and power lines can result in direct habitat loss. Indirect impacts, such as noise, light, human activity, dewatering of springs and surface water, loss or reduction of groundwater that may be connected or important to surface waters, and subsidence, can impact GRSG. The interaction and intensity of effects from habitat loss could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005). Surface mining has a greater direct habitat impact than underground mining but disturbance from aboveground infrastructure for also results in direct loss of habitat if it occurs in GRSG habitat.

A few scientific studies examine the effects of coal mining on GRSG. In North Park, Colorado, overall GRSG population numbers were not reduced, but there was a reduction in the number of males attending leks within 0.8 mile of 3 coal mines, and existing leks failed to recruit yearling males (Braun 1986; Remington and Braun 1991). New leks formed farther from mining disturbance (Remington and Braun 1991). Some leks that were abandoned adjacent to mine areas reestablished when mining activities ceased, suggesting disturbance rather than habitat loss was the limiting factor (Remington and Braun 1991). Hen survival did not decline in a population of GRSG near large surface coal mines in northeast Wyoming, and nest success appeared not to be affected by adjacent mining activity (Brown and Clayton 2004). Blasting, a practice used to remove overburden or the target mineral, produces noise and ground shock. The full effect of ground shock on wildlife is unknown but noise from mining operations during lekking activity could result in lek or nest abandonment (Moore and Mills 1977).

As described for fluid mineral leasing, stipulations would be associated with other mineral leasing in GRSG HMAs and would vary by alternative. The BLM could ask the Secretary of the Interior to propose and make a withdrawal of the land from location and entry under the Mining Law of 1872 pursuant to Section 204(a) of FLMPA. Proposing and making a withdrawal is not a land use planning process and a recommendation does not in itself restrict activities or have any direct impacts. Should the Secretary propose a withdrawal, that proposal would require environmental and other analyses under NEPA and other applicable authorities before the land could be withdrawn. For purposes of this planning initiative, the alternatives analysis includes a description of the likely environmental effects should the Secretary propose and make a withdrawal in the future (e.g., reduced potential for behavioral disturbance and habitat loss/alterations).

Lands and Realty Management

GRSG respond negatively to increased human infrastructure in sagebrush habitats, including roads, power lines, and communication towers (Manier et al. 2013). Although transmission and power line construction does not generally result in substantial direct habitat loss, it would permanently disturb individual GRSG and habitat along the ROW due to the associated human activity, equipment, and noise, and would contribute to habitat fragmentation. In addition, transmission lines can provide perches and nest sites for ravens and raptors, resulting in indirect negative impacts on GRSG survival and reproduction (Gillan et al. 2013; Gibson et al. 2018; Lockyer et al. 2103; Coates et al. 2014, 2016, 2020; Howe et al. 2014; Hanser et al. 2018; O'Neil et al. 2018). Avian predator control methods, such as deterrents, may help reduce avian predation impacts on GRSG, but efficacy is variable (Prather and Messmer 2010; Lammers and Collopy 2007; Slater and Smith 2010).

Areas managed as ROW exclusion would prohibit development of all or certain types/ subsets of ROWs (e.g., utility scale wind and solar testing and development). In areas managed as ROW avoidance the BLM would consider allowing ROW on a case-by-case basis. This flexibility may be advantageous where federal and private landownership areas are mixed and exclusion areas may result in more widespread development, potentially in higher quality habitat, on private lands if BLM-administered lands could not be used.

Collisions with power lines, vehicles, and property fencing and increased predation by raptors using these features may increase GRSG deaths at leks (Connelly et al. 2000a; Lammers and Collopy 2007). Since GRSG deaths associated with power lines and roads occur year-round (Aldridge and Boyce 2007) roads and power lines may also indirectly affect lek persistence by altering productivity of local populations or survival at other times of the year. Artificial ponds created by development (Zou et al. 2006) can support breeding mosquitoes known to carry West Nile virus (Walker et al. 2007b) and elevate the risk of GRSG deaths in late summer

(Walker and Naugle 2011). GRSG may also avoid otherwise suitable habitat as development increases (Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Doherty et al. 2008).

Avoidance of developed areas should be considered a reduction in the distribution of GRSG (Walker et al. 2007a) as avoidance can result in population declines when density dependence, competition, or displacement of birds into poorer-quality adjacent habitat lowers survival or reproduction (Aldridge and Boyce 2007; Holloran et al. 2010). The specific response is tied to the type of ROW, its location, and associated human activity and infrastructure. GRSG exhibit extremely high site fidelity, which strongly suggests that unfamiliarity with new habitats may also reduce survival (Baxter et al. 2008; Holloran and Anderson 2005), as evidenced in other grouse species (Yoder et al. 2004).

Renewable Energy Management

Potential impacts of renewable energy on GRSG have not been as widely studied as other energy developments. However, impacts on GRSG can be anticipated from studies of oil and gas development and associated infrastructure on the species (Becker et al. 2009). Because GRSG have evolved in habitats with little vertical structure or other man-made features, tall vertical structures such as wind turbines may displace GRSG from their usual habitat (Johnson and Stephens 2011). Wind energy studies have found nest and brood survival are negatively affected with proximity to wind turbines, likely a result of increased predation (LeBeau 2012; LeBeau et al. 2014, 2017a, 2017b). Additional concerns with wind energy development include noise produced by rotating blades, GRSG avoidance of structures, mortality by flying into rotors, and the presence of new roads and power lines (Connelly et al. 2004; Manier et al. 2013). Disturbance from the footprint of infrastructure is negatively associated with GRSG viability (Kirol et al. 2020; Coates et al. 2021). Development of solar facilities would have similar infrastructure effects (vertical structures, roads, fencing, other associated infrastructure, and related changes in vegetation), but would occur at a discrete location with intense development (i.e., a solar field). Negative impacts to GRSG from solar facilities are anticipated to extend to ancillary infrastructure, such as transmission lines and substations as seen with other types of energy development. While there is less potential for mortality or injury due to collisions at solar versus wind facilities, there may be an increased risk of GRSG mortality due to collisions with fencing associated with solar facilities. Research on geothermal development in Nevada reported adverse effects on GRSG populations by decreasing nest survival, adult survival, and increased density of common ravens (Coates et al. 2021).

Longer-term residual impacts may be cumulative and their contribution to GRSG population declines depend on the magnitude, frequency, and duration of human disturbance. GRSG may abandon leks if repeatedly disturbed by raptors perching on power lines or other tall vertical structures near leks (Ellis 1984), by vehicular traffic on roads (Lyon and Anderson 2003), or by noise and human activity associated with energy development (Braun et al. 2002; Holloran 2005; Kaiser 2006).

Travel and Transportation Management

The effect of roads can be direct through changes in habitat and GRSG populations and indirect through avoidance behavior (Lyon and Anderson 2003; USFWS 2010a). Roads alter and fragment habitat by impeding use of seasonal habitats, facilitating habitat degradation by creating a corridor along which invasive plants can spread, allowing for increased human noise disturbance, resulting in GRSG avoidance (i.e., functional habitat loss), direct mortality, and increasing mammalian and avian predator abundance (Formann and Alexander 1998).

GRSG persistence is inversely correlated with road density. Compared with currently occupied GRSG range, areas where GRSG no longer occur are 60% closer to highways and had 25% higher road densities (Manier et al. 2013, citing Wisdom et al. 2011). Within GRSG range, 95% of the mapped sagebrush habitats are within 1.6 miles of a mapped road and density of secondary roads exceeds 3.1 miles per 247 acres in some areas (Knick et al. 2011). Incremental effects of accumulating length state and federal highways and interstates near leks included decreasing lek counts when there were more than 3.1 miles of federal or state highway within 3.1 miles of leks and when more than 12.4 miles of highway occurs within 11.2-miles of leks (Johnson et al. 2011).

Livestock Grazing Management

Research shows livestock grazing in GRSG habitat may either improve or decrease habitat quality, depending on the type of habitat, spatial and temporal scale, and how the grazing is administered (Beck and Mitchell 2000; Boyd et al. 2014). Because of numerous variables that influence the landscape (e.g., vegetation present, soil, elevation, aspect, and precipitation) combined with historic and current levels (e.g., numbers and use) and methods of livestock grazing (e.g., kind of livestock, rest-rotation, and seasonal use) and associated infrastructure on grazing lands (e.g., fences, water impoundments and tanks, corrals), impacts on GRSG habitat from livestock grazing vary tremendously in space and time (Manier et al. 2013). Because of this variability across the planning area the nature and level of impacts discussed in this analysis are described in broad terms. Effects from livestock grazing on riparian habitats are outlined in **Section 4.3.1**, *Nature and Type of Effects.*

Impacts from livestock herbivory (consumption of vegetation) are diffused over broad spatial or temporal scales and are different than discrete disturbances (Knick et al. 2011; BLM IM 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy). Livestock herbivory can influence yearly vegetation conditions, and/or result in altered vegetation dominance over time. Prolonged selective grazing pressure on vegetation communities can affect the condition of individual plants, abundance of species, interspecific competition, and ultimately, community composition (Manier and Hobbs 2006). While specific effects and conditions from grazing are localized in most cases, the continuous and collective presence of these effects across the West may affect the regional condition of GRSG habitats (Manier et al. 2013).

Timing of grazing relative to plant growth stages (e.g., growth initiation, rapid growth, seed development, seed ripe, and dormancy) can influence the effects on vegetation (Briske and Hendrickson 1998; Briske et al. 2003; Veblen et al. 2011). Repeated grazing during periods of fastest growth of the dominant grasses and forbs in intermountain sagebrush steppe over multiple consecutive years tends to favor sagebrush growth (Pyke 2011) through reduced competitive ability of grasses (Manier et al. 2013). Spring grazing in winter habitat may improve GRSG winter habitat because grass reductions can increase sagebrush densities (Angell 1997; Beck and Mitchell 2000), suggesting an opportunity to graze GRSG winter habitats in spring when non-overlapping brood-rearing habitats would be avoided, and vice versa (Manier et al. 2013). Because GRSG initiate nesting prior to new herbaceous growth, grazing levels from the previous year and the residual grass can provide initial cover for nesting GRSG (Hausleitner et al. 2005; Holloran et al. 2005). Nesting GRSG consistently select areas with more sagebrush canopy cover and taller grasses compared with available habitats (Hagen et al. 2007), increasing the probability of a successful hatch (Manier et al. 2013). If nesting and early brood-rearing habitats are grazed in a manner that consistently results in a lack of sufficient residual grass cover the following spring, predation of GRSG nests could increase and the rate of nest success could decrease (USFWS 2010).

The availability of forbs is an essential component of a pre-laying hen's diet (Barnett and Crawford 1994; Connelly et al. 2000; Gregg et al. 2008). In Nevada, greater forb diversity and higher plant species richness were small-scale habitat factors associated with brood success (Casazza et al. 2011). A reduction in forbs due to livestock grazing would reduce the value of nesting and early and later brood-rearing habitat for GRSG and may cause them to use less optimal habitat, potentially affecting nesting GRSG (Barnett and Crawford 1994) and chick survival (Huwer et al. 2008). Forb diversity and concentration dramatically increase invertebrate densities, which are crucial for chick survival and growth (Johnson and Boyce 1990). Insect diversity and density are positively correlated with herbaceous density and diversity (Jamison et al. 2002). However, recent research has found that grazing intensity was not ultimately detrimental to insect abundance and permitted some insect taxa to thrive (Richardson et al. 2023).

The effects from grazing also vary by kind of livestock, numbers of livestock, duration, and area (intensity), and grazing management systems (e.g., rest-rotation and deferred rotation). Grazing intensity (e.g., stocking rate, duration, and frequency) has consistently been identified as having impacts on ecosystem and rangeland health (Briske et al. 2008; Veblen et al. 2011), including the vegetative structure required by GRSG. Livestock, especially cattle, prefer to concentrate near water sources and the location of water affects livestock distribution patterns. This pattern can result in disproportional use of riparian habitats and wet meadows, which can result in loss of riparian vegetation and cover, as well as compaction of soils and lowering of water tables, which alters water quality, invertebrate populations, and plant species composition. This can result in degradation of crucial habitats for GRSG.

Man-made water sources provided in support of livestock grazing may attract GRSG and expose them to insects that may serves as vectors for diseases such as West Nile virus (Naugle et al. 2004). Additionally, the presence of livestock is positively associated with increased raven occurrence (Coates et al. 2016), which can lead to increased GRSG predation. Livestock management practices provide ravens with resource subsidies, such as water sources, which are naturally scarce in the arid west. Structural range improvements, such as fences represent potential movement barriers or predator perches and are a potential cause of direct mortality to GRSG due to collision (Stevens et al. 2012; Manier et al. 2013).

Livestock grazing can be a management tool to aid in the management or maintenance of vegetation communities within GRSG habitat (see site-scale habitat suitability indicators, **Appendix 8**, Greater Sage-Grouse Habitat Monitoring and Reporting). Well managed livestock grazing may change plant community composition, increase productivity of selected species, increase forage quality, and alter structure to increase habitat diversity (Vavra 2005), and can positively effect GRSG habitat suitability (Manier et al. 2013). Many studies demonstrate weeds can be controlled through grazing at a specific time, intensity, and duration to reduce abundance of these species. Under controlled situations, where livestock is used as a targeted vegetation treatment tool, livestock can reduce fine fuel loads (e.g., cheatgrass) (Diamond et al. 2009). Cheatgrass completes its reproductive cycle, using limited soil moisture and nutrients, well before most native perennial grasses and is usually dry by mid-summer, which coincides with increased wildfire danger (Pellant 1996). Intense "flash" grazing during the winter or early-late spring, while it is still green, may control cheatgrass. However, recent research also suggests bunchgrass community structure and the presence of biological soil crusts increases resistance to cheatgrass invasions and that grazing management that decreases those components decreases the vegetation communities' resistance to invasion (Reisner et al. 2013). Sheep and goats (if permitted) can be used to control noxious weeds such as leafy spurge, spotted knapweed, and yellow star thistle. Effectiveness of livestock as a management tool for the control of undesirable vegetation is highly dependent on the scale, livestock behavior, and ability to avoid grazing native vegetation.

Although the potential for population level effects is uncertain, GRSG may be directly impacted by livestock trampling of GRSG eggs or causing nest desertion from repeated disturbance (Beck and Mitchell 2000). Trampling by livestock under short-duration or season-long grazing may also kill sagebrush, particularly seedlings growing in the spaces between shrubs (Beck and Mitchell 2000), though effects are typically localized.

Under all alternatives, described in **Section 2.9.7**, livestock grazing would be managed to meet or make progress towards land health standards and improper grazing would be limited and addressed through implementation-level corrective actions. In this RMPA, varying acres of GRSG HMAs would be available or unavailable for livestock grazing. The actual number of AUMs authorized on a permit may be adjusted through permit renewals, permit modification, allotment management plan development, or other appropriate implementation activity. In areas unavailable for grazing, there would be no GRSG habitat alterations as a result of grazing, as described above. However, removal of grazing would result in reduced landscape scale removal of fine fuels, which could indirectly impact GRSG habitat by increasing the potential for wildfire. The BLM could still implement targeted grazing treatments, but the scale would be less than if more areas are available for grazing. In areas of mixed land ownership, making public lands unavailable for grazing that are adjacent to private grazing lands would result in more fencing. This could impact GRSG due to increased perches for avian predators (Coates et al. 2015; O'Neil et al 2018) and increased risk of collision. Additionally, sale of private lands could lead to an increased potential for urbanization in some areas, which may impact GRSG due to habitat loss, fragmentation and disturbance.

Wild Horse and Burro Management

Wild horses may alter habitat conditions for GRSG, including reduced vegetation abundance and cover, increased shrub canopy fragmentation, lowered species richness, increased compaction in surface soil horizons, and increased dominance of unpalatable forbs (Manier et al. 2013; Chambers et al. 2017; Coates et al. 2021). In addition, horse populations over appropriate management levels can degrade riparian areas, decrease water quantity and quality, and increase soil erosion. Cumulatively, this can reduce habitat quality for wildlife, including GRSG. Effects of wild horses on habitats may also be more pronounced during periods of drought or vegetation stress (NTT 2011). Methods used for wild horse and burro gathers may also disturb GRSG.

Fences used to manage horse distribution represent a potential source of direct mortality to GRSG (Manier et al. 2013). Year-round water availability in horse herd management areas and wild horse territories is required by the Wild and Free-Roaming Horses and Burros Act of 1971. This can result in year-long use of riparian areas by wild horses and other modifications (e.g., fences, troughs). Negative effects are possible depending on how each facility is constructed. Range improvements would increase potential perch sites for avian predators (fences) and potential drowning hazards (troughs).

Predator Management

GRSG are prey for various predators including coyotes, badgers, bobcats, red fox, hawks, and corvids (Mainer et al. 2013). Predation can be a threat to GRSG, especially in areas of low population density where there is limited habitat or poor habitat quality (USFWS 2010). Under some circumstances, predation rates can increase, such as when human subsidies attract increased numbers of predators. Raven populations have dramatically increased, with 293% more ravens within GRSG range compared to outside their range between 1966 and 2018 (Harju et al. 2021). This has led to concerns about increased predation rates which can be exacerbated by supplemental food resources, increased infrastructure supporting nesting and perching opportunities, increased paved roads and highways which are sources of road-kill, and livestock carcasses and afterbirths. Elevated raven abundance associated with human resource subsidies have been documented to cause elevated predation rates on GRSG (Coates et al. 2020). Predator control in areas of compromised habitats with high populations of synanthropic predators (predators that live near, and benefit from, an association with humans) may be help ensure GRSG persistence until habitat conditions improve (Coates et al. 2015; O'Neil et al 2018). Predators, especially coyotes are often controlled to prevent livestock loss, may reduce predation on GRSG.

ACEC Designation

Special management areas such as ACECs can be used as a management tool to provide protection to GRSG and habitats through restrictions on uses and surface-disturbing activities. However, the conservation value of an ACEC designation for GRSG depends on area's purpose, and in some cases, surface-disturbing activities may be allowed. The High Lakes ACEC and Red Knoll ACEC, in OR include GRSG and GRSG plant communities as relevant and important values although they were not specifically designated for GRSG conservation. Management to protect these values in these ACECs and others that overlap GRSG habitat may provide incidental protection to GRSG and their habitats by restricting land disturbances (e.g., ROWs).

4.2.2 Alternative 1

Habitat Designation and Management

Rangewide Environmental Consequences

Under Alternative 1, GRSG habitat is separated into SFAs, PHMA, GHMA, and other HMAs for certain states (see **Table 2-3**). Restrictions to land use and surface-disturbing activities would occur within each HMA and SFA, depending on the classification (see **Chapter 3**). Corresponding management actions, including lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would provide a hierarchy of potential conditions to minimize effects in HMAs. Mineral withdrawal was recommended for lands within SFAs to emphasize protection of GRSG, and if the withdrawal would occur management for SFAs would provide the highest level of protection to GRSG. However, the lack of WEMs in SFAs, even for actions that would benefit GRSG, could limit habitat improvements. In general, restrictions to land use and surface-disturbing activities in HMAs and SFAs would reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. Effects from specific restrictions associated with each resource use are described in the sections below. In most cases management actions for state-specific HMA (IHMA, OHMA, etc.) would be consistent with those for PHMA; where differences occur, they are analyzed under *State-Specific Environmental Consequences*. Alternative 1 includes lek buffers for all HMAs. These buffers are consistent with the lek buffer distances identified in the USGS Report, *Conservation Buffer Distance Estimates for Greater Sage-Grouse - A Review* (a 1-mile buffer would be used as the minimum threshold in Colorado). Modifications to the buffer distances could be made if they meet the criteria outlined in the report. Lek buffers would reduce disruption to GRSG, minimize habitat loss, and reduce habitat degradation, and should contribute to maintaining nesting habitat effectiveness and brood survival.

Alternative 1 incorporates an adaptive management strategy composed of soft and hard triggers that are based on population and habitat changes. The BLM would rely on data from several sources to track and identify population changes to assess the population trigger in the adaptive management approach. Triggers would be determined by population area, making the strategy more locally responsive than if triggers were determined on a sub-regional or statewide basis. Responses to soft triggers may require adjustment of future project level/plan implementation activities, as consistent with the individual site-specific NEPA analyses. Soft trigger responses can come in the form of terms, conditions, RDFs, or site-specific mitigation measures. Hard triggers represent a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives set forth in the Proposed Plans. If new scientific information becomes available demonstrating that the hard-wired response would be insufficient to stop a severe deviation from sage-grouse conservation objectives set forth in the ARMPA, the BLM will implement interim management direction to ensure conservation options are not foreclosed. The BLM will also undertake any appropriate plan amendments or revision if necessary. The use of adaptive management would benefit GRSG by allowing flexible resource management decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. If management changes are successful, they would reduce impacts to GRSG by limiting disturbances and improving habitat conditions. The BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types and in all states (except WY GHMA). Properly implemented, mitigation should offset any loss of GRSG habitat resulting from land use activities.

Under Alternative 1, all states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. Habitat objectives would be considered when authorizing activities in GRSG habitat. The exact language varies by state, but in general, inclusion of specific habitat objectives could result in increased certainty and greater levels of consistency when considering implementation-level actions. Following these objectives could prevent activities such as improper grazing practices and result in increased habitat quality. Improved habitat conditions would increase nest success, chick survival, and GRSG persistence over the long term.

State-Specific Environmental Consequences

There could be impacts to GRSG in WY GHMA associated with land use activities as described under *Nature and Types of Effects*. No mitigation would be required in WY GHMA.

In CO, ID, NV/CA, OR, and UT, a 3% disturbance cap would apply to land use activities (except wildfire and agriculture) at both biologically significant unit (BSU)-scale and at proposed project analysis area within PHMA. In ID, the same cap would apply but it could be exceeded in utility corridors if it benefits GRSG. Calculating disturbance at the project-level means may prevent some development that could occur if disturbance is only calculated at a coarser scale. In addition to calculating disturbance at the project-level, disturbance would also be calculated for each BSU. The definition of a BSU would vary by state, but in general, a BSU is defined as a spatial area that contains relevant and important GSRG habitats and is used for comparative calculations to support evaluation of changes to habitat. Including caps at both project and BSU scales would reduce disturbance on both the local and landscape scales, therefore, provide protection for both the larger population and individual leks and their surrounding habitat.

Excluding wildfire and agriculture from the disturbance calculation for those states listed above may result in a higher level of disturbance overall. Since wildfire was the primary source of habitat loss in previous years (Herren et al. 2021), this may contribute to continued declining habitat trends. However, wildfire and agriculture are factored into the soft and hard habitat triggers and included as part of the HAF boundary and 70% sagebrush cover habitat objective; if these disturbances lead to the trip of a trigger, adaptive management would be applied to reverse the trends. In PHMA and IHMA, the Anthropogenic Disturbance Screening Criteria would apply stringent criteria to any proposed projects. No disturbance cap would apply in GHMA or GRSG brood-rearing habitat and migration corridors.

Managing RHMA in MT would add protections to GRSG in those areas. Management actions in RHMA would emphasize restoration for the purpose of restoring habitat to provide the ability for establishing or enhancing GRSG populations to sustainable, dense levels. Management in RHMA that leads to restrictions to land use and surface-disturbing activities would reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. The restoration focus in RHMA would further improve GRSG habitat. The higher disturbance cap in MT, WY, and the Dakotas could lead to greater levels of anthropogenic disturbance within a project area, and therefore greater potential for habitat loss and alterations as well as direct disturbance to GRSG, depending on the degree to which wildfire and agriculture contribute to disturbance in a given area. Because disturbance will only be calculated at the project level, cumulative disturbance over a larger area could potentially occur at levels that influence GRSG populations within a BSU. However, in areas with reduced habitat due to wildfire and/or agriculture, additional anthropogenic development would be limited, reducing the combination of threats and habitat degradation.

Although all states would include an adaptive management strategy, the metrics, thresholds, timeframes, and spatial scales for evaluating and responding to triggers would vary state by state. As a result, there would be no consistency in how triggers are calculated across the range and responses may not be implemented across an area that encompasses an entire population group and/or seasonal habitats needed throughout the year. If management changes do not apply to all populations and habitats being affected, some individuals and/or habitat areas may improve while others remain impacted.

In UT, the GHMA identified in Alternative 1 is generally comprised of poor-quality habitat on the periphery of larger PHMA. The extent to which some of these GHMA areas may provide connectivity, be used as corridors, or provide certain seasonal habitat during portions of a bird's life cycle is largely unknown due to limited telemetry. Most of these GHMA areas are predominantly private, Tribal, and TLA lands, and because of the limited regulatory discretion (other than split estate where BLM administers the mineral estate) that the BLM has on resources in these areas impacts on GRSG from development are likely to continue at current rates. Only 6 of the 13 leks in GHMA are in areas affected by BLM management, with the other 7 in areas predominantly managed by USFS, tribal, or private entities. Development could still occur in UT GHMA potentially resulting alteration, direct loss, and fragmentation of seasonal GRSG habitats. Fragmentation could further limit the amount of usable habitat available for the small and declining population of GRSG that occupy GHMA.

Minerals Management

Rangewide Environmental Consequences

Leasing of fluid minerals would be allowed in PHMA and ID IHMAs, subject to NSO stipulations and/or seasonal restrictions. This would increase HMA acres subject to effects from mineral resource development as described in *Nature and Types of Effects* compared to alternatives in which PHMA would be closed to leasing. In SFAs, there would be no exceptions, waivers, or modifications allowed. In PHMA outside of SFAs, no waivers or modifications would be allowed; however, exceptions could be considered on a very limited basis, and only in circumstances where granting an exception would have either have no impacts or would reduce impacts on GRSG.

NSO stipulations on new leases would protect PHMA from surface-disturbing activities on BLM lands. In large contiguous areas primarily managed by the BLM, GRSG exposure to disruption would be limited to the human activity that accompanies construction, development, or production activities. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area. However, in areas of mixed ownership, impacts could still occur due to directional/horizontal drilling as described in *Nature and Types of Effects*. NSO on BLM lands may encourage co-location of leases, which could help prevent fragmentation and preserve connectivity between leks by concentrating effects outside of PHMA.

PHMA in all states would be closed to salable mineral development (except where authorized in MT and open subject to restrictions in WY), but open for new free use permits (except ID). PHMA in all states and

ID IHMAs would be closed to non-energy mineral development, but they could consider expansion of existing leases. Most states would include minimization measures for salable mineral and non-energy mineral development in GHMA, but they were not recommended for withdrawal. These are described in the 2015 EISs for CA, CO, ID, MT/DK, NV, OR, UT, and WY (BLM 2015a-2015h). SFAs in all states were recommended for withdrawal from location and entry under the United States mining laws. Following publication of the RODs, the BLM applied for a withdrawal of the SFAs, pursuant to section 204 of FLPMA. The Secretary accepted the BLM's application and the BLM initiated the withdrawal process for those lands. These restrictions would reduce the HMA acres affected and potential impacts to GRSG and habitat within PHMA and GHMA, such as disturbance and habitat alterations. Indirect effects on wildlife include noise, dust, and light impacts resulting from mining and transportation. Additional impacts on GRSG associated with mineral development would be as described under *Nature and Types of Effects*.

State-Specific Environmental Consequences

In WY, applying an NSO within 0.6 miles of occupied GRSG leks in PHMA would protect fewer areas than in other states. Buffer distances from 0.5 to two miles from oil and gas infrastructure have been shown to be inadequate to prevent declines of birds from leks (Walker et al. 2007a). Studies have shown that greater distances, anywhere from two to four miles, are required for viable GRSG populations to persist (Connelly et al. 2000b, Holloran and Anderson 2005, Walker et al. 2007a).

In WY and MT PHMA, fluid mineral development in areas that are already leased (and thus are exempt from NSO stipulations) would also be subject to density and disturbance limits, which would limit the extent of development and associated impacts. GHMA would be subject to NSO stipulations for fluid mineral development within 2 (CO), 1 (OR) or 0.25 (WY) miles of leks. GHMA in UT would also be subject to NSO stipulations but the distance varies by BLM office. PHMA and GHMA in CO and GHMA in OR would be closed to fluid mineral development within 1 mile of leks; this would provide increased protections to GRSG and contribute to lek persistence because no development (surface or subsurface) could occur. Fluid mineral development would be subject to Controlled Surface Use (seasonal restrictions and/or buffers) stipulations in ID, NV/CA OR, and WY GHMA. MT-DK would include a 0.6-mi NSO in GHMA and seasonal limitations (breeding, nesting, early brood-rearing & winter habitat) and CSU (density and disturbance) for the rest of the GHMA. Applying these restrictions to fluid mineral development would reduce potential impacts to GRSG associated with fluid mineral development as described under *Nature and Types of Effects*.

Development of fluid mineral resources in GHMA would still result in the localized direct loss and fragmentation of seasonal habitats and displacement of GRSG from current use areas outside of the applicable lek buffers. The general effects of fragmentation, habitat loss, and displacement are discussed in *Nature and Types of Effects*. Application of lek buffers as required conservation measures or COAs would protect lekking, most nesting, and some brooding habitat; however, nesting and brooding habitat located outside of the buffer would be afforded no specific protections other than the restrictions associated with management of PHMA and GHMA. Impacts of development outside buffer areas could be offset by mitigation because operators would be required to mitigate impacts until there is a net conservation gain. However, mitigation may be conducted off-site if it would provide greater benefit to GRSG as a whole in the planning area, thus potentially resulting in unmitigated impacts on local populations in GHMA.

In CO, ID, ND, NV/CA, OR, UT, WY, and parts of MT/DK (Billings, HiLine, Miles City, ND, SD), priority would be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA, or within the least impactful areas within PHMA and GHMA if avoidance is not possible. Leasing outside of HMAs would reduce potential for impacts associated with horizontal drilling (in PHMA which would be NSO) and with fluid mineral leasing, exploration, and development in GHMA. However, the prioritization objective could potentially result in temporarily deferring a parcel in PHMA from leasing to a later sale. There would be no similar objective in the Lewistown or Butte Field Offices, and therefore, potential for impacts would be greater.

For both salable mineral and non-energy mineral development, WY PHMA would be subject to seasonal restrictions, while WY and MT PHMA would be subject to density and disturbance limits. These additional restrictions would reduce potential impacts to GRSG associated with salable mineral development as described under *Nature and Types of Effects*, but to a lesser extent than if they were completely closed to development. In Idaho, IHMA would be open to non-energy mineral development in Known Phosphate Lease Areas, and similar impacts (e.g., displacement and habitat impacts from loss, disturbance, and erosion could occur from open pit mining.) could occur in areas open to development.

PHMA in CO, MT/DK, UT, and WY would be considered “essential habitat” for coal unsuitability evaluation. This would likely lead to PHMA in these states being considered unsuitable for coal development and would limit the potential for impacts associated with coal development described in *Nature and Types of Effects*. ID, NV/CA, and OR would not address coal development due to absence of the mineral.

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK; these stipulations would reduce the potential for impacts associated with fluid mineral leasing as described in in *Nature and Types of Effects*.

In CO PHMA and within 4 miles of an active lek, siting criteria would be applied to guide development of the lease or unit that would result in the fewest impacts possible to GRSG. Criteria include consideration of location of proposed lease activities in relation to critical GRSG habitat areas, and evaluation of the potential threats from proposed lease activities, and an evaluation of the proposed lease activities, including design features, in relation to the site-specific terrain and habitat features. To authorize an activity based on these criteria, the environmental record of review must show no significant direct disturbance, displacement, or mortality of GRSG.

Lands and Realty Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states, ID IHMAs, and some MT RHMAs would be identified as ROW avoidance areas to allow for management flexibility (except for minor ROWs in WY, as described under state analysis). PHMA would be exclusion areas for wind and solar (utility scale solar only in ID, NV/CA and OR) development (with exceptions in WY, OR, and ID IHMA, see state-specific analysis). Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts associated with ROW development, such as disturbance and increased potential for predation, as described *in Nature and Types of Effects*. GHMA in all states would be open to minor ROWs with mitigation measures (WY does not require mitigation, see state-specific analysis). Impacts associated with ROW development, such as disturbance and increased potential for predation, could occur in these areas if developed, but mitigation measures would help to offset the impacts.

New ROWs in PHMA would not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in Alternative 1. The BLM would collocate new ROWs with existing infrastructure when possible. Alternative 1 would apply at implementation a protective buffer from disturbance around leks in PHMA, IHMA and GHMA, depending on the type of disturbance and based on the latest science. BLM would retain management flexibility to route ROWs to minimize overall impacts on

GRSG habitat. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original footprint. These measures would protect GRSG and their habitats from fragmentation, disturbance and predation, and other impacts, as described in *Nature and Types of Effects*.

State-Specific Environmental Consequences

In IHMA new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. PHMA in WY would be open to minor ROWs with buffers and mitigation. Effects from ROWs could occur as described under *Nature and Types of Effects*; buffers and mitigation would help offset the impacts, but to a lesser extent than ROW exclusion/avoidance. GHMA in WY would be open to minor ROWs and no mitigation measures would be required. There would be a greater potential for impacts associated with ROWs in these areas.

CO, NV/CA, and OR GHMA would be identified as avoidance areas for major ROWs, which would reduce impacts as described under *Nature and Types of Effects.* ID and UT GHMA would be open to major ROWs with minimization measures, while WY GHMA would be open to major ROWs. In ID and UT, minimization measures would help reduce the impacts, but to a lesser extent than ROW exclusion/avoidance.

Classifying GHMA in CO, NV/CA, and OR as avoidance areas for major ROWs would decrease the potential for impacts associated with ROW development as described *in Nature and Types of Effects*. Opening UT and ID GHMA to major ROWs with minimization measures, would increase the potential for impacts, such as disturbance and increased potential for predation, but mitigation measures would help to offset the impacts. Opening GHMA in WY to major ROWs would also increase the potential for impacts, and there would be no mitigation measures to offset the impacts.

Renewable Energy Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states would be exclusion areas for wind and solar (utility scale solar only in ID, NV/CA and OR) development (with exceptions in WY, OR, and ID IHMAs; see state-specific analysis). Within the exclusion areas, this would eliminate direct impacts from potential renewable energy development on GRSG in PHMA. As a result, GRSG would experience reduced potential for disturbance, habitat alterations, and habitat fragmentation as described *in Nature and Types of Effects*.

State-Specific Environmental Consequences

In WY, PHMA would be avoidance areas for wind development or open if it can be sufficiently demonstrated that development would not result in population declines. ID IHMAs would be avoidance areas for utility-scale solar and wind development. PHMA in OR would be avoidance areas for wind and solar development in Lake, Harney, and Malheur Counties. Classifying PHMA as avoidance areas would decrease the potential for impacts as described in *Nature and Types of Effects*, but to a lesser extent than exclusion areas.

Classifying GHMA in CO, MT/DK, NV/CA, and OR as avoidance areas for wind development, GHMA in CO, MT/DK and OR as avoidance areas for solar development, and GHMA in NV/CA and UT as exclusion areas for solar development, would decrease the potential for impacts associated with wind and/or solar development. Because GHMA in ID, UT and WY would be open to wind development and GHMA in ID and WY are open to solar development, there would be a greater potential for impacts as described in *Nature and Types of Effects*.

Depending upon the potential for renewable energy development and the size and location of permitted development in GRSG habitat, there could be impacts ranging from discountable in less important habitats to decreasing the population growth rate if placed in important habitats. COAs could be applied to reduce impacts on GRSG, but they would not be consistently applied across the decision area. Therefore, renewable energy development in GRSG habitat would be expected to result in habitat loss, degradation, fragmentation, and direct disturbance to the birds. Based on previous research (e.g., LeBeau 2012), nests and broods near wind facilities would have a lower rate of success and such declines in these vital rates, especially impacts on nest success, would decrease the population growth rate in these populations and may lead to loss of the population over time (Taylor et al. 2012).

Livestock Grazing Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA and GHMA in all states, and ID IHMA, and would be available for domestic livestock grazing. Impacts to GRSG and habitat from grazing, such as habitat alterations, could occur in PHMA, GHMA, and ID IHMAs as described in *Nature and Types of Effects*.

Priority for review and processing of grazing permits/leases would be in SFAs, followed by PHMA outside of SFAs. Precedence would be given to existing permits/leases in these areas not meeting land health standards, with focus on those containing riparian areas, including wet meadows. Prioritization would help the BLM identify issues that may be associated with improper grazing and implement corrective actions in the areas that have the greatest habitat value. Management changes, if required, would be tailored to meet land health standards and GRSG habitat objectives. The BLM would also require thresholds and responses to address and respond to future conditions in new fully processed permits. The review process described above would reduce impacts to GRSG from grazing if review leads to adjustments to existing permits/leases that improve land health standards.

State-Specific Environmental Consequences

In MT/DK, the BLM would use applicable RDFs to mitigate potential impacts from West Nile virus when developing or modifying water developments. This would reduce potential for impacts to GRSG from disease spread associated with livestock subsidies as described in *Nature and Types of Effects*.

Under Alternative 1 all or portions of 13 key RNAs in Oregon would be unavailable for livestock grazing (see **Appendix 17** for further analysis). In key RNAs, 21,959 acres would be unavailable to livestock grazing (**Table 3-25**, Oregon Key RNA Acreages). Two key RNAs (Foster Flat and Guano Creek-Sink Lakes) would remain unavailable to livestock grazing. **Tables 4-2** and **4-3** provide corrections and updates to the vegetation communities with the various key RNAs and are based on new, site-specific information gathered or generated by the Lakeview, Vale, and Burns districts in Oregon. Under Alternative 1, fencing would be present in and adjacent to key RNAs in Oregon. However, the ability to distribute livestock would generally be maintained, and impacts would be limited from these actions (BLM 2015, p. 4-203). Making portions of RNAs that contain plant communities important to GRSG unavailable to grazing could provide the BLM with areas for baseline vegetation monitoring without the influence of BLM-permitted activities. Whether removal of grazing would reduce the risk of invasive plant spread into the key RNAs is uncertain.

Wild Horse and Burro Management

Rangewide Environmental Consequences

Under Alternative 1, wild horse populations would continue to be managed for AMLs and in balance with other resource uses (e.g., rangeland health, livestock, and wildlife). Wild horse gathers would be prioritized based on escalating or potential emergencies, public safety, nuisance animals, court orders, population growth suppression, and resource impacts associated with monitoring data, which is generally based on wild horse population inventories, wild horse condition, availability of sufficient water and forage resources, rangeland health, use levels of upland habitats, and riparian resource conditions. Evaluation of land health assessments in wild horse HMAs could identify vegetation conditions that could prompt gathers, reducing wild horse numbers and the associated impacts on GRSG habitats.

Predation Management

Rangewide Environmental Consequences

Under Alternative 1, following more specific vegetation objectives and reducing opportunities for predators (e.g., by minimizing human resource subsidies) may, in some cases, improve the quality of habitat and decrease opportunities for predation as described under *Nature and Types of Effects*. Improved habitat conditions and decreases in predation would increase nest success, chick survival, and GRSG persistence over the long term.

State-Specific Environmental Consequences

In NV/CA, UT, and WY, habitat objectives to minimize human resource subsidies, and coordinate with other partners on predator management would likely reduce exposure of predatory birds to GRSG nests and chicks, thereby ensuring GRSG persistence until habitat conditions improve (Coates et al. 2015; O'Neil et al 2018). Similarly, habitat management in CO, NV/CA, and UT to provide GRSG concealment from predators may help reduce predation and increase GRSG persistence.

ACEC Designation

Alternative 1 would not result in any impacts from ACEC designation since it does not include management for ACECs.

4.2.3 Alternative 2

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA and associated management would be similar to those described for Alternative 1 (**Table 2-3**). However, the overall acreage would be slightly less with less than 1% fewer acres of PHMA and approximately 1.5% fewer acres of GHMA. Further, some SFAs would be removed in states as described under state impacts. Impacts from language to maintain and enhance sagebrush habitats would be the same as described for Alternative 1.

State-Specific Environmental Consequences

Removing SFAs in CA, ID, NV, UT, and WY would reduce protections to GRSG and habitat. However, previous management area classifications (e.g., PHMA) would remain, but protections may be lower under some of those other classifications. Reducing restrictions to land use and surface-disturbing activities could increase the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. Habitats in these area would likely be reduced in quality due to impacts associated with mineral development described in *Nature and Types of Effects*. If protections are lacking from adjacent lands and the lands are developed, this could lead to habitat fragmentation due to large, contiguous areas of habitat losing habitat suitability. Protections to GRSG and habitat from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, and impacts would be as described under Alternative 1. Management of RHMA would be the same as described for Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all its corresponding management actions from the 2015 plan amendments. The removal of GHMA and their associated management actions would likely incentivize development in areas formally identified as GHMA and could therefore lead to GRSG habitat loss and alterations.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMAs. This would help offset impacts associated with land use activities, as described under *Nature and Types of Effects*, but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In UT and WY, the net conservation gain requirement would be removed. Although the BLM would not require compensatory mitigation in HMAs, it would enforce state mitigation policies and programs. In CO, ID, NV/CA, OR, UT, and WY HMAs, compensatory mitigation would be voluntary unless required by laws or by the State. As a result, the potential for impacts from land use activities, as described under *Nature and Types of Effects*, would be greater relative to Alternative 1.

Impacts from applying a 3% (CO, ID, NV/CA, OR, UT, and the Dakotas) or 5% (MT, WY, and the Dakotas) disturbance cap in PHMA would be similar to those described for Alternative 1. In UT and ID the cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Consequently, some additional development could occur in ID, which may increase potential for habitat loss and alterations, particularly for individual leks and their surrounding habitat.

The ability to exceed the disturbance and density caps could result in loss and degradation of site-specific GRSG and impacts on local GRSG populations. Exceedances to the caps would only be allowed if site-level analysis indicates the project, in combination with all voluntary and required design features, will improve the condition of GRSG habitat. The risk in allowing this exceedance is the possible loss of a specific type of habitat that mitigation may not address because it does not require compensation for the exact same habitat value. Consequently, it is possible that while the required habitat improvement will occur, it may not address the loss of a specific habitat type. This may result in a long-term impact on GRSG in the project area.

Impacts from including an adaptive management strategy would be similar to those described for Alternative 1. However, some states would include the addition of "un-triggers", meaning that the management change implemented to reverse a trigger could be revoked and the original management would be reimplemented once the issue is resolved. Reverting back to the original management that resulted in the trigger being tripped could lead to additional population declines and/or habitat degradation that could cause the trigger to be tripped again.

In Idaho, the BLM would apply the lek buffer distances for certain land uses from the 2019 Idaho GRSG ARMPA , or Alternative 2, and as described in **Appendix 19**. In general, the buffer distances would vary by HMA type, with buffer distances in PHMA being the largest followed by IHMA, then GHMA. Buffer exception criteria would be included for IHMA/GHMA as described in the appendix. Under Alternative 2, buffer distances in PHMA and IHMA are based upon the 'lower end of the interpreted range' and mostly the 'literature minimum', respectively, as summarized in the USGS Report, *Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review* (Manier et al. 2014). Buffers would reduce disruption to GRSG, minimize habitat loss, and reduce habitat degradation, which should result in maintaining nesting habitat effectiveness and brood survival. Protections would be greatest in PHMA, followed by IHMA, then GHMA. This approach would encourage development outside of the best habitat and into lesser quality or non-habitat.

In UT, the GHMA designations would be removed with all its corresponding management actions from the 2015 plan amendments. Alternative 2 prioritizes the importance of management prescriptions on PHMA to protect the seasonal habitats that support over 95% of GRSG populations in Utah. Impacts would likely accelerate the effect on resources in the former GHMA since those acres will be removed from management consideration. GRSG management would revert to the management in place prior to the 2015 ARMPA; therefore, some protections such as lek buffers, seasonal restrictions may still be applied depending on the GRSG resource present.

Minerals Management

Rangewide Environmental Consequences

Impacts from fluid mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in CO PHMA and CO GHMA (see state-specific analysis).

Impacts from salable mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in ID IHMAs and NV/CA PHMA (see state-specific analysis).

Impacts from non-energy mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in NV/CA PHMA (see state-specific analysis).

Impacts from coal management in PHMA and GHMA would be the same as described for Alternative 1, except in UT PHMA (see state-specific analysis).

Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. The Secretary proposes and makes withdrawals through a separate process pursuant to section 204 of FLPMA not through BLM land use planning.

State-Specific Environmental Consequences

Removing the closure of CO PHMA to fluid mineral development would increase potential for disturbance and habitat alterations/degradation since mineral development activities could occur in previously closed areas and potentially result in impacts described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely have minimal impacts since the stipulation would avoid potential for disturbance and habitat alterations/degradation from surface-disturbing activities.

Impacts from prioritizing fluid mineral leasing outside of HMAs in CO, ID, OR, and MT/DK offices would result in the same impacts in these states as described under Alternative 1. Removing the objective in UT and NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. Removal of the mineral leasing prioritization objective would not increase threats, since the NSO stipulation would still be in effect. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. However, if the BLM has a backlog of Expressions of Interest for leasing, the BLM would prioritize work first in non-habitat followed by lower habitat management areas (e.g., GHMA). For fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

Adding exception criteria to salable and non-energy mineral closures for NV/CA PHMA and allowing consideration of new free use permits for salable minerals in ID IHMA and NV/CA PHMA would increase the potential for associated impacts as described in *Nature and Types of Effects.*

Identifying essential habitat in UT PHMA as part of future coal unsuitability criteria would likely lead to these areas being considered unsuitable for coal development and would limit the potential for associated impacts as described in *Nature and Types of Effects*.

In CO PHMA and within 4 miles of an active lek, impacts from applying siting criteria for fluid mineral development would be the same as those described for Alternative 1.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA, see state-specific analysis).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from renewable energy management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA, see state-specific analysis).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW and wind/solar development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development.

Livestock Grazing Management

State-Specific Environmental Consequences

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, with the following exceptions. The removal of review prioritization and processing of grazing permits in UT, WY, and NV/CA, may have minimal impacts as the BLM still has the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

In Oregon, all or portions of 13 key RNAs would be available to livestock grazing, consistent with all applicable regulations and policies. The 13 key RNAs available for livestock grazing would be Black Canyon, Dry Creek Bench, East Fork Trout Creek, Fish Creek Rim, Foley Lake, Lake Ridge, Mahogany Ridge, North Ridge Bully Creek, Rahilly-Gravelly, South Bull Canyon, South Ridge Bully Creek, Spring Mountain, and Toppin Creek Butte (BLM 2019a, p. 1-6). The key RNAs would be required to meet land health standards and other applicable BLM regulations and policies and would remain subject to management, including regulation of grazing, to maintain and promote the characteristics of the RNAs (BLM 2018, p. 4-6). Grazing impacts would vary within and among the key 13 RNAs, depending on site productivity, timing of grazing, stocking intensity, and duration of grazing (Oregon Greater Sage-Grouse Proposed RMPA/Final EIS 2018, p. 4-6). Alternative 2 would result in 21,959 fewer undisturbed acres within Oregon available for additional research in plant communities important to GRSG (Oregon Greater Sage-Grouse Proposed RMPA/Final EIS 2019, p. 4-7). The small size of the RNAs likely limit any impacts of livestock grazing on larger GRSG populations. Two key RNAs (Foster Flat and Guano Creek-Sink Lakes) would remain unavailable to livestock grazing.

In MT/DK, impacts from using applicable RDFs to mitigate potential impacts from West Nile virus when developing or modifying water developments would be the same as described for Alternative 1.

Wild Horse and Burro Management

Rangewide Environmental Consequences

Impacts from wild horse and burro management would be the same as described for Alternative 1.

Predation Management

Rangewide Environmental Consequences

Impacts from objectives to reduce opportunities for predators would be the same as described for Alternative 1.

State-Specific Environmental Consequences

Impacts from state-specific predation management objectives in CO, NV/CA, and WY would be the same as described for Alternative 1. Adding specific language to address corvid nests in UT may reduce human subsidies that attract corvids, which would reduce predation levels (Coates et al. 2015; O'Neil et al 2018).

ACEC Designation

Alternative 2 would not result in any impacts from ACEC designation since it does not include management for ACECs.

4.2.4 Alternative 3

Habitat Designation and Management

Rangewide Environmental Consequences

Under Alternative 3, all HMAs would be managed as PHMA, over double the acreage of PHMA compared with Alternatives 1 and 2 (**Table 2-3**). Management actions for PHMA, such as lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would be more restrictive. Managing previously designated GHMA as PHMA would minimize potential impacts to GRSG. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would decrease potential for disturbance to birds and habitat alterations because management restrictions associated with PHMA would occur over a larger area.

There are no SFAs under this alternative, but their absence would likely not reduce protections to GRSG habitat rangewide. Although management actions for PHMA would be less restrictive than those for SFAs, management restrictions in PHMA under this alternative would be more restrictive than Alternatives 1 and 2 and applied to a greater overall area, designed to promote GRSG conservation and reduce potential impacts from land-use activities. Management restrictions would only be applied to development associated with valid existing rights as no new activities would be authorized.

Impacts from mitigation would be similar to Alternative 1 as the BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. Compensatory mitigation would need to fully offset any residual effects on habitat function and value at the scale necessary to meet the RMP GRSG goals and objectives. These requirements reduce the potential for impacts from land use activities such as habitat loss or alterations. Maintaining habitat function and value would help increase nesting success and brood survival, thereby contributing to the species' persistence.

The BLM would apply a 3% cap for pre-existing authorizations or disturbances (including infrastructure, wildfire, and agriculture) at the project scale and within HAF fine scale habitat selection area (for all states except WY, which does not have fine scale HAFs; see *State-Specific Environmental Consequences*) while honoring valid existing rights. The disturbance cap would not be applicable to new authorizations since all PHMA would be closed to new infrastructure projects. If disturbance from existing infrastructure developments exceeds 3% of habitat at the project scale or HAF fine scale area, new infrastructure associated with pre-existing authorizations would be deferred. The smaller size of most HAF fine-scale areas compared to BSU-scales might result in the cap being reached more quickly. This may prevent some development and associated impacts to GRSG. Because fine scale HAFs represent an individual's home range and are determined in part by the quality and juxtaposition of resources within and between seasonal habitats, reducing disturbance in these areas may help ensure that habitat function and quality remains to support seasonal movements. There would be no disturbance cap exceptions under this alternative, which may result in a lower level of disturbance overall. Including wildfire and agriculture as part of the overall disturbance cap would also result in a lower level of disturbance, particularly since wildfire was the cause of most of the habitat loss between 2012 and 2018 (Herren et al. 2021).

Currently, the percentage of disturbance in PHMA/IHMA within fine scale HAF boundaries is well below 3% and below 1% in most areas (BLM data 2023), yet population and habitat trends are still declining (Herren et al. 2021). Implementing a 3% disturbance may result in a continuation of these trends, but to a lesser extent than if the disturbance cap were higher (or non-existent). Because habitat connectivity is important to maintaining gene flow and ensuring genetic diversity and distribution (Row et al. 2018), limiting fragmentation by adhering to disturbance caps would help maintain population connectivity.

The BLM would include an adaptive management strategy for habitat loss due to development under this alternative. However, because management is already restrictive, additional management would be limited to proactive measures, which are dependent on budget and staffing.

Effects from habitat management and conservation would be similar to those described for Alternative 1, however, Alternative 3 would include additional objectives to maintain existing connectivity between GRSG populations. This would contribute to GRSG persistence and viability by continuing to facilitate gene flow and allowing for genetic variation (Row et al. 2018). Genetic variation and connectivity are necessary for GRSG resilience as described under the affected environment.

State-Specific Environmental Consequences

In Wyoming, the BLM would apply a 3% cap (including infrastructure, wildfire, and agriculture) at the project scale and within neighborhood cluster boundaries. Clusters are used in place of fine scale HAF boundaries as HAF boundaries have not been delineated for Wyoming. Two of the Wyoming clusters (D-151 and D-147) are currently exceeding the 3% disturbance cap, and therefore, no more development could occur in these areas. Disturbance levels on the remaining 110 clusters are below 2% (BLM GIS 2023).

In Montana and the Dakotas, allowing treatments in PHMA to conserve, enhance or restore GRSG habitat and re-establishment of sagebrush cover and desirable understory plants would improve habitat quality and quantity, which would potentially contribute to GRSG persistence and viability. Lek buffers would apply to all surface disturbing activities associated with pre-existing authorizations and disturbances, and would therefore, reduce GRSG habitat loss and lek disturbance.

In NV/CA, lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks regardless of HMA designation (see **Appendix 4** for lek definitions). This change is consistent with

FLPMA (43 United States Code (USC) 1701 Sec. 201) and BLM Manual 6840 in that it provides protections for special status species. Impacts to discretionary surface-disturbing activities include an increase in area where GRSG surveys are conducted beyond PHMA and adoption of no surface disturbance buffers within potential project areas. This would benefit GRSG by applying protective buffers to leks which otherwise might not be applied until an updated HMA model is available.

In Idaho, lek buffers would be applied to active and pending active leks according to Idaho's lek definitions (see **Appendix 4** for lek status definitions by state) with distances the same as those described under Alternative 1 (see **Appendix 19**). Lek buffers would apply to all surface disturbing activities. Since all HMA would be treated as PHMA, and PHMA would be closed to new infrastructure projects, buffers may provide limited additional protection for GRSG since PHMA allocations are more restrictive and are larger than areas protected by buffers.

In UT, all habitat would be PHMA, including GHMA from Alternative 1. PHMA would include some areas of unoccupied habitat, historic habitat where birds have not been observed in 20 years or more or may have never occurred (e.g., habitat west of Sanpete Valley), areas of non-habitat (e.g., phase 3 pinyon-juniper, rock outcrops), and areas which are currently not habitat but could become habitat through significant restoration. Including these areas under the more restrictive management of Alternative 3 raises the concern that the BLM would not use the least restrictive constraint to meet the resource protection objective in leasing restrictions for existing development rights. Under Alternative 3 in UT, all occupied leks are encompassed by PHMA.

Minerals Management

Closing PHMA to fluid mineral leasing, salable minerals, and non-energy minerals would reduce potential impacts to GRSG and habitat, such as disturbance and habitat alterations. Valid, existing leases may be developed under this alternative. Impacts would be reduced to a greater extent than Alternatives 1 and 2 since areas closed to leasing could not be developed. Closing PHMA to mineral leasing and development would protect GRSG habitat from surface-disturbing activities and associated habitat fragmentation, and maintain connectivity between leks. GRSG would not be exposed to disturbance associated with noise and human activity that accompanies construction, development, or production activities. However, restrictions to development on BLM lands might push development onto private land, which could result in indirect impacts as described under *Nature and Types of Effects*.

State-Specific Environmental Consequences

Impacts from managing coal in CO, MT/DK, UT and WY would be same as described for UT in Alternative 2. In UMRBNM in Montana, BLM land will not be disposed of other than by exchange, and only when necessary to further the protective purposes of the Monument. Protecting this area would also reduce impacts to GRSG and habitat by reducing surface disturbances associated with mineral resource management. In CO PHMA and within 4 miles of an active lek, impacts from applying siting criteria for fluid mineral development would be the same as those described for Alternative 1.

Lands and Realty Management

All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. This would decrease the potential for impacts associated with ROW development. However, the inability to site ROWs in PHMA could lead to longer ROW routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on

GRSG habitats outside of PHMA and may result in increased impacts on GRSG populations using habitat on adjacent private lands.

Renewable Energy Management

PHMA in all states would be ROW exclusion areas for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for habitat loss, degradation, fragmentation, and direct disturbance to birds in these areas. Alternative 3 would offer more protection from renewable energy development than under Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions.

Livestock Grazing Management

Rangewide Environmental Consequences

All PHMA would be unavailable for domestic livestock grazing. As a result, livestock would be removed from PHMA and impacts to GRSG and habitat associated with grazing, such as habitat alterations (*Nature and Types of Effects*) would be reduced. Removing livestock could lead to increases in herbaceous understories, which would increase forage availability and nesting habitat suitability for GRSG. However, changes would depend on factors such as current conditions, climate, other land uses, etc. Removing livestock could also result in changes to the vegetation community composition, which could alter GRSG habitat suitability depending on the change (see *Nature and Types of Effects*).

Removing livestock from PHMA would reduce the potential for disease transmission assuming removal of man-made water sources to support livestock, such as water troughs, which may house vectors for diseases, such as West Nile virus (Naugle et al. 2004). Likewise, avian predators may be reduced if range improvements, including artificial water sources and fences, are also removed (Stevens et al. 2012; Manier et al. 2013, Coates et al. 2016). However, if livestock are removed on BLM fences may be erected to fence out BLM lands from adjacent private grazing lands. Additional fencing may also be needed to keep wild horses off BLM-administered PHMA. If fencing increases in areas of mixed ownership, there would be increased potential for impacts such as injury or mortality from fence strikes and predation. Additionally, removing livestock from BLM lands may concentrate grazing on private lands, potentially leading to overgrazing and decreased GRSG habitat suitability where concentrated grazing occurs. There would be the possibility of increased wildfires without livestock to reduce fine fuels on a large portion of the landscape (see **Section 4.4** for further analysis, discussion, and citations regarding the effects of grazing on wildfires). If the potential for a large-scale wildfire were to increase, this could put large areas of GRSG habitat at risk of damage or loss from burning.

State-Specific Environmental Consequences

In MT/DK, CHMA would be available for grazing. Impacts would occur in CHMA as described under *Nature and Types of Effects*. The BLM would assess and modify as needed water features to reduce the risk of potential impacts from West Nile Virus or other disease outbreaks.

Impacts in key RNAs in Oregon would be the same as described for Alternative 1.

Wild Horse and Burro Management

Removing wild horses and burros in PHMA would increase total vegetation, grass abundance and cover, sagebrush canopy cover, species richness, and dominance of palatable forbs (Manier et al. 2013; Chambers et al. 2017). This would increase habitat quality for wildlife, including GRSG. Where range improvements, such as fences and water troughs are removed, it would decrease potential perch sites for avian predators and potential drowning hazards and/or potential for disease transmission. Gathers needed to remove wild horses and burros from herd management areas could disturb GRSG in the short term through human presence and noise.

Predation Management

Under Alternative 3, the risk of predation may be reduced by reducing habitat disturbance, anthropogenic subsidies, and stopping or slowing the incursion of novel predators. Reduced predator numbers would help reduce predation levels and may increase GRSG persistence to a greater extent than Alternatives 1 and 2.

ACEC Designation

Under Alternative 3, all PHMA would be managed as ACECs. The management in ACECs under this alternative, and thus the associated impacts, would be the same as for PHMA.

4.2.5 Alternative 4

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as HMAs would be similar to those described for Alternative 1, although PHMA would increase by approximately 10% and GHMA would decrease by 1-2% (**Table 2-3**). Impacts from applying a 3% disturbance cap at the project scale and within HAF fine scale habitat selection area would be similar as to those described for Alternative 3, however, the cap would apply to both existing and proposed infrastructure authorizations (subject to valid existing rights). Additionally, wildfire and agriculture would not be included in the disturbance calculation, possibly resulting in more room for new authorizations and infrastructure projects. Since wildfire was the cause of the majority of habitat loss between 2012 and 2018 (Herren et al. 2021), the 3% cap would limit additional disturbance above habitat loss from wildfire.

Exceptions to the disturbance cap could allow for habitat fragmentation and an increased GRSG behavioral responses to the additional development. Further, habitat avoidance, changes in habitat use, and increased mortality risk from, for example, increased predators associated with developed areas, may have compounding adverse effects on GRSG populations. However, the exception would only be approved if site-specific NEPA analysis indicates that doing so will improve the condition of GRSG habitat in comparison to siting a project outside the designated corridor, so these effects are not anticipated. There would be no exceptions to the 3% PHMA (and IHMA) disturbance cap at the HAF fine scale habitat selection area, which would limit the overall level of disturbance at this scale.

The BLM would include population-level adaptive management informed by the results of state wildlife management agency analysis and TAWS, a framework developed to inform anomalies in population trends (Coates et al. 2021). If one of these thresholds is tripped, it would allow management changes in response to population declines. Adaptive management could help slow or reverse negative trends that may reduce GRSG population persistence and viability. If more than 3% of GRSG habitat within a HAF fine scale habitat area is lost from non-anthropogenic (non-development) disturbances, a soft threshold would be tripped and future new infrastructure projects or permits would be deferred within these areas until habitat services (as indicated by sagebrush recovery) are restored. Inclusion of these non-anthropogenic losses will lessen future habitat declines from anthropogenic disturbances.

State-Specific Environmental Consequences

In Colorado, the BLM would clarify the activity period for the leks being included in management allocations and decisions, increasing the amount of BLM-administered lands within buffer distances, and therefore, lands that would be subject to more intensive management decisions for lek and habitat protection. Alternative 4 would also increase the acreage of GHMA in Colorado where NSO stipulations would be applied compared to Alternatives 1 and 2. The same acreage under major stipulation (NSO) in Alternative 4 would be under moderate stipulation (CSU). This would increase the area of GRSG habitat protected from surface disturbance as described in *Nature and Types of Effects*.

CHMA in Montana and the Dakotas (**Table 2-31**) are areas of connectivity important to facilitate the movement of GRSG and maintain ecological processes, including between priority populations, adjacent states, and across international borders. Management in CHMA that leads to restrictions to land use and surface-disturbing activities would reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. The restoration focus in RHMA would further improve GRSG habitat. Including more protective management in GHMA (such as ROW avoidance and utility scale solar and wind exclusion or avoidance in some areas) would make management more consistent with the state plan and reduce potential for GRSG impacts such as habitat alterations and disturbance.

In Idaho, lek buffer distances (see **Appendix 19**) would be the same as under Alternative 1, but buffers would apply to 'active' and 'pending active' leks using the Idaho lek definitions (Cook et al. 2022; see **Appendix 4** for lek status definitions). Lek buffers would apply to a total of 1,254 leks (1,093 active; 161 pending active), where 76% of these leks are in PHMA, 19% of leks in IHMA and 4% of leks in GHMA. This change from Alternative 1 could increase the amount of BLM lands where lek buffers may apply but would depend on HMA type and buffer distance. For the largest buffer distance (3.1 miles), this could result in an increase of 14% of HMA with more restricted BLM management. Effects of this increase in acres of BLM lands where lek buffers may apply would be realized where allocations for resources are open or avoided in HMA, but not for those resources with closed or exclusion allocations in PHMA, such as wind or solar energy development, or non-energy leasables or salable minerals (**Table 2-4**).

In NV/CA, impacts from clarifying use of lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks (see **Appendix 4** for lek definitions) regardless of HMA designation would be the same as described for Alternative 3. Of the 380 known occupied leks in Utah, 366 (96.3%) are in PHMA under Alternative 4. As a result, there would be no substantial effect of impacts on small populations in former GHMA.

Minerals Management

Rangewide Environmental Consequences

Leasing would be permitted in HMAs, which would increase the HMA acres affected and potential for impacts in most states as described in *Nature and Types of Effects*. However, the BLM would include management actions to minimize potential for conflict and associated impacts from subsequent development. The BLM would also prioritize projects that avoid, minimize, reduce, rectify, and/or adequately compensate direct and indirect impacts to PHMA/IHMAs, and include applicable and technical COAs. Additionally, the 3% disturbance cap would apply at the fine scale HAF habitat selection area within PHMA/IHMA, which would help reduce overall disturbance and habitat impacts, including fragmentation. Applying an NSO stipulation within PHMA (except WY, see below), IHMA, and some RHMA would also decrease the potential for disturbance and habitat loss, alterations, and fragmentation. Reduced habitat fragmentation would help maintain habitat connectivity and population persistence and viability.

State-Specific Environmental Consequences

Expansion of the NSO stipulation to all PHMA in WY in an area that is already developed will only achieve the protections for new activities. Leks in PHMA would still be impacted by ongoing existing disturbances due to human presence. Greater protections would result where the NSO applies to leks not experiencing as much existing disturbance.

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK, limiting the potential for impacts associated with fluid mineral leasing as described in *Nature and Types of Effects*. In all MT/DK HMAs management to refine, streamline, and make stipulations consistent would be applied. A CSU stipulation would be applied to all GHMA rather than just to a lek buffer. This would improve consistency among BLM offices and partner natural resource entities and provide clear and consistent direction to applicants and partners for cross-office boundary projects. Applying stipulations would reduce impacts to GRSG and habitat from mineral resource management as described under *Nature and Types of Effects*. Impacts from closing UMRBNM to mineral leasing and development would be the same as those described for Alternative 3.

In CO PHMA and GHMA, siting criteria would be applied to guide development of the lease or unit that would result in the fewest impacts to GRSG. The following criteria would apply: location of the proposed authorization was determined to be nonhabitat; topography/areas of non-habitat create an effective barrier to impacts; co-locating the proposed authorization with existing disturbance; and/or the proposed location would be an alternative to a similar action occurring on a nearby parcel. Applying these criteria would reduce the potential for impacts to GRSG. If the criteria do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider permitting the action. Construction, drilling, and completion in CO PHMA or GHMA within 4 miles of an occupied lek during lekking, nesting, and early brood-rearing (March 1 to July 15) would be prohibited, but the TL may be adjusted based on application of the criteria described above.

In NV/CA PHMA, GHMA, and OHMA, management direction identifies six criteria used to grant exceptions to the allocation decisions (**Table 2-3**). The criteria narrow the use of mitigation to gain an exception to the allocation decisions. The changes are a benefit to GRSG by reducing consideration of surface disturbing projects that could remove GRSG habitat and/or disturb individuals, and a cost to proponent driven projects in that there would be fewer opportunities to gain exceptions.

All ID PHMA will be closed to new mineral materials development but continued use of existing pits will be allowed. An exception would be possible for new free use permits in areas with existing anthropogenic disturbance. Impacts to GRSG would continue since the disturbance is already existing.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states, ID IHMA, MT CHMA, and some MT RHMA as ROW avoidance areas would be similar to those described for Alternative 1. Where development cannot be avoided, breeding and nesting habitats, or in limiting/high value seasonal habitats would be avoided unless certain criteria are met. This would reduce the potential for impacts described *in Nature and Types of Effects*, by precluding alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages. Where major ROWs cannot be avoided, applying minimization measures (e.g., disturbance cap, seasonal constraints, tall structure limitations, RDFs, nest and perch deterrents, etc.) would also minimize potential for impacts. Residual direct and indirect impacts would be offset through compensatory mitigation. The magnitude of impacts would not be expected to be of a level that would impact GRSG population and lek persistence or viability.

Managing GHMA as ROW avoidance areas within breeding, nesting habitats and other limited seasonal habitats would reduce the potential for impacts as described *in Nature and Types of Effects*, particularly by avoiding alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages (e.g., breeding, migration). The potential for GRSG to be affected may vary in GHMA depending on the location and ability to relocate the ROW. Some areas, such as plains and prairies, may be more suitable for ROW development, whereas in may be less likely for ROWs to be sited in areas with mountainous or rugged topography.

Avoiding placement of ROWs within one-half mile of PHMA or IHMA would protect those areas from indirect impacts. Because all other areas would be managed as ROW open, impacts, such as habitat alteration and disturbance, could occur, however, compensation would be required (see Alternatives).

State-Specific Environmental Consequences
Effects from applying an NSO stipulation within 0.6 miles of leks in PHMA in WY would have effects as described for Alternative 1.

In Colorado, a timing limitation would be expanded to include GHMA and added to leased areas as conditions of approval of the ROW; this would reduce impacts to GRSG and habitat as described under *Nature and Types of Effects*.

In Idaho, lek buffers would be the same as under Alternative (**Appendix 19**). Lek buffers would protect leks from new disturbance and together with other restrictions in HMA, such as RDFs, Mitigation, Disturbance Cap, would serve to ensure responsible development.

Renewable Energy Management
Rangewide Environmental Consequences
Impacts from managing PHMA in all states and some MT RHMA as ROW exclusion areas for wind and solar energy development would be similar to those described for Alternative 3 (excludes IHMAs, see state-specific environmental consequences). However, since PHMA would apply to a smaller area under this alternative, the extent of protection from disturbance associated with from renewable energy development would be less.

Managing GHMA as avoidance areas for wind and solar energy development in all states would decrease the potential for impacts associated with wind and/or solar development as described in *Nature and Types of Effects*. Where avoidance is not possible, impacts to GRSG habitat would be minimized through measures such as avoiding surface use, occupancy, or placement of utility scale wind and solar facilities within one-half mile of PHMA, within one mile of active leks, and outside limited/high value seasonal habitats and movement corridors. Such measures would protect PHMA from indirect impacts; reduce potential for habitat alterations in breeding areas, migration corridors, and high value habitat; and minimize disturbance to breeding and migrating birds. Managing GHMA and MT CHMA as avoidance areas for wind and solar energy development would limit opportunities for development but reduce potential for GRSG disturbance and habitat alterations and fragmentation, in GHMA that are adjacent to PHMA.

State-Specific Environmental Consequences
Managing ID IHMAs as exclusion areas for wind and solar energy development within 3.1 miles from active leks and avoidance in the remainder of the IHMA would decrease the potential for impacts as described in Nature and Types of Effects, but to a lesser extent than if the entire IHMA were managed as an exclusion areas as there would be greater potential for development to occur outside of 3.1 miles from leks. However,

development outside of this buffer would likely not disturb leks or alter lekking or nesting habitat. Because infrastructure would be considered only if it would not impair habitat use by GRSG and will meet RMP GRSG goals and habitat objectives, any alternations or disturbance would not impact lek or population persistence/ viability.

Because surface use, occupancy, or placement of utility scale wind and solar facilities would be prohibited within one-half mile of PHMA, adjacent PHMA would be protected from indirect impacts from development in IHMAs. This would also limit opportunities for development, but reduce potential for disturbance and habitat alterations adjacent to PHMA.

Livestock Grazing Management

Rangewide Environmental Consequences

Because the presence of GRSG HMAs would not affect whether an area is available for livestock grazing or change existing status of lands available or unavailable for livestock grazing, impacts from domestic livestock grazing management would be similar to those described for Alternative 1. The BLM would alter management objectives and actions to minimize, reduce, or correct for any impacts to GRSG and habitat, managing livestock grazing to meet or make progress toward meeting the GRSG habitat objectives. Adjustments to existing AUMs would be made based on site-specific conditions providing flexibility to adjust permits conditions to avoid or reduce impacts to GRSG or habitat. Additionally, if land health assessment conditions are not met as indicated by an assessment specific to site capability, adjustments to grazing practices would be made to provide for suitable GRSG habitat at the HAF site scale. Range management improvements and existing infrastructure would be evaluated with respect to their effect on GRSG and GRSG habitat. This could help prevent impacts associated with grazing infrastructure such as increased predation and disease transmission (Naugle et al. 2004; Coates et al. 2016; Stevens et al. 2012; Manier et al. 2013). Together, these management actions and objectives would help to minimize, reduce, or correct for GRSG disturbances and habitat alternations that could otherwise lead to impacts on population persistence and viability.

State-Specific Environmental Consequences

Impacts from permitting grazing in CHMA and from reducing the risk of potential impacts from West Nile Virus would be the same as described for Alternative 3. Impacts in key RNAs in Oregon would be the same as described for Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 4 would be the same as described for Alternative 1.

Predation Management

Impacts from reducing opportunities for predators would be similar to those described for Alternative 1 with the exception that precluding new anthropogenic infrastructure new anthropogenic infrastructure would be avoided where possible. As such, there would be a slightly greater potential for new infrastructure to occur, which could attract predators and increase predation on GRSG. Because other measures to maintain predation at natural levels would be applied, this is not expected to increase predation to a level that would influence lek or population persistence and viability.

ACEC Designation

Alternative 4 would not result in any impacts from ACEC designation since it does not include management for ACECs.

4.2.6 Alternatives 5 and 6

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as HMAs would be similar to those described for Alternative 1, though the BLM would manage approximately 7% more PHMA than Alternatives 1 and 2 and 10% fewer acres of GHMA (**Table 2-3**). Impacts from applying a 3% cap would be the same as described for Alternative 4, except in WY and MT (see State-Specific Environmental Consequences). Impacts from exceeding the 3% disturbance cap would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development and disturbance to GRSG and habitat. Allowing a project to proceed before compensatory mitigation is in place would result in a time lag, potentially decades, during which GRSG habitat would be fragmented and reduced in carrying capacity by project impacts. As a result, habitat and population trends may continue to decline to a greater extent compared to Alternative 4. Impacts from population and habitat adaptive management would be the same as described for Alternative 4.

State-Specific Environmental Consequences

Impacts from applying a 5% disturbance cap at the project scale in WY and MT would be similar to those described for Alternative 1. However, the 3% disturbance cap would still apply at the HAF fine scale habitat selection area, which may limit additional development reducing fragmentation of GRSG seasonal habitats and ensuring habitat function and quality remain to support seasonal movements. Additionally, WY and MT would include wildfire and agriculture in the disturbance calculation, and therefore, the level of disturbance from other sources (energy development, roads, RPWs, etc.) would be relatively lower.

In Colorado, impacts from applying a 1-mile lek buffer as the minimum threshold would be the same as described for Alternative 1. These alternatives would allow for more flexibility in development while maintaining the BLM's ability to apply site-specific criteria for GRSG habitat protection. Alternative 6 also includes potential CSU stipulations to be applied in GHMA within 1 mile of PHMA. This would allow for increased flexibility while considering indirect effects that development in GHMA may have on PHMA.

Management in Wyoming SHMA would be consistent with GHMA restrictions, which would increase protections to GRSG and habitat as described under *Nature and Types of Effects*.

Impacts from designating RHMA and CHMA in Montana and the Dakotas would be the same as described for Alternative 4. Including more protective management in GHMA (ROW avoidance within 1.2 miles of active leks and crucial winter range, and utility scale solar and wind exclusion or avoidance in some areas) would make management more consistent with the state plan and decrease potential for impacts such as habitat alterations and disturbance.

In Idaho, lek buffers would be similar as those under Alternative 2 and consistent with the 2021 Idaho Sage-grouse Plan (State of Idaho 2021). Buffers would apply to active and pending active leks (Cook et al. 2022; **Appendix 4**) resulting in a potential increase in the amount of BLM lands where lek buffers, similar to Alternative 4. Lek buffers would remain the same in PHMA , except for minor linear features where less PHMA would be protected (**Appendix 19**).

Compared to Alternative 2, buffer distances would increase in IHMA for major linear features and transmission line towers, resulting in more IHMA potentially protected from these disturbances (**Appendix 19**). Buffer distances would be decreased in IHMA for communication and meteorological towers in IHMA, and in GHMA for surface disturbances due to continuing human activities that alter or remove the natural vegetation. These decreases in buffer distances would result in less IHMA and GHMA protected from these types of disturbances.

Compared to Alternatives 1, 3, and 4, Alternatives 5 and 6 would have reduced buffers in IHMA and GHMA (**Appendix 19**). In addition, Alternatives 5 and 6 would have buffer exception criteria, where BLM may approve actions within IHMA and GHMA if it is impracticable to locate the project outside of the buffer and impacts are avoided through project siting and design, to the extent reasonable. The reduced buffer distances in IHMA and GHMA would reduce restrictions while maintaining buffers for PHMA, and are in line with Idaho's three-tiered habitat approach. Since development and anthropogenic disturbance could occur closer to leks in IHMA and GHMA, some leks would be at higher risk of effects from development, such as avoidance behavior, reduced productivity, or decline in lek abundance. A more detailed analysis would occur during project-specific NEPA analysis.

In NV/CA, impacts from clarifying use of lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks (see **Appendix 4** for lek definitions) regardless of HMA designation would be the same as described for Alternative 3.

In UT, Alternatives 5 and 6 would prioritize habitat management areas (PHMA and GHMA) that encompass 95.6% of the male GRSG counted on leks during 2023 surveys. This includes 2,740 (93.8%) males counted within PHMA, 54 (1.8%) counted in GHMA and 127 (4.3%) counted outside of any HMA. GHMA designations in Morgan-Summit, South Slope Uintah/Blue Bench, and Uintah Population Area (Deadman's Bench, East Bench, and Book Cliffs) would be removed, including any corresponding management actions. Because 90% of Utah's GRSG are supported by habitat in PHMA under these Alternatives there would be no substantial effect of accelerating impacts on the small populations in former GHMA.

Minerals Management

Rangewide Environmental Consequences

Impacts from mineral resource management would be similar as described for Alternative 4 with state-specific differences described below.

State-Specific Environmental Consequences

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK, limiting the potential for impacts associated with fluid mineral leasing as described in in *Nature and Types of Effects*. Applying a 5% disturbance cap at the project scale in MT and WY, and 3% disturbance cap at the HAF fine scale area could allow for more potential mineral development, which could increase disturbance and habitat alterations, including fragmentation (see **Table 2-3**). Allocations in PHMA in WY differ between Alternative 4 and Alternative 5.

Impacts from consistency in stipulations in MT/DK HMAs and from closing UMRBNM to mineral leasing and development would be similar to those described for Alternative 3.

Impacts from applying siting criteria for development in CO PHMA and GHMA would be similar to those described under Alternative 4. To grant an activity based on compensatory mitigation, the compensation project must be planned, funded, and approved in coordination with the State of Colorado.

In NV/CA, impacts from identifying criteria for granting exceptions to allocation decisions would be the same as described for Alternative 4.

Impacts from closing ID PHMA to new mineral materials development but allowing continued use of existing pits would be the same as described for Alternative 4. Impacts from reduced lek buffers in IHMA and GHMA would provide for additional opportunities for mineral resource management, specifically salable minerals and non-energy leasables.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states, ID IHMA, MT CHMA and some MT RHMA as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4. Micro-siting to avoid placement near leks or in connectivity corridors to avoid dividing breeding habitat from adjacent nesting or other seasonal habitats would reduce potential for alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages (e.g., breeding, migration). Because major ROWs that are located inside RMP designated ROW corridors would not need to comply with disturbance cap or compensatory mitigation requirements, habitat alteration and disturbance could occur where these corridors overlap PHMA.

Managing GHMA in all states and WY SHMA as ROW open with minimization measures and compensation, to maintain habitat supporting GRSG populations consistent with state agency habitat designations and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for impacts as described in *Nature and Types of Effects*. However, reduction of impacts would be to a lesser extent than if managed as avoidance areas.

State-Specific Environmental Consequences

In Colorado, impacts from expanding a timing limitation to include GHMA for conditions of approval of the ROW would be the same as described for Alternative 4.

In Idaho, lek buffers would be similar as those under Alternative 2 and consistent with the 2021 Idaho Sage-grouse Plan (State of Idaho 2021). Lek buffers would be reduced in IHMA and further reduced in GHMA. Effects would be similar to those described under Minerals Resource Management under Alternatives 5 and 6 (described above). These effects would be analyzed in detail during the project-level NEPA analysis.

Renewable Energy Management

Rangewide Environmental Consequences

Classifying PHMA and IHMA as avoidance areas for wind and solar energy development but exclusion in breeding/nesting habitat and limited seasonal habitat would decrease the potential for impacts as described in *Nature and Types of Effects*, but to a lesser extent than if all HMA were exclusion areas. Solar and wind development would be considered on a case-by-case basis in avoidance areas. Because development would not be allowed in breeding and nesting habitats, or in limited/high value seasonal habitats unless certain criteria are met (refer to **Table 2-10**), the magnitude of impacts, such as disturbance and habitat alterations, would not be expected to be of a level that would influence lek or population persistence/ viability.

Managing GHMA and WY SHMA as open to wind and solar energy development would result in potential impacts as described in *Nature and Types of Effects*. However, the inclusion of minimization measures and compensation to maintain habitat supporting GRSG populations consistent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for those impacts in high value and seasonal habitats.

State-Specific Environmental Consequences

In Idaho, PHMA and IHMA would be avoidance areas for utility scale wind and solar energy development (including met towers). Development would not be allowed in breeding and nesting habitats, or in limited/high value seasonal habitats unless one of the criteria below is met. Development would not be allowed within breeding and nesting habitat inside lek buffers (**Appendix 3**), but breeding and nesting habitat outside of lek buffers would be avoidance areas.

Differences in effects between Alternatives 4, 5, and 6 are described under Greater Sage-grouse, Habitat Designation and Management and Minerals Resource Management, State-specific Circumstances, Alternatives 5 and 6 above. With the increased interest in renewable energy development including utility scale wind and solar energy development in Idaho, there may be increased impacts to GRSG leks in PHMA, IHMA and GHMA under Alternatives 5 and 6. Reduced lek buffers in IHMA and GHMA and a possible buffer exception could result in possible lek abandonment, avoidance behavior, or reduced productivity due to increased anthropogenic disturbance around a lek. The extent of impacts would depend on a variety of factors, including habitat type and condition, proximity to other leks, unique seasonal habitats, or connectivity, etc. However, energy development would likely be limited by proximity to transmission line corridors and substations and would not extend to all PHMA, IHMA or GHMA. However, leks in IHMA and GHMA would be at higher risk from effects from energy development due to the reduced buffers and buffer exception under Alternatives 5 and 6 than under Alternative 4.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from livestock grazing management under Alternatives 5 and 6 would be the same as described for Alternative 4.

State-Specific Environmental Consequences

In Montana and Dakotas impacts from permitting grazing in CHMA and from reducing the risk of potential impacts from West Nile Virus would be the same as described for Alternative 3.

In Oregon, the 15 key RNAs in Oregon would be retained under Alternatives 5 and 6. Their associated areas allocated as unavailable to grazing are proposed to be retained, modified, or re-allocated to grazing based on district-generated, site-specific updated information since the 2015 ARMPA. Regardless of availability for grazing, the key RNAs would be required to meet land health standards and other applicable BLM regulations and policies and would remain subject to management, including regulation of grazing and invasive plant removal. The amount of land within key RNAs that would be made available to grazing is small relative to the size of the species' range and any impacts of livestock grazing on GRSG populations using these areas would likely be minimal and undetectable.

Although key RNA boundaries are not being modified (with the exception of data updates and clarifications), district site visits and analysis since the 2015 ARMPA have found vegetative communities that would not be consistent with why key RNA designations for sage-grouse habitats were made. They include mountain mahogany vegetation communities (Dry Creek Bench, Mahogany Ridge, Fish Creek Rim, and Spring Mountain Key RNAs) and the old-growth juniper (Black Canyon Key RNA) vegetation community.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternatives 5 and 6 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce impacts from wild horses and burros on GRSG in some areas.

Predation Management

Impacts from objectives to reduce opportunities for predators under Alternatives 5 and 6 would be the same as described for Alternative 4.

ACEC Designation

Alternative 5 would not result in any impacts from ACEC designation since it does not include management for ACECs.

Under Alternative 6, the acres of ACECs would be the same as in Alternative 3, but management within ACECs would differ as described below.

Impacts from mineral development could occur as described under *Nature and Types of Effects*. Plans of operations for locatable mineral disturbances would reduce effects if measures are included to reduce disturbance to GRSG and habitat alterations.

Managing ACECs as open to fluid mineral leasing subject to NSO stipulations would decrease the HMA acres subject to effects from mineral resource development. The NSO stipulation could protect these acres from surface-disturbing activities. Limiting surface disturbance would ensure that connectivity between leks would be preserved and not contribute to fragmentation. Including an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if no direct or indirect impacts can be demonstrated is not expected to result in additional impacts.

Managing ACECs as closed to new or expansion of non-energy minerals associated with existing operations (e.g., fringe leases) would reduce potential impacts to GRSG and habitat, such as disturbance and habitat alterations as described under *Nature and Types of Effects*. Managing ACECs as closed to new salable mineral/mineral material operations for all sale types except for free-use pits would reduce potential impacts to GRSG and habitat as described under *Nature and Types of Effects* but to a lesser extent than if free use pits were also prohibited.

Managing ACECs as exclusion areas for major ROWs and avoidance areas for minor ROWs would reduce potential impacts to GRSG and habitat, such as disturbance, habitat alterations, and increased potential for predation, as described under *Nature and Types of Effects*. Managing ACECs as ROW exclusion areas for wind and solar energy development would eliminate the likelihood for GRSG impacts including habitat loss, degradation, fragmentation, and direct disturbance to birds in these areas.

4.3 VEGETATION

4.3.1 Nature and Type of Effects

Greater Sage-Grouse Management

GRSG management plans incorporate objectives for maintaining, improving, or restoring vegetation communities, particularly sagebrush and riparian and wetland habitats. In the 2015 GRSG plans there is consistently-applied management across all LUPs to preserve and improve vegetation communities. However, anthropogenic disturbances, such as road construction, mineral development, and ROW development, would continue. This could influence impacts on vegetation, including removal, fragmentation of vegetation communities, loss of pollinator habitat, and conversion of areas to an earlier seral stage, which could change vegetation community succession and reduce the extent of native plant communities. Remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Soil compaction would inhibit natural revegetation in areas without active reclamation efforts and would reduce plant vigor, making plants more susceptible to disease, drought, or insect attack. Expansion of conifer woodlands, especially pinyon (*Pinus* spp.) and juniper (*Juniperus* spp.), is also associated with increased bare ground and increased erosion potential (Manier et al. 2013). Juniper expansion presents a threat to GRSG as it doesn't provide suitable habitat, and mature trees displace shrubs, grasses, and forbs through direct competition for resources.

Disturbance caps would influence the allowable level of disturbance within a GRSG HMA, and these would vary by alternative. In general, a lower level of allowable disturbance would have fewer impacts to vegetation including reduced sagebrush or riparian vegetation fragmentation and reduced vectors for noxious weed or invasive species introduction or spread.

An adaptive management approach is included in the event that habitat or populations continue to decline. In the event a threshold is met, more restrictive measures could be applied. This would help to ensure that actions are taken to limit impacts to habitat (and by proxy, vegetation) in an appropriate time frame to offset impacts.

Minerals Management

Mineral development requires construction of roads, well pads, wells, and other infrastructure, and associated noise, traffic, and lights that alter, degrade, and/or entirely displace native ecosystems (Manier et al. 2013). Surface disturbance associated with mineral development often removes vegetation, reduces the condition of native vegetation communities and the connectivity of habitat, and encourages the spread of invasive species (NTT 2011). Vegetation removal results in conversion of areas to an earlier seral stage, which could change vegetation community succession and reduce desired plant communities. The remaining vegetation could have reduced vigor or productivity due to mechanical damage, soil compaction, and dust. Impacts would not occur in areas closed to mineral leasing or development.

Lands and Realty Management

Permitted activities, such as construction of utility ROWs, involve vegetation removal, which reduces the condition of native vegetation communities and individual native plant species, alters age class distribution, reduces connectivity, and encourages the spread of invasive species. Construction activities could compact soils, which would inhibit natural revegetation in areas without active reclamation efforts and would reduce plant vigor, which would make plants more susceptible to disease, drought, or insect attack. In most cases, reclaimed areas would be ripped and seeded during interim or final reclamation (NTT 2011).

Aboveground linear and underground ROWs, such as transmission lines or pipelines, would temporarily remove vegetation during construction. Vegetation would be permanently removed for construction of surface linear ROWs, such as roads. Because aboveground and surface linear ROWs may extend for many miles, vegetation communities could be fragmented and the potential for weeds to be introduced or to spread may increase. Aboveground site-type ROWs and wind energy projects would remove vegetation during the life of the project, often lasting several decades, but areas would be reclaimed after the ROW is decommissioned. ROW corridors would concentrate disturbances in one area, which would cause greater impacts in this one area but would reduce the likelihood of disturbance in other areas.

ROW exclusion areas would protect vegetation from disturbance and removal. In ROW avoidance areas, the permits would be considered on a case-by-case basis. This flexibility may be advantageous where federal and private land ownership is mixed, as exclusion areas may result in more widespread development on private lands.

Livestock Grazing Management

Livestock grazing can affect soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems (Connelly et al. 2004; NTT 2011; Jones 2000). Grazing effects are not distributed evenly because historic practices, management plans and agreements, and animal behavior all lead to differential use of the range (Manier et al. 2013). In addition, some grass species that evolved with grazing pressure from large herbivorous mammals (such as warm season grasses *Bouteloua gracilis*) may be less affected by livestock grazing compared to species without herbivore-adapted traits (such as cold season grasses like *Agropyron spicatum, Pascopyrum smithii,* and *Festuca idahoensis*) (Mack and Thompson 1982). Cold season grass species that don't tolerate prolonged and heavy grazing are the dominant vegetation communities in the grass understories of sagebrush habitats across the biome. Livestock often use riparian and wetland areas for water and shade, which could reduce riparian community condition and hydrologic functionality. Properly managed grazing could also assist with desired vegetation objectives, modify vegetation composition, and structure, and reduce litter and fine fuel loading, which could reduce wildfire size and severity (see **Section 4.4**, Wildland Fire Ecology and Management).

While limited, improper grazing can lead to loss of vegetative cover, reduced water infiltration rates, decreased plant litter, increased bare ground, reduced nutrient cycling, decreased water quality, and increased soil erosion (Manier et al. 2013; Jones 2000). Grazing may also confer competitive advantage on pinyons and junipers through the removal of native grasses and forbs, facilitation of tree regeneration by increased shrub cover, and enhanced seed dispersal (Baker 2011). As described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of these effects.

Wild Horse and Burro Management

Wild horse and burro impacts are similar to those from livestock grazing, as wild horses and burros also forage on and trample vegetation. However, wild horse and burro use is not authorized through the permitting process and is thus not managed in the same way as livestock grazing. All herd management areas are managed for appropriate management levels (AML). Priorities for gathering excess wild horses and burros to maintain AML are based on population inventories, resource monitoring objectives, gather schedules, and budgets. Implementing management to protect GRSG generally involves reducing or otherwise restricting land uses and activities, such as wild horse and burro populations, that could reduce vegetation and water availability. By managing wild horse and burro populations to meet AML, the potential for those populations to adversely affect vegetation would be reduced. Limiting development to protect GRSG would also support vegetation habitat for wild horses and burros and limit human and surface disturbance. Reducing wild horses and burros populations in GRSG habitat management areas could assist in reducing impacts to vegetation communities in these areas. However, establishing priority for gather operations in PHMA could put herd management area that do not contain PHMA at risk for overpopulation, with associated negative affect on vegetation communities.

4.3.2 Alternative 1

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Under Alternative 1 restrictions on land use and surface-disturbing activities would occur within each HMA and SFA (**Table 2-3**) and would limit impacts to vegetation as described under *Nature and Type of Effects*. More restrictive management within SFAs emphasizes protection of GRSG in these areas, and would provide the highest level of protection to vegetation. In general, restrictions on land use and surface-disturbing activities in HMA and SFAs would reduce the likelihood of vegetation loss, sagebrush or riparian vegetation fragmentation, and introduction and spread of invasive weeds.

Structural changes to sagebrush shrublands have caused an increase in encroachment of pinyon pine, juniper, and noxious weeds that are replacing native plant communities. Treatments designed to prevent encroachment of trees and nonnative species vary across the range and would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. Fuels treatments, where allowed, would result in either more open-forested conditions, which would improve the habitat for species selecting these habitats, or decreased encroachment of juniper and pinyon species, which would improve habitats for GRSG and other sagebrush-dependent species. Habitat connectivity for GRSG could be increased over the planning time frame through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

Alternative 1 would also incorporate an adaptive management strategy composed of soft and hard thresholds based on population and habitat changes. See **Section 4.2.2** for a detailed description of thresholds. In general, an adaptive management strategy would help to ensure that actions are taken to limit impacts to vegetation in an appropriate time frame to offset impacts.

Under Alternative 1, all states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. Habitat objectives would be considered when authorizing activities in GRSG habitat. The exact language varies by state, but in general, inclusion of specific habitat objectives would result in improved vegetation conditions. Following these objectives could prevent rangeland not meeting range health standards that degrade vegetation communities, reduce conifer encroachment, and reduce the introduction and spread of invasive weeds.

State-Specific Environmental Consequences

In MT and WY, a 5% disturbance cap would apply to land use activities, including wildfire and agriculture, at the project area scale in PHMA. States with higher disturbance caps could see greater levels of disturbance within a project area, and therefore greater potential for impacts to vegetation as described *under Nature and Types of Effects*. WY has no required mitigation in GHMA potentially increasing impacts to vegetation.

In CO, ID, NV/CA, OR, UT, and the Dakotas, a 3% disturbance cap would apply to land use activities (except wildfire and agriculture) at both BSU-scale and at proposed project analysis area within PHMA. In ID, the same cap would apply but it could be exceeded in utility corridors if it benefits GRSG. Calculating disturbance at the project-level means that the amount of disturbance allowed could not exceed 3% of the site-specific project area; this may prevent some development that could occur if disturbance is only calculated at a coarser scale. In addition to calculating disturbance at the project-level, disturbance would also be calculated for each BSU. Including caps at both project and BSU scales would reduce the likelihood for sagebrush or riparian vegetation removal, degradation, or fragmentation, and improve the acreage and condition of sagebrush vegetation on both the local and landscape scales.

Although all states would include an adaptive management strategy, the metrics, thresholds, timeframes, and spatial scales for evaluating and responding to thresholds would vary state by state. As a result, there would be no consistency in how thresholds are calculated across the range and responses may not be implemented across an area that encompasses an entire population group and/or seasonal habitats needed throughout the year. If management changes do not apply to all populations and habitats being affected, some vegetation communities may improve while others remain impacted.

Minerals Management

Rangewide Environmental Consequences

Leasing of fluid minerals would be allowed in PHMA and IHMA subject to NSO stipulations and/or seasonal restrictions. In general, NSO stipulations on new leases would protect vegetation in PHMA from surface-disturbing activities and would not contribute to fragmentation. Restrictions on mineral development within PHMA and GHMA as described in the 2015 EISs for CA, CO, ID, MO/DK, NV/CA, OR, UT, and WY (BLM 2015a-2015h) would reduce potential impacts to vegetation such as vegetation removal and increased weed spread as described under *Nature and Types of Effects*.

State-Specific Environmental Consequences

In WY, management of PHMA as NSO within 0.6 miles of leks would protect vegetation in these areas, though to a lesser extent than elsewhere rangewide where all PHMA would be NSO. In WY and MT PHMA fluid mineral development in areas that are already leased (and thus are exempt from NSO stipulations) would also be subject to density and disturbance limits. In CO, OR, WY, and UT NSO stipulations within lek buffers (buffer distance varies by state) in GHMA would provide increased protection to vegetation in these areas. PHMA and GHMA in CO and GHMA in OR would be closed to fluid mineral development within 1 mile of leks which would also provide increased protections to vegetation and limit impacts from surface disturbance in these areas. However, development of fluid mineral resources in GHMA would still result in the localized direct loss and fragmentation of vegetation from current use areas outside of the applicable lek buffers. The general effects of mineral development on vegetation are discussed in *Nature and Types of Effects*.

Impacts of development outside buffer areas could be offset by mitigation because operators would be required to mitigate impacts until there is a net conservation gain. However, mitigation may be conducted off-site if it would provide greater benefit to GRSG, potentially resulting in unmitigated impacts on vegetation in GHMA.

Prioritizing leasing outside of PHMA and GHMA within CO, ID, ND, NV/CA, OR, UT, WY, and parts of MT/DK (Billings, HiLine, Miles City, ND, SD) would reduce the potential for impacts to vegetation associated with mineral development as described under *Nature and Type of Effects* in these areas. There would be no similar objective in the Lewistown or Butte Field Offices, and therefore, potential for impacts would be greater. In WY and MT, salable mineral and non-energy mineral development in PHMA would also be subject to density and disturbance limits which would also reduce potential impacts to vegetation, but to a lesser extent than if they were completely closed to development. In Idaho, IHMA would be open to non-energy mineral development in Known Phosphate Lease Areas; therefore, similar impacts (e.g., direct vegetation loss, surface disturbance, and erosion) could occur in areas open to development.

Lands and Realty Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states and ID IHMA would be identified as ROW avoidance areas to allow for management flexibility (except for minor ROWs in WY, as described under state analysis). PHMA would be exclusion areas for wind and solar development (with some differences between states, see state-specific analysis). Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts associated with ROW development, such as disturbance and increased potential for weed spread, as described *in Nature and Types of Effects*. GHMA in all states would be open to minor ROWs with mitigation measures (except for in WY where mitigation is not required). Impacts associated with ROW development, such as surface disturbance and increased potential for weed spread, could occur in these areas if developed, but mitigation measures would help to offset the impacts.

New ROWs in PHMA would not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in the Proposed Plan. In IHMA new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would collocate new ROWs with existing infrastructure when possible. Alternative 1 would apply a buffer from disturbance around leks in PHMA, IHMA and GHMA, depending on the type of disturbance and based on the latest science (USGS 2014a) which would protect vegetation in the buffer. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original footprint. These measures would protect vegetation from fragmentation and other impacts as described in *Nature and Types of Effects*.

State-Specific Environmental Consequences
PHMA in WY would be open to minor ROWs with buffers and mitigation. Buffers and mitigation would help offset the impacts, but to a lesser extent than ROW exclusion/avoidance. GHMA in WY would be open to minor ROWs and no mitigation measures would be required which would increase the potential for impacts associated in these areas.

Classifying GHMA in CO, NV/CA, and OR as avoidance areas for major ROWs would continue to reduce the potential for impacts associated with ROW development as described *in Nature and Types of Effects*. Opening UT and ID GHMA to major ROWs with minimization measures would increase the potential for impacts, but mitigation measures would help to offset the impacts. Opening GHMA in WY to major ROWs would also increase the potential for impacts, and there would be no mitigation measures to offset the impacts.

Livestock Grazing Management
Under Alternative 1, PHMA and GHMA in all states and ID IHMA would be available for domestic livestock grazing. Therefore, impacts to vegetation from grazing such as increased weed spread as described under *Nature and Types of Effects*, could occur in these areas. The BLM would prioritize SFAs and PHMA outside of SFAs for additional livestock grazing management. This would include or adjust permit terms and conditions needed to meet land health standards and GRSG habitat objectives.

Wild Horse and Burro Management
The BLM within all states where wild horses and burros overlap with GRSG habitat would need to manage populations within established AML, incorporating GRSG habitat objectives into wild horse and burros management. Monitoring wild horses and burros would gather prioritization information for GRSG habitat activities within SFAs, PHMA, IHMA (ID) and GHMA. Under Alternative 1, evaluation of land health assessments in wild horse HMA could identify vegetation conditions that would determine prioritization of areas to reduce wild horse numbers and the associated impacts on vegetation. Disturbances that are found in *Nature and Types of Effects* would have similar grazing impacts and may increase noxious weeds and invasive species presence, while also promoting conifer encroachment. Removing wild horses and burros in those PHMA with existing herd management areas in all states would increase total vegetation, grass abundance and cover, and sagebrush canopy cover, species richness, and dominance of palatable forbs (Manier et al. 2013; Chambers et al. 2017).

Hard thresholds (see **Appendix 2**) represent a trigger indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives set forth in the BLM plans. Adaptive management strategies and the potential for changes in management would be consistent between all states and would benefit GRSG habitat, especially in wild horse and burro areas. However, there is no consistency in the specific thresholds between states or the strategies associated with responding to those thresholds. The metrics, thresholds, and timeframes and spatial scales vary state by state, as does the level of detail that explains each of these. Similarly, the responses associated with adaptive management thresholds vary by state, with some prescribing specific actions and others identifying teams to develop a response.

4.3.3 Alternative 2

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Areas managed as HMAs would vary slightly from Alternative 1 (**Table 2-3**). Rangewide effects to vegetation from GRSG habitat management and conifer encroachment treatment under Alternative 2, would be the same as those described for Alternative 1.

State-Specific Environmental Consequences

Removing SFAs in UT, WY, NV, and ID would reduce protections to vegetation by removing restrictions on land use and surface-disturbing activities in those areas. However, previous management area classifications (e.g., PHMA) would remain, but protections may be lower than what is required in SFAs. Protections afforded to vegetation from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, where the habitat classification would be retained; impacts would be as described under Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all its corresponding management actions. This would likely incentivize development in areas formally identified as GHMA, and could lead to vegetation loss, sagebrush or riparian vegetation fragmentation, and increased weed spread.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMA. This would help offset impacts associated with land use activities, as described under *Nature and Types of Effects*, but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In UT and WY, the net conservation gain requirement would be removed, which would increase potential for impacts.

Although the BLM would not require compensatory mitigation in HMA, it would enforce state mitigation policies and programs. In CO, ID, NV/CA, OR, UT, and WY HMA, compensatory mitigation would be voluntary unless required by laws other than FLPMA or by the State. As a result, the potential for impacts from land use activities, as described under *Nature and Types of Effects*, would increase relative to Alternative 1, in which a net conservation gain would be required.

Impacts from applying a 3% (CO, ID, NV/CA, OR, UT, and Dakotas) or 5% (MT and WY) disturbance cap in PHMA would be similar to those described for Alternative 1. However, in UT and ID the cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Consequently, some additional development could occur in ID, which may increase potential for impacts to vegetation compared to Alternative 1.

Impacts of including an adaptive management strategy would be similar to those described for Alternative 1. However, some states would include the addition of "un-triggers", meaning that the management change implemented to reverse a threshold could be revoked and the original management would be reimplemented once the issue is resolved. Reverting to the original management that resulted in the threshold being met would likely lead to impacts to vegetation that could cause the threshold to be met again.

Minerals Management

Rangewide Environmental Consequences

Impacts from mineral development would generally be the same as described for Alternative 1 except for slight differences among the states (see state-specific analyses). Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) would have no on the ground impact. The Secretary proposes and makes withdrawals according to a separate process pursuant to section 204 of FLPMA not through BLM land use planning.

State-Specific Environmental Consequences

Removing the CO PHMA closure to fluid mineral development would increase potential for disturbance and vegetation loss or degradation. This is because mineral development activities could occur in previously closed areas and cause impacts as described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts to vegetation because the NSO stipulation would avoid potential for disturbance and associated impacts due to surface-disturbing activities.

Impacts from prioritizing fluid mineral leasing outside of HMA in CO, ID, OR, and MT/DK offices would result in the same impacts as described under Alternative 1. Removing the objective in UT, NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. However, if the BLM has a backlog of Expressions of Interest for leasing, the BLM would prioritize work first in non-habitat followed by lower habitat management areas (e.g., GHMA). For fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

Adding an exception criterion to salable and non-energy mineral closures for NV/CA PHMA with free use permits and allowing consideration of new free use permits for salable minerals in ID IHMA would increase the chance for activities to occur in these areas and thus the potential for associated impacts as described in *Nature and Types of Effects* would be greater.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA, see state-specific analysis).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development.

Livestock Grazing Management

Impacts from domestic livestock grazing management would generally be the same as described for Alternative 1, with differences across states as described below.

State-Specific Environmental Consequences

Removing SFAs in UT, WY, NV, and ID would remove the prioritization for review and processing of grazing permits in these areas. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Adding clarification of habitat objectives to land health standards in WY, ID, and NV and clarifications on grazing in riparian areas and management of range improvements in WY may, in some cases, help move vegetation toward desired conditions.

In OR, livestock grazing in the 13 key RNAs would be returned to language that pre-dated the 2015 amendments. Because this language would not specifically address habitat objectives for GRSG, these habitat objectives may not be met, and potential for impacts to vegetation and overall vegetation degradation would increase relative to Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management in Alternative 2 would be the same as Alternative 1, except for the removal of references to SFAs for the states that removed them, and removal of the reference to GHMA in UT, which removed that HMA type under this alternative. This would potentially lead to disturbances in extensive portions of the PHMA, IHMA, and GHMA that aren't required to protect SFAs. Disturbances to these areas, see *Nature and Types of Effects*, would increase the likelihood of native vegetation degradation and fragmentation for GRSG habitat with an increase in bare ground soils that would potentially increase noxious weeds and invasive species establishment and conifer encroachment.

4.3.4 Alternative 3

Greater Sage-Grouse Management

Under Alternative 3, the BLM would manage the largest acreage of HMAs, all as PHMA (**Table 2-3**). In addition, the BLM would manage ACECs for GRSG. Conifer encroachment impacts and treatments for Alternative 3 would be the same as those described for Alternative I. Management actions for PHMA would be more restrictive and designed to promote GRSG conservation to a greater extent in areas previously designated as GHMA. Therefore, managing previously designated GHMA as PHMA would minimize potential impacts to vegetation to a greater extent than if they remained managed as GHMA. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would also increase protections for and minimize impacts to vegetation.

Classifying previously designated SFAs as PHMA would likely not reduce protections to vegetation rangewide. This is because although management actions for PHMA would be less restrictive than those for SFAs under other alternatives, the management restrictions in PHMA under this alternative would be more restrictive than Alternatives 1 and 2 (e.g., PHMA would be closed to fluid, salable, and non-energy minerals) and applied to a greater overall area.

Impacts from mitigation would be similar to those described for Alternative 1, as the BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. An emphasis would be placed on avoiding impacts, which would reduce potential for effects. Additionally, compensatory mitigation would need to fully offset any residual effects on habitat function and value and at the scale necessary to meet the RMP GRSG goals and objectives. These requirements would reduce the potential for impacts from land use activities, such as direct vegetation loss and sagebrush or riparian vegetation fragmentation.

The BLM would apply a 3% cap for new and pre-existing authorizations for infrastructure, wildfire, and agriculture (subject to valid existing rights) at the project scale and within HAF fine scale habitat selection area while honoring valid existing rights. Calculating disturbance at the project scale and HAF fine scale habitat selection area may prevent some development, and therefore reduce impacts to vegetation. Because fine scale HAFs typically represent a local population's home range and are determined in part by the quality and juxtaposition of resources within and between seasonal habitats, reducing disturbance in these areas may help to reduce sagebrush or riparian vegetation fragmentation and impacts to vegetation from surface disturbance.

Effects to vegetation from habitat management and conservation would be similar to those described for Alternative 1, however, Alternative 3 would include additional objectives to maintain existing connectivity between GRSG populations. Maintaining connectivity would reduce the potential for increased sagebrush or riparian vegetation fragmentation.

Minerals Management

Closing PHMA in all states to fluid mineral leasing, salable minerals, and non-energy minerals would reduce the potential for impacts to vegetation, such as direct vegetation loss, increased fragmentation, and increased weed spread as described under the *Nature and Types of Effects*. Impacts would be reduced to a greater extent than Alternatives 1 and 2 because areas closed to leasing could not be developed at any point.

Recommending PHMA for withdrawal from location and entry under the United States mining laws would have no impact. However, if the BLM were to apply for a withdrawal pursuant to section 204 of FLPMA and the Secretary were to accept the application, the BLM could initiate the process to withdraw PHMA. A withdrawal would reduce potential impacts to vegetation associated with mineral development as described under *Nature and Types of Effects* since surface disturbance associated with location and entry would be less likely to occur in withdrawn areas.

Lands and Realty Management

Under Alternative 3, all PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. These restrictions would decrease the potential for impacts to vegetation in PHMA to a greater extent than under Alternatives 1 and 2. However, the inability to site ROWs in PHMA could lead to longer ROW routes in order to bypass closed areas which would in turn increase surface disturbance overall and other impacts of ROW siting on vegetation outside of PHMA.

Livestock Grazing Management

Under Alternative 3, all PHMA would be unavailable for domestic livestock grazing. As a result, livestock would be removed from PHMA and impacts to vegetation associated with livestock grazing, as described under *Nature and Types of Effects* would not occur. Alternative 3 would reduce the likelihood for spread of weeds, would allow for native understory perennial plant recovery, and would increase herbaceous vegetation cover (Strand and Launchbaugh 2013). Not utilizing livestock as a tool available for implementing fuels management treatments or invasive species control in sagebrush habitat areas could make PHMA more susceptible to a large-scale wildfire that would decrease native vegetation and increase the potential for noxious weed and invasive species growth in sagebrush vegetation communities within PHMA. Increased risk of wildfire would decrease protection of sagebrush habitats and may require repeated post-fire rehabilitation treatments to recover habitat function and continuity.

Wild Horse and Burro Management

Under Alternative 3, no wild horse and burro herd management areas would be designated in PHMA and wild horses and burros would be removed in areas where there are currently herd management areas. This could potentially increase protections for native plant communities within PHMA and decrease the potential for introduction and spread of noxious weeds and invasive species. Reducing ground disturbances to the herd management areas in PHMA would improve GRSG habitat and would assist in reducing the potential for conifer encroachment opportunities from compacted and bare soils.

4.3.5 Alternative 4

Greater Sage-Grouse Management

Under Alternative 4, more PHMA and less GHMA would be managed than Alternatives 1 and 2 (**Table 2-3**). Restrictions within HMAs would improve GRSG habitat by increasing acres and conditions of vegetation communities, connect sagebrush or riparian vegetation fragmented areas, mitigate noxious weed or invasive species introduction and spread, and decrease conifer encroachment. HMA protections would be expanded to new areas based on updated science.

The disturbance cap would be applicable to new authorizations under Alternative 4. Disturbance cap calculations would also be specific to activities that would remove vegetation and increase the potential for noxious weeds due to an increase in bare-ground areas. This would require more mitigation that could assist in preserving native vegetation populations or reducing invasive plants and noxious weeds for GRSG management. However, areas of GRSG non-habitat within the HMA boundaries would either be removed from the HMA or would be recategorized with decreased protections. Removing areas from HMA classification would have noticeable impacts to native vegetation in those areas and increase the potential for noxious and invasive species as well as soil degradation from surface disturbing activities. The 3% disturbance cap would include all acres of habitat classified as PHMA (and IHMA in Idaho). Areas outside those designations could experience disturbance and be converted to an earlier seral stage that would change vegetation community succession and reduce the extent of native plant communities.

As under Alternative 1, BLM would continue to include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations under Alternative 4. However, habitat objectives tables would be updated based on best available science which would reinforce current or provide new thresholds. The updated language would allow for flexible management that could identify problems sooner and assist in reducing potential vegetation disturbances and invasive plants and noxious weeds spread. Adaptive management attempts would more accurately reflect GRSG habitat conditions and strive for better manage vegetation to support GRSG.

Minerals Management

Alternative 4 and NSO stipulations would be similar to Alternative 1, including in WY where the NSO stipulations would be expanded to include all of PHMA. Leasing would be focused to areas that have the least potential for conflicts. BLM would evaluate parcels identified in Expressions of Interest (EOIs) associated with GRSG HMA and determine which to potentially analyze for potential inclusion in a lease sale. This would be applied to a larger area compared with Alternative 1 due to the increase in acres that would be managed as PHMA. As a result, Alternative 4 could reduce fragmentation of vegetation communities and could maintain the extent and condition of native populations where development doesn't occur.

The BLM would work with project proponents to promote measurable GRSG conservation objectives such as, but not limited to, consolidation of project related infrastructure to reduce habitat fragmentation and loss and to promote effective conservation and connectivity of seasonal habitats and PHMA (and IHMA). Vegetation communities in HMA that are considered to have least potential for conflicts with GRSG management and therefore more likely to be considered for development would see a potential increase in impacts to vegetation communities and in invasive plants and noxious weeds.

Lands and Realty Management

Alternative 4 would be similar to Alternative 1 with varying PHMA and IHMA exclusions for utility scaled ROWs. State-specific differences for facilities and activities would be guided by the strategy to avoid, minimize, or mitigate impacts on GRSG habitat. Wind and solar energy development would be excluded in PHMA and within specified areas of IHMA. Vegetation and soils disturbance from energy development would be eliminated in GRSG habitat containing sagebrush/perennial grass vegetation communities. By exclusion of development, the vegetation and soil conditions would neither be adversely nor beneficially impacted, but rather maintain current conditions and trends. Alternative 4 would exclude wind and solar energy testing and generation facilities in PHMA and in IHMA exclusions would apply within 3.1 miles from active leks that would reduce impacts compared to Alternative 1. Maintaining current conditions in PHMA and IHMA would provide consistent habitat for GRSG, reduce noxious weed and invasive species introduction, and decrease sagebrush or riparian vegetation fragmentation.

Livestock Grazing Management

Impacts to GRSG habitat from Alternative 4 would be the same as Alternative 1, although no SFAs would be managed under Alternative 4. As a result, these areas would not receive additional priority for grazing management. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Alternative 4 is similar to Alternative 1 with the exception of references to SFAs, for all states, would be removed from the management plan. Removal of SFAs would have similar impacts to vegetation communities as states that have removed them under Alternative 2.

4.3.6 Alternative 5

Greater Sage-Grouse Management

Under Alternative 5, more PHMA and less GHMA would be managed than Alternatives 1 and 2 (**Table 2-3**). Lands would be managed for avoiding and minimizing direct and indirect disturbances on sagebrush vegetation and sagebrush communities that would require compensatory mitigation to achieve no net habitat loss. No net habitat loss and disturbance limits would not apply to the removal of invasive or encroaching vegetation, where such removal creates habitat. Therefore, this alternative could improve more acres of vegetation for GRSG habitat than Alternative 1. Alternative 5 habitat objectives would be similar to Alternative 4.

Minerals Management

Under Alternatives 5, fluid mineral development could be more flexible compared with Alternative 1 due to WEMs, though adherence to the WEM criteria would ensure no impacts to GRSG within 0.6 miles of leks or provide for off-setting effects through compensatory mitigation in PHMA beyond 0.6 miles (except in WY, where the NSO only applies within 0.6 miles). In addition, compensatory mitigation could be used more frequently under Alternative 5 to offset both direct and indirect adverse impacts on riparian and sagebrush habitats in PHMA and GHMA. Protective effects of PHMA would increase under Alternative 5 compared to

Alternative 1, as PHMA would be expanded (**Table 2-3**). Approved mineral developments would cause surface disturbances that would lead to vegetation community degradation, sagebrush or riparian vegetation fragmentation, and increases in noxious weeds and invasive species presence.

Lands and Realty Management

Avoidance for utility scale wind and solar in Alternative 5 would be similar to management under Alternative 1 but would keep GHMA open for utility scale developments with minimization measurements. This would result in more impacts on native vegetation and GRSG habitats from renewable energy development, in comparison to Alternative 1 where GHMA are only open in ID and WY for solar and wind. Under Alternatives 5, GRSG habitat would be fragmented from new ROW developments in GHMA resulting in an increase in the potential for invasive species and noxious weeds throughout the open ROW areas from impacts as described under *Nature and Types of Effects*.

Livestock Grazing Management

Impacts from livestock grazing management under Alternative 5 would be the same as those described for Alternative 4.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be the same as described for Alternative 4. Under Alternative 5, BLM would manage WHB in the low end of AML and would reduce the potential for impacts from wild horses and burros on vegetation such as those described under Nature and Type of Effects, compared with Alternatives 1, 2, and 4.

4.3.7 Alternative 6

All impacts would be the same as described for Alternative 5 except for those from ACECs. ACECs under Alternative 6 would cover the same areas as Alternative 3 and would provide further protection to vegetation communities from surface disturbing activities as described under *Nature and Types of* Effects.

4.4 Wildland Fire Ecology and Management

4.4.1 Nature and Type of Effects

Impacts on wildfire management result from changes in wildfire frequency and intensity and the ability to employ wildfire-suppression methods, both of which would affect management of wildfire and related costs within the planning area. Surface disturbance caused by development would generally contribute to the modification of the composition and structure of vegetation communities (including increases in noxious weed proliferation) around developed areas. This would then be more likely to fuel high-intensity wildfires, which could increase program costs because of the increased potential for wildfire.

Livestock grazing is the most widespread land use across the sagebrush landscape (Connelly et al. 2004) and it can be used to achieve resource objectives. Livestock grazing can alter an ecosystem's fuel characteristics, particularly fine fuel loads; however, this effect depends on weather conditions and plant community characteristics (Strand et al. 2014). In shrub-steppe, grazing with cattle may not be effective when shrub cover is high enough to serve as the primary carrier of the wildfire (Schachtschneider 2016) nor is it likely to be effective under extreme burning conditions (Strand et al. 2014). Several small-scale studies (Davies et al. 2010, Davies et al. 2016, and Davies et al. 2017) indicate cattle grazing can reduce grass fuels, alter potential wildfire behavior, and protect restoration investments, particularly when used on annual grasses prior to the wildfire season (Strand et al. 2014). Sagebrush grassland grazed at 30 to 50% utilization has been found to have lower percent cover of perennial grasses and total herbaceous species, as well as larger gaps in fuels (Davies et al.

2010). At higher wind speeds, targeted grazing at a utilization of 50% reduced flame lengths below 4 feet, allowing direct attack by firefighters (Decker 1998). Burned areas that were grazed at 40% utilization had less cheatgrass and more perennial grasses compared with ungrazed burned areas (Davies et al. 2009). For invasive, annual, grass-dominated landscapes, high-intensity grazing is typically needed to suppress invasive annuals and thereby change wildfire behavior (Mosley and Roselle 2006). By coupling knowledge of fuel characteristics with foraging habits of different livestock, prescriptions of the appropriate intensity can be developed to target specific components of the fuel load, and grazing can be applied effectively to reduce the risk associated with fine fuels. Such management would be consistent with Executive Order 13855, Promoting Active Management of America's Forests, Rangelands, and other Federal Lands to Improve Conditions and Reduce Wildfire Risk.

4.4.2 Alternative 1

A comprehensive strategy for wildland fire management would be implemented under Alternative 1, including the FIAT. The FIAT would identify PHMA areas and management strategies to reduce the threats to GRSG from invasive annual grasses, wildfires, and conifer expansion. It would incorporate recent scientific research on resistance and resilience of Great Basin ecosystems as well as interdisciplinary team knowledge. Potential management strategies include proactive measures, such as fuels management and habitat restoration and recovery, and reactive measures, such as fire operations and post-fire rehabilitation. Together, these actions would improve wildland fire management, given the limited resources available, and would target those areas that need most protection. The likelihood for wildfire would be reduced and subsequent impacts on vegetation, particularly vegetation that meets GRSG habitat requirements, described under **Section 3.2**. would also be reduced. Providing adequate rest from livestock grazing would improve the likelihood that ESR seedings would stabilize the site, compete effectively against invasive annuals, and successfully establish native vegetation over the long term.

4.4.3 Alternative 2

Impacts on wildland fire management under Alternative 2 would be the same as described for Alternative 1.

4.4.4 Alternative 3

Under Alternative 3, all PHMA would be unavailable for livestock grazing. This could limit the BLM's ability to achieve resource objectives as described under the *Nature and Type of Effects*, and could alter the risk of large-scale wildfires.

4.4.5 Alternative 4

Impacts on wildland fire management under Alternative 4 would be the same as described for Alternative 1.

4.4.6 Alternatives 5 and 6

Impacts on wildland fire management under Alternatives 5 and 6 would be the same as described for Alternative 1.

4.5 FISH AND WILDLIFE

4.5.1 Nature and Type of Effects

Minerals Management

Mineral exploration and development could result in impacts on the fish and wildlife species and habitat identified in **Chapter 3**. During minerals management, increased human disturbance activities could result in temporary habitat avoidance or direct impacts on fish and wildlife species, causing mortality or injury. Other direct impacts include the removal or degradation of habitat from vegetation removal and increased potential for the spread of noxious weeds. Continuous (24-hours per day) operations often associated with fluid minerals exploration and development or mining can result in long-term impacts on wildlife and their habitat from displacement or other noise-related disturbance. Displacement of species could increase competition for resources in adjacent habitats. These activities could remove and fragment habitats due to road development and use, facility construction and placement, and creation of well pads and pipelines. Wildlife may avoid developed areas over the long term, or may adapt and recolonize sites, including after reclamation of temporarily disturbed areas.

Both short term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from industrial activities such as oil and gas development) have been documented to cause physiological effects on wildlife species. These include increased heart rate, altered metabolism, and changes in hormones, foraging, anti-predator behavior, reduced reproductive success, density, and community structure (Radle 2007; Barber et al. 2009a). In addition, noise can impact wildlife through the disruption of communication and environmental cues (US Department of Transportation, Federal Highway Administration 2023). Determining the effect of noise is complicated because different species and individuals have varying responses, and certain species rely more heavily on acoustic cues than others (Radle 2007; Barber et al. 2009b). Impacts would be both short- and long-term, depending on the type and source of noise, and the depending on the species.

Impacts on big game populations would result from disturbance and/or loss of seasonally important habitat (for example, critical winter, breeding, or rearing habitats). Big game species could also be impacted by interference with seasonal migration or movement patterns (Kauffman et al. 2022) that decreases the ability of a species to breed or overwinter successfully. If effects are severe enough, this could lead to population declines.

Restricting surface-disturbing activities during minerals management actions would reduce impacts on wildlife and their habitat. Such management actions include stipulations to protect GRSG habitat, closure of areas to mineral leasing and development, and restrictions within ACECs. Areas closed to mineral leasing and development or managed under NSO stipulations would reduce surface disturbance and associated impacts from mineral development in certain areas. Wildlife on BLM-administered lands may be affected by disturbances from mineral development in adjacent lands.

Lands and Realty Management

Although transmission and power line construction does not generally result in substantial direct habitat loss, it would disturb wildlife species in habitat along the ROW due to the associated human activity, equipment, and noise, and would contribute to habitat fragmentation. In addition, transmission lines provide perches and nest sites for predators such as ravens and raptors, resulting in indirect negative impacts on prey species. Over the long term, ROWs may cause mortality of birds and bats due to collisions with power lines or guy lines. Collocation of transmission lines could reduce impacts by siting new developments in areas that are previously disturbed. Roads associated with energy transmission facilities can also reduce the extent and quality of habitat or serve as inroads for invasive plants to establish, further reducing habitat quality.

In areas managed as ROW exclusion, the BLM would prohibit all development of ROWs, with some exceptions provided; in areas managed as ROW avoidance, the BLM would consider allowing ROWs on a case-by-case basis. This flexibility may be advantageous where federal and private landownership areas are mixed and exclusion areas may result in more widespread development on private lands if BLM-administered could not be used.

Renewable Energy Management

The type of effects on fish and wildlife species from renewable energy development and associated infrastructure (including construction and operation of distribution and transmission lines, substations, and access roads) would largely be similar to the type of effects resulting from ROW management, including habitat removal, alteration, or fragmentation, and direct injury or mortality, disturbance, and displacement. The development of wind energy could cause habitat loss and fragmentation, and both short- and long-term impacts to wildlife habitat. Disturbances during installation of towers, roads, and infrastructure could force wildlife away from preferred habitat. Some smaller prey species will avoid and abandon areas where overhead structures such as power lines and towers are present due to the increased risk of avian predators. Construction of wind turbines throughout the planning area create collision hazards for raptors, bats, and multiple avian species. Studies have documented deaths of avian and bat species from wind turbines, although the levels of collision and death vary in the scientific research (Cohn 2008; Madders and Whitfield 2006; Frick et al. 2017). Specific wildlife impacts from wind energy development have been shown for some big game species. Mule deer are displaced from suitable habitat by human activity related to the development and operation of gas wells in western Wyoming (Sawyer et al. 2006). Recent study regarding interactions of a transplanted elk population with an operating wind facility in Oklahoma found no evidence that turbines had a significant impact on elk use of the surrounding area (Walter et al. 2006). Similarly, Johnson et al. (2000) found no effect on pronghorn use of the Phase I and II Foote Creek Rim project in Wyoming.

Solar-specific impacts would be similar to wind disturbances during development that would lead to habitat removal, alteration, fragmentation, and collision risks. Wildlife, such as small mammals, big game, reptiles, and amphibians, would be more vulnerable to habitat fragmentation due to the large geographic range (DOE 2021). Additionally, the risk for collision would increase for avian species that migrate, nest, or forage in or around solar developments if they are attracted to the solar panels as they resemble large bodies of water.

Livestock Grazing Management

The direct and indirect impacts of livestock grazing on plants, as described in **Section 4.3**, Vegetation, can have indirect impacts on insect pollinators, particularly bees. Trampling can also have negative impacts on pollinator nesting sites, destroying active nests and causing soil compaction which can prevent new nest construction. Livestock may also trample nests of ground-nesting birds.

While limited, improper grazing management can lead to loss of vegetation cover, reduced nesting habitat quality (for ground-nesting species), reduced forage availability, reduced water infiltration rates due to soil compaction, change in vegetation composition, decreased plant litter, increased bare ground, reduced nutrient cycling, decreased water quality, increased soil erosion, and reduced overall habitat quality for wildlife (Manier et al. 2013). Grazing may contribute to the spread of nonnative, invasive plants and noxious weeds in sagebrush ecosystems by reducing cover of native bunchgrass (Reisner et al. 2013). It may increase desertification or worsen the impacts of climate change on rangeland (Beschta et al. 2014). Properly managed grazing may be compatible with wildlife habitat, does not preclude healthy rangelands, and may reduce wildfire in sagebrush ecosystems by reducing fuel loads in certain circumstances (Strand and Launchbaugh 2013; Svejcar et al. 2014; NTT 2011). As described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of adverse effects.

Structural range improvements, such as fences (especially woven-wire fences) represent potential wildlife movement barriers and predator perches, restricting movement and increasing predation pressure (Coates et al. 2016). Additional range improvements for water availability would place troughs that can create drowning risks for wildlife if not properly constructed with adequate escape ramps and maintained. Generalist predators can be abundant in anthropogenic-influenced areas, including areas developed for minerals management, livestock grazing, and other uses, where they can reduce prey populations. Common ravens (*Corvus corax*) prey on eggs and young of numerous other wildlife species, including GRSG. Ravens have been documented to prey on other special status species in the western US, including desert tortoises (*Gopherus agassizii*; Boarman 1992), least terns (*Sterna antililarum*; Avery et al. 1995), and western snowy plovers (*Charadrius alexandrines nivosus*; Strong et al. 2021).

Wild Horse and Burro Management

Wild horses and burros may alter habitat conditions for fish and wildlife species, including reduced total vegetation and grass abundance and cover, lowered sagebrush canopy cover, increased shrub canopy fragmentation, lowered species richness, increased compaction in surface soil horizons, and increased dominance of unpalatable forbs (Manier et al. 2013). Wild horses and burros also have direct impacts on wildlife and compete for forage and water as they have been documented aggressively defending water sources from native ungulates (Perry et al. 2015). In addition, herd populations over AML can degrade riparian areas, decrease water quantity and quality, and increase soil erosion. These effects can reduce habitat quality for fish and wildlife species. Effects on habitats may also be more pronounced during periods of drought or vegetation stress (NTT 2011).

Fences used to manage livestock distribution represent a potential source of movement barriers and increased predation, as described in *Livestock Grazing*, above. In addition, water must be available year-round in Herd Management Areas and wild horse territories, in compliance with the Wild and Free-Roaming Horses and Burros Act of 1971. This can lead to riparian areas receiving year-long use by wild horses and could modify riparian areas with additional fencing and troughs to accommodate year-long wild horse use. The range improvements would increase potential perch sites for avian predators and increase potential drowning hazards (water troughs). Man-made water sources of water may also increase the risk of West Nile virus in GRSG (Naugle et al. 2004). Moreover, there would be less water available for fish and wildlife in these areas. Conversely, range improvements are typically developed consistent with program guidance such as bird ladders to reduce drownings, maintain adequate water flow to maintain the spring source (BLM 2014).

Predation Management

Predation management would have similar effects as those described in **Section 4.2** for GRSG and would ultimately benefit wildlife species that overlap with GRSG habitats because there would be less predation pressure in these areas. Conversely, predator management may also adversely affect predatory wildlife populations that are the source of threats to GRSG.

ACEC Designation

ACECS are special management areas that are designed to protect important values such as fish and wildlife resources and habitat through restrictions on uses and surface disturbing activities. Management of the ACEC is designed to focus on the resource or natural hazard of concern, however this differs from area to area. Currently there are existing ACECs in Oregon that include GRSG as an important value (See **Section 4.11.1**, *ACECs and Research Natural Areas).* There is also considerable overlap of existing ACECs and GRSG habitat, which provides secondary protection for GRSG as well as other wildlife species. ACEC designation may be a useful tool for the BLM to effectively manage habitat not only for GRSG but for other wildlife species by restricting land use operation and disturbances in these areas.

4.5.2 Alternative 1

Under Alternative 1, lands would be managed to conserve, enhance, and restore sagebrush ecosystems. By separating GRSG habitat into SFAs, PHMAs, IHMAs, and GHMAs, management actions would then be applied within identified designations, as well as in certain areas outside of PHMA, IHMA, and GHMA, including vegetation objectives to achieve improvements in GRSG habitat. SFA designations would have the most restrictions, and therefore the most protection for wildlife species that occupy these habitat types.

In most of the planning area, priority will continue to be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs, or within the least impactful areas within PHMA, IHMA, and GHMA if avoidance is not possible. Applying a disturbance cap can help reduce effects to wildlife within the areas, as well as applying seasonal restriction when wildlife species are more vulnerable to disturbance. Impacts on wildlife species from mineral development would be as described under *Nature and Types of Effects*. Allowing exceptions to lease stipulations, COAs, and terms and conditions to be considered on a case-by-case basis during restricted time periods could lead to additional surface disturbing activities and functional habitat loss.It is unknown, however, what type or degree of exceptions would occur, because the outcome is dependent on each lease and the habitat where the lease is being developed.

Fluid Minerals Management

Under Alternative 1, restrictions on fluid mineral leasing, application of the disturbance cap, and use of conservation measures would reduce the extent of direct habitat loss for terrestrial wildlife species whose ranges overlap PHMA. However, scale of disturbance (both direct and indirect) would depend on lease size and configuration. In instances where several small leases occur entirely within PHMA or the 4-mile lek perimeter, pad and road development may have substantial impacts on wildlife species. Excluding or reducing surface-disturbing activities in PHMA would shift development into other areas and may influence those species that use non-sagebrush communities for nesting, cover, and forage.

Under this alternative, NSO and CSU stipulations would be applied to protect GRSG, which would further reduce wildlife habitat loss and degradation caused by fluid mineral development. While GHMA would be available for fluid minerals leasing and other types of minerals and energy development, such activities would be subject to conservation measures (i.e., net conservation gain, lek buffers, and RDFs). This would generally have a local protective impact on some wildlife in those areas.

The primary impacts on wildlife species (especially big game) from minerals development within the planning area would be the reduction in usable wildlife habitat and disruption of migration corridors that link crucial habitats (winter range) and parturition areas. Reductions would be particularly severe in areas with continuous surface disturbance. As discussed by Bartmann et al. (1992), crowding of animals may have a density-dependent impact of reducing animal survival and damaging resources. Human disturbance of big game results in increased energy costs (Bromley 1985) and disturbed big game animals incur a physiological cost, either through excitement (preparation for exertion) or locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to poorer (lower) quality habitat. If the disturbance becomes chronic or continuous, these costs can result in reduced animal fitness and reproductive potential (Geist 1978). Additionally, a fleeing or displaced animal is also more visible to predators and at a higher risk for predation. Displacement of fluid mineral development outside of suitable GRSG habitats could negatively affect raptors and migratory birds that commonly nest in pinyon-juniper and other treed areas. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying capacity for local raptor and migratory bird populations.

Salable Mineral Management

All salable mineral pits located in PHMA that are no longer in use would be restored to meet GRSG habitat conservation objectives. As such, this alternative would benefit those wildlife species whose ranges and habitats are coincident with PHMA. Surface-disturbing activities from salable minerals development would be relocated outside of PHMA. This would result in habitat loss or modification of other vegetation types (mountain shrub and pinyon-juniper), with negative impacts on those wildlife species associated with non-sagebrush communities.

Nonenergy Leasable Minerals

Under Alternative 1, no new nonenergy mineral leasing would be allowed in PHMA and existing mines would not be permitted to expand. RDFs would be applied for solution mining wells in PHMA. By reducing the amount of direct habitat loss, this alternative would retain habitat for terrestrial wildlife species whose ranges or habitats are coincident with PHMA.

Locatable Minerals Management

SFAs were recommended for withdrawal from the Mining Law of 1872, as amended. Such a withdrawal, if it occurs, would close the SFA to location and entry under the Mining Law of 1872, subject to valid existing rights. The BLM would request that operators include appropriate mitigation and applicable seasonal restrictions in plans of operation which would reduce impacts on fish and wildlife.

Lands and Realty Management

Under Alternative 1, PHMA in CO, NV/CA, ID, and OR would be managed as an avoidance area. ROW projects would be allowed in PHMA if the project would not adversely affect GRSG populations. GHMA would also be managed as avoidance for ROWs. Additionally, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. As a result protections would be greater under this alternative for those species that overlap all GRSG habitat. Both PHMA and GHMA would be managed as avoidance for large transmission lines, except for several ongoing projects.

Alternative 1 in UT would provide management flexibility in developing infrastructure, focusing on GRSG habitat. PHMA would be ROW avoidance for new linear and site type ROWs, permits, and leases; high voltage transmission lines ROWs (100 kV or greater); major pipelines; and communication sites. Additional protection would be provided by managing PHMA and GHMA as ROW exclusions areas for solar energy development and PHMA as ROW exclusion areas for wind energy development. RDFs would be applied to further reduce impacts. Ensuring a net conservation gain to GRSG under the regional mitigation strategy may require projects to avoid, minimize, or compensate for their potential impacts on GRSG, which could reduce the loss or disturbance of habitat from specific projects. Offsite mitigation may not always benefit species impacted at the disturbed site. Therefore, there could be a local impact on certain species.

In WY there would be an increase in ROW avoidance areas that could reduce ROW construction activities and related impacts to wildlife habitat. Existing ROWs would be used whenever possible for placement of new linear facilities, which would minimize overall habitat loss and fragmentation. Exceptions could occur, and in those cases disturbance is to be limited and mitigated. New projects would have seasonal stipulations that would help prevent disturbance to wildlife species during those timeframes. Management for construction would consider impacts to GRSG populations and be designed to minimize impacts through project design and mitigation. The considerations could reduce the impacts from disturbance and habitat loss for other wildlife species. Requiring raptor perching deterrents could reduce the effects to prey species from hunting by predatory bird species; however, predatory birds would not benefit from hunting perches.

Under Alternative 1, a 3% disturbance cap (5% on lands in WY and MT which would include fire, agriculture, and urban development [MT only]) on discrete anthropogenic disturbances would be applied in PHMA and IHMA in ID, at both the BSU and project levels. Additionally, a limit would be placed on the density of energy and mining facilities, which would reduce impacts on wildlife habitat caused by such disturbances. Including transmission lines outside of transmission corridors in the 5% disturbance calculation could reduce wildlife habitat loss and reduce disruptions in habitat connectivity. Disturbance and development can create travel or migration barriers which can alter distribution patterns, increasing stress and energy loss and fitness in wildlife species.

Renewable Energy Management

Under Alternative 1, renewable energy development would be permitted in some states. As a result, sagebrush associated wildlife species would experience reduced potential for disturbance, habitat alterations, and habitat fragmentation as described *in Nature and Types of Effects*. Within exclusion areas, direct impacts would be eliminated on wildlife species, but development in avoidance areas would have more effects on wildlife as some development would occur on a case-by-case basis. Impacts include altered habitat, habitat fragmentation, and noise associated with development. Additionally, the potential exists for both solar and wind facilities to cause direct mortality of some wildlife, particularly birds and bats (Frick et al. 2015; DOE 2021).

Mitigation and Adaptive Management

Under Alternative 1, anthropogenic disturbances in PHMA, IHMA, and GHMA would be mitigated to ensure a net conservation gain to GRSG, which would also maintain habitat for other wildlife species that use GRSG habitat. Conservation measures would be imposed to complement mitigation and further reduce anthropogenic disturbance in PHMA and GHMA, including RDFs and lek buffers.

Application of Habitat Objectives

The habitat objectives would identify the desired outcome for habitat on BLM-administered lands in all GRSG HMAs. Some wildlife species that co-exist in sagebrush communities with GRSG and which have similar habitat requirements would benefit most from the desired habitat conditions. These include management of activities to support suitable GRSG habitat at multiple scales, supporting connected mosaics of sagebrush to provide seasonal habitats and dispersal. The specific tables identifying indicators and benchmarks supported by various scientific publications throughout the range would be retained in the monitoring appendix as a tool through which suitability is informed.

Livestock Grazing Management

Under this alternative, site-specific reviews during grazing permit renewals could allow for adjustments to the number of AUMs on federal lands. Within SFAs prioritization of grazing permit/lease review not meeting Land Health Standards, with a focus on those containing riparian and wet meadow vegetation would improve riparian and wet meadow vegetation. This action would also protect wildlife, for which riparian and wet meadow habitats provide important habitat.

Adjustments in grazing use or management of BLM-administered lands to meet Standards for Rangelands Health could also result in actions that would balance the impacts of grazing while sustaining wildlife species and their habitat. Adjusting grazing management because of monitoring could provide overall improvements in landscape health, prevent or reduce the spread of invasive, nonnative plant species, provide additional forage, and allow for greater cover habitat for wildlife.

Wild Horse and Burro Management

Alternative 1 would place some restrictions on the management of wild horses and burros, however the BLM would consider all resource values in conjunction with GRSG when managing wild horses. These management strategies would benefit wildlife species whose ranges overlap herd management areas within PHMA or GHMA.

ACEC Designation

Alternative 1 does not include management for ACECs.

4.5.3 Alternative 2

Habitat Management Area Alignments

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA (**Table 2-3**) would be similar to those described for Alternative 1. However, some SFAs would be removed in states as described under state impacts. Impacts from language to maintain and enhance sagebrush habitats would be the same as described for Alternative 1.

Removal of GHMA in UT and associated management may reduce some indirect protection for all wildlife species, including crucial habitat for big game species that rely on the area for wintering and fawning/calving within mapped GHMA. Impacts on big game are considered negligible because big game uses a variety of habitat types beyond sagebrush. Additionally, GHMA is not the only management for these areas but is merely complimentary to management of habitat under applicable RMPs and according to BLM Land Health Standards. Removing GHMA minimization measures that, as noted above would not preclude development, would not likely result in additional impacts that are not already addressed by management of crucial habitats in existing land use plans.

The offsite mitigation in PHMA to replace impacted habitat in occupied GRSG habitat outside of PHMA may not always benefit the same other wildlife species that were impacted at the disturbed site. While it could lead to a local improvement for species in treated areas, especially those that rely on sagebrush habitats, it could also result in an unmitigated loss in the quantity and quality of habitat at the location of the impact. As the amount of development increases in the GRSG habitat outside PHMA, the impact from disturbances mitigated in PHMA would mount and could affect the use patterns of wildlife in those areas.

Fluid Minerals Management

Impacts on fish and wildlife species from the leasing objective would be similar to Alternative 1, except it would not be relevant in UT or NV/CA. In WY, leasing would be allowed in PHMA, which would increase the potential for impacts on wildlife species that occupy PHMA and surrounding habitat. Impacts from fluid mineral development is discussed under *Nature and Types of Effects*.

Impacts on fish and wildlife species from WEMs would be similar to Alternative 1, except that they would no longer be applied in NV/CA and UT. Allowing placement of developments in non-habitat portions of PHMA may increase impacts on certain wildlife and migratory birds whose habitat requirements do not overlap sagebrush areas. Adjacent non-sagebrush habitats could see an increase in development and disturbance when trying to avoid and minimize disturbance to sagebrush communities.

Salable Mineral Management, Nonenergy Leasable Minerals, and Locatable Minerals

Impacts on wildlife species would be the same as Alternative 1, except PHMA in ID allows consideration of new free use permits and NV/CA added exception criteria to the closure. Increased potential for related impacts as outlined in *Nature and Types of Effects* would result from providing consideration of new free use permits for salable minerals in ID IHMA and adding an exemption criterion to salable and non-energy mineral closures for NV/CA PHMA. This is because there would be a higher likelihood of salable and/or non-energy mineral activities taking place in these areas. Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. This is because a recommendation to withdraw lands under the Mining Law of 1872 has no impact. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Lands and Realty

Under Alternative 2, impacts from ROWs on wildlife species would be the same as Alternative 1, with additional exception criteria added in Nevada. Alternative 2 proposes to remove the requirement to consider burying transmission lines (except when not technically feasible) and allow increased flexibility to consider site-specific impacts and minimization options. This action could lead wildlife such migratory birds, small mammals, and reptiles by increasing predator perches from unburied lines that may lead to increased take of migratory birds and their nests by raptors and corvids; however, impacts of predator perches could be minimized on a site-scale by use of perch deterrents on poles. Additionally, Alternative 2 would result in more aboveground power lines that increases the risk of birds and bat collisions (Frick et al. 2017). There could be beneficial impacts on big game and migratory bird habitat by not burying transmission lines because it offers more protection for sensitive habitat areas. Removal of sagebrush and associated vegetation can be avoided with placement of surface lines, which minimizes habitat disturbance and potential for weeds.

In addition, there would be a 3% disturbance cap, not including wildfire or agriculture for CO, ID, NV/CA, OR, UT, and the Dakotas. In UT the cap may be exceeded if it will benefit GRSG. The 3% cap may be exceeded at either scale if a technical team determines that site specific GRSG habitat and population information, combined with project design elements indicates the project will improve the condition of GRSG habitat within the proposed project analysis area or within the PHMA in the population area where the project is located. Factors considered by the team will include GRSG abundance and trends, movement patterns, habitat amount and quality, extent and alignment of project disturbance, location and density of existing disturbance, project design options and other biological factors. Such exceptions to the 3% disturbance cap may only be approved by the BLM Authorized Officer with the concurrence of the State Director. The finding and recommendation shall be made by the technical team, which should consist of, at least, a BLM field biologist, other local GRSG experts, and biologists and other representatives from the appropriate State of Utah agency.

Allowing exceedances to the disturbance and density caps in PHMA could affect wildlife by a reduced level of protection for habitat from disturbance. These disturbance impacts may increase by allowing exceptions to the disturbance cap, especially within areas of non-sagebrush, therefore impacting wildlife species that use these other habitat types (e.g., pinyon-juniper woodlands and pinyon jays); however, exceptions to the disturbance and density cap may also benefit some wildlife species with habitats that overlap with GRSG. This would come about by improving habitat conditions through the increased potential for voluntary vegetation treatments.

Renewable Energy Management

Impacts from renewable energy would be similar under Alternative 1. However, in Nevada, PHMA would have additional exception criteria added. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development. These impacts are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Maintaining a mitigation strategy in PHMA that leads to a planning area-wide improvement of GRSG habitat would include management for vegetation communities. Generally, these areas include habitats that are dominated by grasses and shrubs than by trees. However, the removal of trees such as pinyon and juniper are included in some habitat management strategies. While each individual project proponent would no longer be required to increase habitat to obtain an authorization for use of public lands, the effects of habitat improvements that were described in the 2015 Final EIS would continue to be achieved: namely, increasing the quantity and quality of sage-steppe vegetation communities in early- to mid-seral condition. Additionally, the effects of habitat improvements would still occur where voluntary mitigation occurs. This would increase habitats for wildlife species with habitats that overlap that of GRSG; however, it would also generally decrease habitat availability for wildlife species or seasonal habitats of species that are not sage dependent.

Application of Habitat Objectives

Impacts from habitat objectives would be the same as for Alternative 1.

Livestock Grazing Management

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, except for in the states described below. In UT, WY, and NV/CA, the prioritization for review and processing of grazing permits was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Impacts on wildlife species would be the same as Alternative 1.

ACEC Designation

Impacts would be the same as described under Alternative 1.

4.5.4 Alternative 3

Habitat Management Area Alignments

Managing the largest area as PHMA would minimize potential impacts on wildlife species that occupy previously designated GHMA as there would be more restrictions in the areas. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would also decrease potential for disturbance to sagebrush associated wildlife species and habitat alterations because management restrictions associated with PHMA would occur over a larger area.

Minerals Management

Closing PHMA in all states to fluid mineral leasing, salable minerals, and non-energy minerals would reduce potential impacts to wildlife that occupy GRSG range, such as disturbance and habitat alterations. The type of impacts associated with mineral development are described in detail under *Nature and Types of Effects*. Compared to the other Alternatives 1 and 2, the impacts would be lessened. This is because areas closed to leasing would not be developed and there would be a decrease of HMA acres that would be subjected to effects from mineral development. Closing PHMA to mineral leasing and development would protect habitat for wildlife in these areas from surface-disturbing activities as well as subsurface activities (e.g., directional drilling), maintain connectivity between leks and big game habitat, and not contribute to fragmentation. Sagebrush associated wildlife would not be exposed to disruption that is often associated with the noise and human activity that accompanies construction, development, or production activities in PHMA. However, restrictions to development on BLM lands might push development onto private land, which could result in indirect as described under *Nature and Types of Effects*.

Recommending PHMA for withdrawal from location and entry under the United States mining laws would have no impact. However, if the BLM were to apply for a withdrawal pursuant to section 204 of FLPMA and the Secretary were to accept the application, the BLM could initiate the process to consider withdrawing PHMA from location and entry under the Mining Law of 1872. Such a withdrawal would reduce potential impacts to wildlife associated with GRSG range and habitat associated with locatable minerals as described under *Nature and Types of Effects*. This is because surface disturbance associated with location and entry would be less likely to occur in withdrawn areas because only claimants who demonstrate a valid existing right would be able to proceed.

Excluding or reducing surface-disturbing activities in PHMA could shift development into habitats outside of PHMA. This may influence those species that use non-sagebrush communities for nesting, cover, and forage. Of note would be woodland raptors and migratory birds that commonly nest in pinyon-juniper. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying capacity for local raptor and migratory bird. Additional development in habitats outside of PHMA would affect small mammals and big game populations and connectivity between habitats could be reduced by habitat loss and degradation. This would depend largely on the amount and distribution of development.

Lands and Realty

Compared to Alternatives 1 and 2, new infrastructure development would be far more restricted. All PHMA would be excluded from new ROW authorizations. Only new linear ROW would be allowed in designated ROW corridors. The potential impacts on wildlife that occupy PHMA would be decreased because of the exclusion of ROWs. In PHMA, there would be a decreased probability of habitat degradation and fragmentation. However, because ROWs cannot be placed in the PHMA, more lengthy ROW routes may be necessary to go around closed areas. Longer routes could have more negative effects on wildlife species using habitat outside of PHMA because the ROW would be located in PHMA adjacent habitats, non-federal lands, or private lands.

Renewable Energy Management

Under Alternative 3, PHMA in all states would be ROW exclusion areas for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for habitat loss, degradation, fragmentation, direct mortality to birds and bats and direct disturbance to wildlife in PHMA. Alternative 3 would offer more protection from renewable energy development compared to Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions. Impacts from wind and solar developments are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Impacts on wildlife species from mitigation would be similar as described for Alternative 1, because the BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. These requirements would reduce the potential for impacts from land use activities, such as habitat loss or alterations. Maintaining habitat function and value would benefit wildlife species associated with sagebrush habitats.

Application of Habitat Objectives

Impacts from habitat objectives would be similar to those described for Alternative 1. Since the habitat objectives would be modified under this alternative, the species affected may vary slightly.

Livestock Grazing Management

Alternative 3 would make all PHMA unavailable for livestock grazing and therefore would have the fewest direct impacts on terrestrial wildlife. The reduction in herbivory from livestock grazing under this alternative would allow for herbaceous forage and cover for wildlife to increase and would prevent impacts as described under *Nature and Type of Effects*. There would also be less trampling or compacting of vegetation and/or soils, and less competition for forage, water, space, and habitat alteration.

In contrast, livestock grazing may reduce invasive species and noxious weeds or enhance forage and brood-rearing conditions for some wildlife species, so the removal of livestock grazing may increase the risk of invasion of noxious or invasive weeds. Relatedly, without a reduction in fine fuels, there may be an increased risk of large-scale wildfire that would remove wildlife habitat. Additionally, more fencing may be needed to separate PHMA from adjacent non-federal grazed lands, which could increase collision risk, change or prevent movements by some wildlife species, and increase predator perching opportunities for some species.

Wild Horse and Burro Management

Under Alternative 3, wild horses and burros would be removed from herd management areas within PHMA. This would increase habitat quality for wildlife because there would be a reduction in grazing competition, which could result in improvements to vegetation cover, forb abundance, forage for native wildlife, and spring habitat. Where range improvements, such as water troughs are removed, there would be a reduction in potential drowning hazards and/or potential for disease transmission. Additional fencing may also be needed to keep wild horses off BLM-administered HMAs which could increase collision risk, change or prevent movements by some wildlife species, and increase predator perching opportunities for some species.

ACEC Designation

Under Alternative 3, all PHMA would be managed as ACECs. The management of ACECs under this alternative would be the same as for areas managed as PHMA under this alternative and impacts would be as discussed under *Nature and Types of Effects*.

4.5.5 Alternative 4

Habitat Management Area Alignments

Under Alternative 4, PHMA boundaries would be expanded compared with Alternatives 1 and 2 and acres managed as GHMA would decrease (**Table 2-3**). By managing these areas, wildlife species whose range overlaps with GRSG would benefit from management actions to protect GRSG to a greater extent where PHMA and other HMA designations have expanded. Under this alternative, impacts on wildlife would be similar under to those described under alternatives 1 and 2 with a focus on improving GRSG habitat by increasing acres and conditions of vegetation communities, habitat connectivity, mitigation of noxious weeds and/or invasive species, and decrease conifer encroachment.

Minerals Management

Range wide, leasing would be permitted in HMAs, which would increase potential impacts to wildlife in these areas as described in the *Nature and Types of Effects*. The BLM would, however, implement management strategies that would reduce the possibility of conflict and associated consequences from potential development in GRSG habitats or linking regions as described in **Section 4.2.3**. Giving preference to lands that would not obstruct the suitability and proper operation of GRSG habitat, considering their proximity to already-existing development, potential for development, and the presence of significant GRSG habitats or connectivity areas, would minimize potential impacts to wildlife species that overlap GRSG habitat. In contrast, this may shift operations to nonfederal lands and impact other wildlife species whose range does not overlap GRSG.

The fluid mineral development and leasing objective would consider leasing in areas where there is the least potential for conflicts with GRSG and its habitat. The avoidance strategy will ensure minimal disturbance on wildlife species that overlap GRSG range. However, impacts may be shifted to non-federal lands which may pose greater impacts for wildlife species that do not overlap with GRSG habitat. Those impacts are discussed under *Nature and Types of Effects*.

Other impacts from minerals management would be similar to those described for Alternative 1.

Lands and Realty

Under Alternative 4, in all states managing PHMA (IHMA in ID) as ROW avoidance areas would be similar to Alternative 1. In areas where development cannot be avoided, there would be additional protection by avoiding important GRSG habitat such as leks and nesting/early brood-rearing habitat. This would reduce impacts on wildlife species who also utilize high value GRSG habitat, however, this may shift impacts to other potentially important wildlife habitat that doesn't overlap with GRSG. Impacts on wildlife species are described in *Nature and Types of Effects*.

GHMA would also be managed as ROW avoidance areas within breeding and nesting habitats, along with other limited seasonal use habitats. Avoiding placement of ROWs within one-half mile of PHMA or IHMA would help protect or buffer those areas from indirect impacts. Because all other areas would be managed as ROW open, impacts, such as habitat alteration and disturbance, could occur, however, compensation would be required (see Alternatives). Similar to impacts from PHMA management described above, potential for impacts on wildlife whose range overlaps with GRSG habitats would be reduced, while other wildlife species whose range is outside of GRSG habitat may have increased potential for impacts. Those impacts are described in *Nature and Types of Effects*.

Since HMAs would be extended to additional regions based on best available science, restrictions inside HMAs would lessen impacts on wildlife species whose range overlaps with GRSG, as discussed under *Nature and Types of Effects*. Alternative 4 would have restrictions on disturbance caps between states that would decrease surface disturbances impacting wildlife habitat and improve protection for GRSG habitat within new HMA boundaries.

Renewable Energy Management

Under Alternative 4, wind and solar development would be managed by HMA, and proximity to lek locations, similar to Alternative 3. Management stipulations for PHMA would be exclusion for utility scale wind and solar development. For IHMA exclusion would be within 3.1 miles of active lek locations and avoidance strategies for the remainder. All GHMA would be managed as avoidance. Within the exclusion areas impacts on wildlife that overlap GRSG habitat would be reduced as development would not be permitted. As a result, development would likely shift to areas outside of GRSG habitat, causing direct impacts on wildlife species whose range does not overlap with GRSG. Those impacts are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Impacts under this alternative would likely be higher than Alternative 3 because more projects would take place if PHMA, IHMA, and GHMA were not closed to new projects. There would also be the addition of required compensatory mitigation that would meet the requirements set by the state wildlife agency or appropriate authority (See alternatives). Depending on GRSG population triggers there may be additional mitigation in some areas, and the BLM would coordinate with state wildlife management agencies to consider project activities, direct and indirect impacts, and restoration success rate. Impacts on wildlife would potentially be minimized depending on GRSG population triggers in the area and the overlap of wildlife habitat with GRSG habitat. On the contrary, management actions may be shifted to non-federal lands or other wildlife habitat where development and disturbance may occur. These impacts are discussed under *Nature and Types of Effects*.

Application of Habitat Objectives

Impacts on wildlife from application of habitat objectives under this alternative would be the same as Alternative 3.

Livestock Grazing Management

Impacts on wildlife would be similar to those described under Alternative 1. However, because SFAs would not be managed, Alternative 4 does not include a programmatic prioritization strategy. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value. In addition, the BLM would include additional management objectives and actions that give GRSG and GRSG habitat further protection from livestock grazing impacts. Some of these management objectives and actions include site-specific adjustments to AUMs, flexibility to adjust permits, and meeting land health conditions. These added management objectives and actions would potentially reduce impacts to other wildlife species that overlap GRSG range. The impacts are further discussed under *Nature and Types of Effects*.

Wild Horse and Burro Management

Impacts on wildlife from wild horse and burro management would be the same as described for Alternative 1.

ACEC Designation

Alternative 4 does not include management for ACECs and thus there would be no effects on fish and wildlife from ACEC management under this alternative.

4.5.6 Alternative 5

Impacts on fish and wildlife from fluid, salable, nonenergy leasable, and locatable minerals management would be the same as described for Alternative 2. Impacts from application of habitat objectives and minimizing threats from predation would be the same as described for Alternative 3. Impacts from the fluid mineral development and leasing objectives, mitigation, adaptive management, and grazing would be the same as described for Alternative 4.

Habitat Management Area Alignments

Under Alternative 5, the BLM would manage protections in more PHMA and less GHMA compared with Alternatives 1 and 2. This would lead to increased protection for other wildlife whose ranges overlap with PHMA but less protection for those whose ranges overlap with GHMA.

Lands and Realty

Impacts under this alternative would be similar to those described under Alternative 4 in comparison to the management of PHMA and IHMA in ID as ROW avoidance areas with the application of minimization measures in areas where major ROWs cannot be avoided.

Renewable Energy Management

Under this alternative, PHMA and IHMA would be classified as avoidance areas. This would minimize the potential impacts from wind and solar development, but to a lesser degree than exclusion areas because development would be considered on a case-by-case basis, whereas development would be prohibited in exclusion areas. Impacts from wind and solar development are described under *Nature and Types of Effects*.

In high value GRSG habitat such as leks and nesting/early brood-rearing habitat, development would not be permitted, therefore impacts to other wildlife species in these areas would be negligible unless certain criteria are met (nonhabitat/unsuitable habitat or the project prevents indirect impacts).

Managing GHMAs as open to wind and solar energy development range wide would result in potential for impacts on wildlife species as described in *Nature and Types of Effects*. However, the inclusion of minimization measures and compensation to maintain GRSG habitats consistent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for those impacts on wildlife in high value and seasonal GRSG habitats.

Under this alternative, a 3% disturbance cap would be applied range wide at the fine scale, similar to Alternative 4, however, there would be a 5% disturbance cap for the project scale in MT and WY (which would include fire, agriculture, and urban development (MT only)). Impacts on wildlife species under this alternative would be similar as described under Alternative 4 but with more exceptions which would potentially result in more development and disturbance in GRSG habitat.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce impacts from wild horses and burros on fish and wildlife in some areas.

4.5.7 Alternative 6

Impacts would be the same as described for Alternative 5 but with the additional designation of ACECs. The acres of ACECs would be the same as in Alternative 3, but management within ACECs would differ as described below.

Under this alternative, ACECs would be open to fluid mineral leasing with NSO stipulations. These stipulations would minimize impacts on wildlife in these areas, however, this would increase the HMA acres that are potentially at risk to effects from mineral development that are discussed in *Nature and Types of Effects*. While limiting surface disturbance would ensure habitat connectivity between lek locations, this would benefit other wildlife that utilize sagebrush habitat in these areas. On the contrary, this may push surface disturbance into other important wildlife habitats that do not overlap with GRSG habitat.

Managing ACECs and salable mineral/mineral material operations as closed to new or expansion of non-energy minerals associated with existing operations (e.g., fringe leases) would reduce potential impacts on wildlife species and habitat. Management of these resources would reduce potential impacts on wildlife and habitat such as disturbance and habitat degradation or alteration which is discussed in *Nature and Types of Effects*. However, salable mineral/mineral material operations would not close all free-use pits and would have more impacts than if not permitted.

Management of ACECs as exclusion areas for major ROWs and wind and solar development and avoidance areas for minor ROWs would reduce potential impacts on wildlife and associated sagebrush habitat, such as disturbance, habitat alterations, and increased potential for predation, as described under *Nature and Types of Effects*. While ROWs would not be permitted in exclusion areas, they would be evaluated on a case-by-case basis in avoidance areas, therefore impacts would be reduced to a greater extent in exclusion areas compared to avoidance areas.

4.6 Special Status Species

4.6.1 Nature and Type of Effects

The nature and type of effects on special status fish and wildlife species would be similar to those described for fish and wildlife species in **Section 4.5.3**. Effects on special status plants would be similar to those described for vegetation in **Section 4.3.3**. However, impacts on special status species may be greater than impacts on common species because population viability is already uncertain for special status species.

4.6.2 Effects Analysis

In general, impacts on special status fish and wildlife species would be similar to those discussed under **Section 4.5**, Fish and Wildlife, and **Section 4.2**, Greater Sage-Grouse, while impacts on special status plant species would be similar to those discussed under **Section 4.3**, Vegetation. A detailed analysis of impacts on federally listed and proposed species and designated and proposed critical habitat will be prepared in the biological assessment for this RMPA/EIS. The biological assessment is under development and will be included with the Final RMPA/EIS.

Those species more closely associated with sagebrush communities or whose ranges are largely coincident with PHMA and GHMA (e.g., Brewer's sparrow and to a lesser extent white-tailed prairie dog, black-footed ferret, pygmy rabbit, western burrowing owl, ferruginous hawk, Holmgren lupine, Beatley's buckwheat, and squalid milkvetch) would benefit from conservation measures designed to protect GRSG and sagebrush habitat.

Conversely, excluding or avoiding development in GRSG habitats most likely outside of PHMA and IHMA, in GHMA inclusions, may lead to increased activity in other vegetation types (e.g., pinyon-juniper, mountain shrub, and aspen/spruce/fir). Special status species associated with these habitat types, such as pinyon jay, northern goshawk, BLM-sensitive bat species, Canada lynx, Columbian sharp-tailed grouse, sand cholla, Reese River phacelia, and Eastwood milkweed, may be adversely influenced to varying degrees, depending on alternative and development scenarios.

4.7 Wild Horses and Burros

4.7.1 Nature and Type of Effects

Impacts under all alternatives would be limited to any future changes that may result in AML and/or acreage adjustment as well as reconsideration of herd management area designations that are based on achievement of GRSG habitat objectives for improving GRSG habitat conditions. Similar to livestock grazing, wild horse and burro grazing has similar impacts in terms of their effect on soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems. The impacts from wild horse and burro management on these resources are discussed in their respective sections.

Most herd management areas contain GRSG habitat in a sagebrush vegetation community. Overall management direction is to manage for healthy populations of wild horses and burros to achieve a thriving natural ecological balance with respect to wildlife, livestock use, and other multiple uses. All herd management areas are managed to achieve and maintain the AML. Initially, the AML for herd management areas are established in RMPs at the outset of planning and adjusted based on monitoring data throughout the life of the RMP. Priorities for gathering excess wild horses and burros to achieve and maintain AML are based on population inventories, resource monitoring objectives, gather schedules, holding space availability, and budget. Gathers can be conducted in emergency situations when the health of the population is at risk due to lack of forage or water. In some situations, wildfire may be considered as reasoning for an emergency gather. Across all alternatives, use of contraceptives and other population growth suppression to manage wild horse and burro numbers would be implemented to assist in the achievement and maintenance of AML.

Implementing management for the protection of GRSG generally involves reducing or otherwise restricting land uses and activities to levels that are more consistent with the protection of GRSG and their habitat. Ground disturbing activities such as mineral extraction, recreation, or construction activities in ROWs all may remove vegetation and thus reduce forage availability, reduce the ability of wild horses and burros to move freely across herd management areas, or cause general disturbance of an individual band of wild horses or burros (refer to **Table 3-6**). **Table 3-6** displays the total number of herd management areas, and their associated AMLs, that overlap with GRSG HMAs. Protecting areas from surface disturbing activities for the purpose of protecting GRSG would also protect forage for wild horses and burros and limit conflicts with humans or surface disturbance. These land uses and activities typically reduce forage and water availability or otherwise unintentionally disturb wild horse and burro populations, which may necessitate the need to adjust the established AML to meet GRSG habitat objectives.

Impacts on wild horses and burros and the ability of herd management areas to support AMLs may occur within herd management areas where management options are restricted for the protection of GRSG. Impacts from range improvement restrictions would generally vary based on type of range improvement affected; restrictions on fences would improve wild horse and burro habitat by allowing free range, while limitations on projects that could enhance forage and water availability would not help to support the established AML. For instance, herd management area within the planning area may not have open water, and thus wild horses and burros are supported exclusively through water developments.

4.7.2 Alternative 1

Alternative 1 would require a 3% disturbance cap on human surface-disturbing activities in PHMA. It would incorporate RDFs consistent with applicable law in PHMA, GHMA, and IHMA and would also require all human disturbances to result in a net conservation gain for GRSG and their habitat. Lek buffers would also be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, could exclude infrastructure placement in the most cost-effective locations, and would result in overall greater development costs. A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA.

Protections afforded to GRSG and their PHMA or GHMA habitats would benefit wild horses and burros where herd management areas overlap these areas. This is because habitat conditions and forage would be improved, there would be less impact from human disturbances, and wildfire would be strategically managed in habitats. However, temporary or long-term management changes to wild horses and burros may be necessary to achieve and maintain the desired habitat condition. Examples are reducing AMLs, designations, removals, movement patterns, and forage access. Alternative 1 would require more intensive management, particularly in the boundaries of SFAs.

4.7.3 Alternative 2

Alternative 2 would remove references to management within SFAs in some states and remove reference to GHMA in Utah. Because management is more restrictive on lands within SFAs to emphasize protection of GRSG, management for SFAs provides the highest level of protection to forage. Without these protections, there could be additional surface disturbance, and thus removal of forage as described in the *Nature and Type of Effects*. Removal of SFAs would increase impacts on wild horses and burros when compared with Alternative 1. Impacts on wild horses and burros, herd management areas, and AML under Alternative 2 within PHMAs would be the same as those described under Alternative 1.

4.7.4 Alternative 3

Under Alternative 3, no new designation of herd management areas would occur in any herd areas that overlap with PHMA unless the area outside of the PHMA boundary could still support a herd management area. All wild horses and burros would be removed from existing PHMA, which would result in short-term disturbance of herds by human presence and round up activities. Round ups would occur based on congressional funding for these actions, therefore the exact timeline is unknown. However, in the long-term, all wild horses and burros would be removed from PHMA and moved to holding facilities per wild horse and burro herd-removal guidelines under Public Law 92-195 as amended and 43 CFR Part 4700. Acres of herd management areas in PHMA under Alternative 3 are shown in **Table 4-4**.

Wild horses and burros outside of herd management areas in PHMA but in adjacent lands could be impacted by changes in management within the herd management area. Because herd management areas would no longer be managed for AML under this alternative, there is potential for removal of resources, primarily water developments. Additionally, under Alternative 3, livestock grazing would become unavailable within PHMA, and thus range and water improvements may be removed or reclaimed, which would decrease the availability of developed water sources, as described in the *Nature and Type of Effects* section.

4.7.5 Alternative 4

Impacts on wild horses and burros under Alternative 4 would be similar to those under Alternative 1, with additional management direction to remove reference to SFAs.

4.7.6 Alternative 5

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce wild horse and burro populations in some areas.

4.7.7 Alternative 6

Under Alternative 6, the BLM would additionally manage ACECs. These ACEC would cover the same areas as under Alternative 3, however management would include restrictions on fluid minerals, non-energy minerals, major ROWs, wind, and solar developments. As a result, ACEC management would provide further protection to forage for wild horses and burros from surface disturbing activities outside of the HMA, as described under *Nature and Types of* Effects.

4.8 LIVESTOCK GRAZING

4.8.1 Nature and Type of Effects

Impacts on livestock grazing are generally the result of activities that affect forage levels, areas available for grazing, the class or kind of livestock, the timing of use, the interval between grazing periods, intensity of grazing, placement and management of range improvements, and livestock handling techniques in grazing allotments.

Greater Sage-Grouse Management

Protecting GRSG habitat can directly affect livestock grazing if management requires limitations on areas open to grazing or available AUMs, modification of grazing strategies, or limitations on maintenance or construction of range improvements. This could increase time and cost to permittees and lessees or impact the ability of permittees and lessees to fully use permitted AUMs. The impacts of additional direct costs on permittees and operators are analyzed in **Section 4.12**, Social and Economic Conditions.

Minerals Management

Energy and mineral development can directly impact livestock grazing. During the exploration and testing phase of mineral development, the footprint of disturbance is usually small and localized; therefore, minimal acres available for livestock grazing would be directly impacted. However, during the exploration phase, development and human presence can lead to impacts on livestock dispersal and unauthorized grazing use could occur, increasing time and cost to permittees and lessees. Outside of the exploration and testing phase, surface-disturbing mineral development directly affects areas of grazing in the short-term during construction of well pads, roads, pipelines, and other associated facilities. Potential impacts include an increased potential for the introduction and proliferation of invasive plants that are often unpalatable. Other potential impacts are changes in available forage, reduced forage palatability because of dust on vegetation, limits on livestock movement, harassment, and temporary displacement of livestock.

Improving roads for mineral development can facilitate livestock management if it improves operator's ability to maintain infrastructure or improve grazing distribution. In addition, development may also provide other indirect benefits including but not limited to access to locations for supplement placement. Properly implemented BMPs and reclamation mitigation measures could help to maintain rangeland health and forage levels for livestock. Reducing mineral development in GRSG habitat could reduce potential impacts on grazing, as described under *Nature and Type of Effects, Greater Sage-Grouse Management.*

Renewable Energy Management

Similar to mineral development, wind and solar energy development could directly impact livestock through limitations on use of the portions of developed areas. Solar energy development typically leads to removal of livestock grazing within the footprint of the developed site. ROWs used to gain access to developed sites could remove forage permanently. As required by the BLM's grazing regulations, the BLM would notify permittees at least 2 years in advance of any proposed reduction in authorized use in the allotment, including complete removal of grazing within a portion of or the entirety of an allotment.

Lands and Realty Management

Areas managed as ROW avoidance or exclusion could hinder or prevent obtaining access to an allotment or installing a structural range improvement. However, restrictions on ROWs may indirectly benefit livestock grazing by reducing construction impacts (such as dust, displacement, and introduction of invasive plants) from development of other types of ROWs in the long term. Restrictions on ROWs may indirectly impact livestock grazing by reducing construction impacts from development of these ROWs (such as dust, displacement, and introduction of invasive plants) in the long term. Lands and realty actions taken to protect GRSG habitat would involve avoiding or excluding ROWs (e.g., for power lines, pipelines, and other structures) or land transfers in GRSG habitat. They may also slightly decrease disturbance in these areas. However, should development be relocated to areas outside of GRSG habitat, but still within a grazing allotment, these areas may see an increase in construction-related disturbance or displacement of livestock.

Livestock Grazing Management

Changes in livestock grazing management could impact grazing opportunities in a variety of ways. For example, implementing livestock grazing management requirements to benefit GRSG could affect livestock grazing by changing required management actions. Management requirements could increase short-term and long-term costs to permittees and lessees and decrease AUMs, particularly when they require one or more of the following:

- Removal or modification of structural and nonstructural range improvements
- Modification of a grazing strategy and terms and conditions of permits, including but not limited to:
- Changes to the kind or class of livestock grazed
- Change in season-of-use
- Timing or duration of grazing use
- Changes to the pattern of rest-rotation within allotments and pastures
- Changes to area of use

These management requirements could result in direct and indirect economic impacts on individuals, companies, and the local community. For example, if a ranch is dependent seasonally on forage on public lands, reducing or eliminating AUMs on public lands would affect the entire ranching operation by reducing the total amount of available forage (Torell et al. 2002).

Some management changes may require a short-term output of cost for permittees and lessees but could result in long-term benefits. For example, construction of structural range improvements such as fencing or water developments, or use of nonstructural range improvements such as mineral blocks to improve livestock distribution and allow use of a larger portion of the rangeland would generally enhance rangeland health in the long term. However, these management changes would have short-term costs which may be borne by the BLM, permittees or lessees, or other partners. Constructing off-site water sources and fencing riparian vegetation and spring sources could keep livestock away from sensitive riparian areas and provide a cleaner more reliable source of water for livestock, as described under *Nature and type of Effects, Vegetation Management*. However, water developments and fencing could increase costs for permittees and lessees should they be fully or partially responsible for the cost of construction. Other requirements could increase annual operating costs. Examples of this are increased time feeding animals on base property, more complex pasture rotations or increased stockmanship such as herding or fence riding, which would require increased labor and fuels costs for moving animals.

Where lands are devoted to another public purpose excluding grazing, the agency may have to compensate the permittee or lessee for the range improvement projects constructed under a range improvement permit or cooperative agreement, in accordance with 43 CFR Part 4120.3-6(c) (1995).

Wild Horse and Burro Management

When livestock and wild horses occupy the same area, their needs for water and forage may be competitive. In extreme circumstances, wild horses could outcompete livestock temporarily and could preclude livestock access to certain water sources. Livestock and wild horse and burro conflicts could include fence damage. Prioritizing wild horse and burro gathers in herd management areas and HAs in priority GRSG habitat to meet established AMLs would reduce any current levels of forage competition between wild horses and burro and livestock.

4.8.2 Alternative 1

Greater Sage-Grouse Management

Alternative 1 could directly impact livestock grazing through its requirement through BLM's management to meet GRSG-specific habitat objectives in PHMA, GHMA, and other HMAs, as well as other actions to achieve desired GRSG habitat conditions. In addition to restricting management in GRSG habitat management areas and including livestock grazing-specific actions in GRSG habitat (e.g., prioritizing reviews), the BLM would manage SFAs, which provide additional restrictions on development and disturbance.

These management actions, designed to enhance GRSG habitat on BLM-administered lands, could affect livestock grazing by the following:

- Modifying grazing strategies or rotation schedules
- Changing duration and the season of use
- Changing the kind or class of livestock
- Reducing livestock numbers
- Reducing AUMs

Management to achieve these desired conditions would also impact permittees by increasing the amount of time permittees spend to manage livestock on BLM-administered lands and the total costs to a livestock operation. However, restricting development in SFA would reduce disturbance on livestock and their forage.

Indirectly, implementing management direction to achieve desired conditions in GRSG seasonal habitat could impact livestock grazing in the long term. It would do this by implementing management that improves rangeland conditions. Improved rangeland condition could also contribute to increased forage production.

Minerals Management

During the planning initiative that culminated in the 2015 RMP decisions, carried forward here as Alternative 1, SFAs were recommended for withdrawal from location and entry under the Mining Law of 1872, subject to valid existing rights. The BLM applied for a withdrawal of the recommended area and the Secretary accepted the application. The Secretary initiated a separate withdrawal process in 2015 pursuant to Section 204 of FLPMA. That process is currently underway. If the Secretary were to withdraw the lands identified in the proposed withdrawal, any resulting reduction in locatable mineral development would reduce impacts on livestock grazing through protection of forage from surface disturbance and a reduction in harassment of livestock from disturbance; the greatest reduction would be in allotments in SFA.

Under Alternative 1, PHMA would be closed to new mineral materials sales, but GHMA would be open. While these restrictions would limit livestock and forage disturbance, they could push development to allotments outside of PHMA. Additionally, PHMA would be managed as closed to new nonenergy leasable mineral leasing, and impacts would be similar to those described above and under *Nature and Type of Impacts*.

Alternative 1 would prioritize development of fluid minerals outside PHMA, GHMA, and IHMA. This approach would reduce disturbance to livestock and would maintain forage condition in allotments that fall in GRSG occupied habitat. Implementing the GRSG disturbance cap, mitigation strategy, monitoring framework, and hard trigger adaptive management responses under Alternative 1 would ensure that this reduction in disturbance of livestock, while forage condition would be maintained.

Lastly, SFA would be managed as NSO without waivers, exceptions, or modifications. Unleased fluid mineral actions would be subject to objectives and screening criteria in GRSG habitat. This approach would not increase disturbance to livestock and forage in allotments that fall in GRSG-occupied habitat, but it would result in the fewest reductions in permitted use and the fewest restrictions on range improvement construction. This approach would also result in fewer reductions in permitted livestock use.

Renewable Energy Management

Increased restrictions on renewable energy development under Alternative 1 would reduce impacts on forage and harassment of livestock. Alternative 1 would designate PHMA and SFA as ROW exclusion for utility-scale commercial wind and solar energy facilities. There would be fewer potential reductions in permitted livestock use due to forage destruction and quality reduction. Fewer acres would be subject to restrictions on range improvement construction.

Management direction prohibiting solar and wind development in PHMA and restricting development in GHMA and IHMA would limit any impacts of ground disturbances from developing these resources. This management direction would limit the direct impacts of development and surface disturbances on rangelands, which would be beneficial to livestock grazing. However, this may shift impacts in areas outside of priority and general GRSG habitats.

Lands and Realty Management

Under Alternative 1, ROW development would be limited in avoidance and exclusion areas within PHMA. This would maintain forage sustainability and would not increase disturbance to livestock. Most of GHMA would remain open to ROW development. As a result, ROW development and associated disturbance to livestock and their forage are likely to be concentrated in designated corridors and GHMA. Implementing the GRSG mitigation strategy, monitoring framework, and hard trigger adaptive management responses under Alternative 1 would maintain livestock forage.

Alternative 1 would retain all public lands in public ownership; therefore, there would be no effect on current grazing operations. As discussed under *Nature and Type of Impacts*, limits on human disturbance, mitigation strategy, lek buffers, and other conservation measures would further limit disturbance. This would result in reduced indirect impacts on livestock and their forage in PHMA.

As described above, Alternative 1 would include a cap on human disturbance; the 3% disturbance cap (5% in MT and WY) on discrete human disturbances would be applied in PHMA. Human disturbances in PHMA, GHMA, and IHMA would be mitigated to ensure a net conservation gain to GRSG. In addition, conservation measures would be implemented, such as adaptive management and defined monitoring protocols (**Appendix 2**).

Livestock Grazing Management

Under Alternative 1, the effect of livestock grazing management could increase the management actions necessary to maintain GRSG objectives in PHMA, GHMA, and IHMA.

Impacts could include modifying grazing strategies or rotation schedules, changing the season of use, changing the kind and class of livestock, deferring grazing use until a set objective is met, or reducing livestock numbers. Implementing this management direction could reduce AUMs on some allotments and present challenges to livestock operation viability.

Impacts from modification of grazing strategies could result in a decline in permitted grazing, anticipated over time as permits are modified to meet objectives. Under the Alternative 1, priority for land health assessment and permit renewal on BLM-administered lands would be tiered to include SFA first, followed by PHMA outside the SFA. Existing permits and leases in these areas not meeting Land Health Standards would be given priority, with a specific focus on those containing riparian areas, including wet meadows. The timeline for changes in management would generally follow this priority. In the long term, this prioritization could improve rangeland conditions for livestock and wildlife by focusing management on PHMA that are in most need of improvement.

In GHMA and PHMA, the potential risk to GRSG and its habitats from existing structural range improvements will be evaluated, and modifications of those structural range improvements identified as posing a risk will be addressed. Supplements and supplemental feeding will continue to be authorized where appropriate. New range improvement projects would be designed to monitor, adjust, and limit impacts from new and existing water and structural range improvements, as well as fences. Existing range improvements would be evaluated to make sure they conserve, enhance, or restore GRSG habitat. Consideration of GRSG habitat needs would likely limit the number and types of constructed range improvements. In some instances, improvements may be removed to help attain GRSG habitat objectives.

Under Alternative 1, all or portions of 15 key RNAs would be unavailable to grazing. In those areas, permittees and lessees would need to locate alternative forage or reduce AUMs, with the potential for economic impacts as described under *Nature and Type of Effects*.

Modifications to grazing systems could be required to meet seasonal habitat objectives, increasing costs to lessees and permittees. Acres within nesting habitat may be more likely to require changes to grazing management, due to the desired conditions for this habitat type. Impacts would occur on an allotment scale as permit renewal and related management changes were implemented. The level and intensity of impacts would vary on a site-specific basis.

Under Alternative 1, voluntary relinquishment of grazing permits and leases would be permitted. The BLM may determine if relinquished permits and leases and associated allotments should remain available for livestock grazing or be used for other resource management objectives, in accordance with WO IM 2013-184. This may result in some reduction of overall available AUMs, but relinquishment is likely to remain uncommon.

Wild Horse and Burro Management

Management to adjust or reduce AMLs would enhance vegetation productivity and sustainable forage, particularly where rangeland conditions could be improved. Tiered prioritization of gathers in HMAs in SFA, followed by PHMA, GHMA, and IHMA to meet established AMLs would reduce any current levels of forage competition between wild horses and burros and livestock on allotments in PHMA.

4.8.3 Alternative 2

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA (**Table 2-3**) would be similar to those described for Alternative 1.

State-Specific Environmental Consequences

SFAs would be removed in UT, WY, NV/CA, and ID, thereby reducing restrictions due to GRSG habitat protection on livestock grazing operations in those areas. However, removing SFAs would prevent restrictions on land use and surface disturbing activities, and the impacts on livestock grazing from those surface disturbing activities would be as described under *Nature and Type of Impacts*. While difficult to quantify, removing restrictions on SFAs would likely result in fewer impacts on livestock grazing operations when compared with Alternative 1. Protections afforded to forage from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, where the habitat classification would be retained; impacts would be as described under Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all corresponding management actions from the 2015 plan amendments. The removal of GHMA and their associated management actions would likely lead to development in areas formally identified as GHMA and could therefore lead to removal of forage and increased human-livestock conflicts, which would increase impacts on livestock grazing operations when compared with Alternative 1, as described under *Nature and Type of Impacts*.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/ND, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMAs. In UT, there would be a requirement to minimize or eliminate threats affecting the status of GRSG or to improve the condition of GRSG habitat. These requirements would help reduce impacts on livestock grazing associated with land use and surface disturbing activities, as described under *Nature and Types of Effects*, but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In WY, the net conservation gain requirement would be removed, which would increase potential for impacts.

Although the BLM would not require compensatory mitigation in HMAs, it would enforce state mitigation policies and programs in CA, CO, ID, OR, UT, and WY. Compensatory mitigation would be voluntary unless required by laws other than FLPMA or by the state. As a result, the potential for impacts from land use activities, as described under *Nature and Types of Effects*, would increase relative to Alternative 1, in which a net conservation gain would be required.

Impacts from applying a 3% disturbance cap in CO, ID, NV/CA, OR, UT, and the Dakotas or a 5% disturbance cap in MT and WY in PHMA would be like those described for Alternative 1. However, in UT and ID, the 3% disturbance cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Consequently, some additional development could occur in ID, which may increase potential for forage loss. The ability to exceed the disturbance and density caps could result in loss and degradation of livestock forage and increased human-livestock conflicts. Surface disturbing projects that would be precluded under if no exceedances were allowed could proceed under Alternative 2; however, exceedances to the caps would only be allowed if site-level analysis indicates the project, in combination with all voluntary and required design features, will improve the condition of GRSG habitat, thus likely improving forage conditions.

Minerals Management

Rangewide Environmental Consequences

Impacts on livestock grazing operations from fluid mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in CO PHMA and CO GHMA (see State-Specific Environmental Consequences, below).

Impacts from salable mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in ID IHMAs and NV/CA PHMA (see State-Specific Environmental Consequences, below).

Impacts from non-energy mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in NV/CA PHMA (see State-Specific Environmental Consequences, below).

Removing the recommendation for withdrawal of the SFAs in all states (except in MT and Dakotas, which did not have a 2019 amendment) from location and entry under the Mining Law of 1872 would have no impact. This is because recommendations for withdrawal do not restrict any activities; therefore, such recommendations have no impact. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

State-Specific Environmental Consequences

Removing the closure of CO PHMA to fluid mineral development would increase potential for surface disturbance, forage loss, and human-livestock conflicts as described under *Nature and Type of Effects*. This is because mineral development activities could occur in previously closed areas. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts to livestock grazing operations because the NSO stipulation would avoid potential for surface disturbance and forage loss or degradation.

Impacts from prioritizing fluid mineral leasing outside of HMAs in CO, ID, OR, and MT/Dakotas would result in the same impacts in these states as described under Alternative 1. Removing the objective in UT, NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. However, if the BLM has a backlog of interest for leasing, the BLM would prioritize work first in non-habitat followed by lower-tier habitat management areas (e.g., GHMA).

Adding an exception criterion to salable and non-energy mineral closures for NV/CA PHMA and allowing consideration of new free use permits for salable minerals in ID IHMA would increase the potential for associated impacts on livestock grazing operations as described in Nature and Types of Effects. This is because there would be a greater chance for salable and/or non-energy mineral activities to occur in these areas.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1, with additional exception criteria in NV/CA (see State-Specific Environmental Consequences, below).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from renewable energy management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA (see State-Specific Environmental Consequences, below).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW and wind/solar development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development and surface disturbance.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, except for in the states described below.

State-Specific Environmental Consequences

In UT, WY, and NV, the prioritization for review and processing of grazing permits was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

The additional clarification of habitat objectives to land health standards in WY, ID, and NV/CA and clarifications on grazing in riparian areas and management of range improvements in WY may lead to a loss of AUMs in some cases, prohibitions or limitations on range improvements and water developments. However, over the long term, movement towards desired conditions under land health standards could improve overall forage conditions.

Wild Horses and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

4.8.4 Alternative 3

Livestock Grazing Management

Under Alternative 3, all PHMA (see **Table 2-3**) would be made unavailable to livestock grazing. The BLM would have to construct and maintain a large amount of fencing, particularly in areas with mixed surface ownership, to effectively make grazing unavailable. Removing the ability to graze livestock would directly impact permittees/operators through a reduction in income provided by grazing livestock on BLM lands across the rangewide planning area (see **Section 4.12**).

The requirement to remove livestock grazing in PHMA would result in direct and indirect economic impacts on individuals, companies, and the local community. Most ranches are dependent seasonally on forage on public lands, and some are dependent year-round. Eliminating AUMs on public lands would affect the entire ranching operation by reducing the total amount of available forage, as described under *Nature and Type of Impacts*. Without the opportunity to graze public lands, ranchers would be incentivized to sell their private lands leading to an increased potential for urbanization in some areas, leading to a loss of forage for both livestock and native grazers, and would remove the opportunity to graze livestock in the future, should management decisions change in subsequent resource management and land use plans.

In addition, removal of grazing means less landscape-scale removal of fine fuels. The elimination of livestock grazing may increase the potential for large and severe wildfires as fuel loads increased in the absence of managed grazing. There would be potential for BLM to conduct targeted grazing as a means to reduce fine fuels but would not be near the scale that currently exists.

Where areas are made unavailable for grazing due to a permit or lease is being relinquished, the agency may have to compensate the permittee or lessee for the range improvement projects constructed under a range improvement permit or cooperative agreement, in accordance with 43 CFR Part 4120.3-6(c).

4.8.5 Alternative 4

Greater Sage-Grouse Management

Impacts on livestock grazing operations from designating GRSG habitat as HMAs (**Table 2-3**) would be similar to those described for Alternative 1. Impacts from applying a 3 percent disturbance cap at the project scale would be similar as to those described for Alternative 2, however, the disturbance cap would apply to both existing and proposed infrastructure authorizations, subject to valid existing rights, while wildfire and agriculture would not be included in the disturbance cap calculation. Therefore, the level of disturbance from other sources such as energy development, roads and ROWs, and other surface disturbing activities would be higher than if wildfire and agriculture were included in the disturbance calculation. The disturbance cap could be exceeded at the project scale under certain conditions, which may lead to more development and increased impacts on livestock grazing operations, forage, and increased human-livestock conflicts. There would be no exceptions to the 3 percent PHMA (and IHMA) disturbance cap at the HAF fine scale habitat selection area, which would limit removal of forage or disturbance livestock at this scale.

Minerals Management

Increasing the acres subject to NSO Alternative 4 compared with Alternative 1 would reduce the HMA acres affected and potential for impacts as described in *Nature and Types of Effects*. Prioritizing projects that avoid, minimize, reduce, rectify, and/or adequately compensate for direct and indirect impacts to PHMA/IHMAs and including applicable and technical COAs would also reduce impacts on livestock grazing operations and forage.

Lands and Realty Management

Impacts on livestock grazing from managing PHMA in all states and ID IHMAs as ROW avoidance areas would be like those described for Alternative 1. Where development cannot be avoided, additional protection would arise unless certain criteria are met (see **Chapter 2**). This would reduce the potential for impacts described in *Nature and Types of Effects*.

Managing GHMA as ROW avoidance areas within limited GRSG habitats to meet the RMP GRSG goals and habitat objective would reduce the potential for impacts on forage as described in *Nature and Types of Effects*. Within ROW avoidance areas in GHMA, the potential for livestock grazing operations and forage to be affected may vary depending on the location. Avoiding placement of ROWs within one-half mile of PHMA or IHMA would protect those areas from impacts. Because all other areas would be managed as ROW open, impacts, such as surface disturbance or forage removal could cause a reduction in AUMs, thus reducing the amount of forage available for grazing.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states as ROW exclusion areas for wind and solar energy development would be similar to those described for Alternative 2. However, since PHMA would apply to a smaller area under this alternative, the extent of reduction in impacts on livestock grazing from disturbance associated with from renewable energy development would be less.

Managing GHMA as avoidance areas for wind and solar energy development in all states would decrease the potential for impacts associated with wind and/or solar development as described in *Nature and Types of Effects*, but to a lesser extent than exclusion areas. Where avoidance is not possible, impacts to livestock grazing and forage would be minimized through certain measures such as avoiding surface use and occupancy. Such measures would protect PHMA and the forage within from indirect impacts.

State-Specific Environmental Consequences

Managing ID IHMAs as exclusion areas for wind and solar energy development within 3.1 miles from active leks and avoidance in the remainder of the IHMA would decrease the potential for impacts on livestock grazing and forage as described in Nature and Types of Effects, but to a lesser extent than if the entire IHMA were managed as an exclusion area. This is because solar and wind development would be considered on a case-by-case basis in avoidance areas, whereas it would be prohibited in exclusion areas. As such, there would be greater potential for development to occur in avoidance areas.

Livestock Grazing Management

Because the presence of GRSG HMAs would not affect whether an area is available for livestock grazing (except in Oregon key RNAs) and existing areas designated would be maintained as available or unavailable for livestock grazing, impacts from livestock grazing management would be the similar to those described for Alternative 1.

The BLM would include additional livestock grazing management objectives and actions to minimize or reduce impacts to GRSG and habitat. For example, in HMAs, livestock grazing would be managed to toward meeting land health standards the GRSG habitat objectives, avoid direct adverse impacts to key GRSG habitats from range improvements, and employ grazing management strategies that avoid concentrating livestock on key GRSG habitats during key seasons. This could lead to prohibition of range improvement construction as well as adjustments to existing AUMs to meet these management objectives. As such, there would be increased flexibility to adjust the terms and conditions of grazing permits conditions to help avoid or reduce impacts to GRSG or habitat.

Additionally, where the land health standards for GRSG habitat are not met - as indicated by an unsuitable site-scale HAF assessment specific to site capability – and existing livestock grazing is a significant causal factor, adjustments to livestock grazing practices would be made at the authorization, allotment, or activity plan level and in accordance with applicable regulations (43 CFR Part 4180.2(c)(1) or subsequent changes to regulations or policy). Range improvements and other existing infrastructure, such as water developments, would be evaluated with respect to their effect on GRSG and GRSG habitat. These evaluations could lead to limitations on the placement, repair, or construction of range improvements; impacts from these limitations are discussed under *Nature and Type of Effects*.

Wild Horses and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

4.8.6 Alternatives 5 and 6

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Impacts from applying a 3 percent disturbance cap would be the same as described for Alternative 4, except in WY and MT (see State-Specific Environmental Consequences). Impacts from exceeding the 3 percent disturbance cap under certain conditions would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development, leading to a potential reduction in forage availability.

State-Specific Environmental Consequences

Impacts from applying a 5 percent disturbance cap at the project scale in WY and MT would be similar to those described for Alternative 1. However, the 3 percent disturbance scale would still apply at the HAF fine scale habitat selection area, which may prevent some additional development within those areas, reducing impacts on livestock grazing operations. Additionally, WY and MT would include wildfire and agriculture in the disturbance calculation, and therefore, the level of disturbance from other human-made surface disturbing activities would be relatively lower than if wildfire and agriculture were not included in the disturbance calculation, similar to Alternative 2.

Minerals Management

Impacts on livestock grazing from mineral resource management would be the same as described for Alternative 4. The exception is in WY and MT, where applying a 5 percent disturbance cap at the project scale could allow for more potential mineral development, depending on the degree to which wildfire and agriculture contribute to disturbance in a given area, which could increase surface disturbance and forage removal, as well has increased human-livestock conflicts.

Renewable Energy Management

Classifying PHMA and IHMA as avoidance areas for wind and solar energy development would increase the potential for surface disturbing impacts and disturbance to livestock as described in *Nature and Types of Effects*, compared with Alternative 1 under which most PHMA would be exclusion areas.

Managing GHMA as open to wind and solar energy development in all states would result in potential for surface disturbing and limitation on livestock grazing availability as described in *Nature and Types of Effects*.

Lands and Realty Management

Impacts from managing PHMA in all states and ID IHMAs as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4.

Compared with Alternative 1, managing GHMA in all states as open to ROW with minimization measures and compensation would increase the potential for ground disturbing impacts and disturbance to livestock as described in *Nature and Types of Effects*. However, such management would benefit grazing in the instances where a ROW is needed to access an allotment or where a structural range improvement is desired.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from livestock grazing management would be the same as described for Alternative 4.

State-Specific Environmental Consequences

In OR, the 15 key RNAs would be retained; however, their associated areas allocated as unavailable to grazing are proposed to be retained, modified, or re-allocated to grazing based on district-generated, site-specific updated information since the 2015 ARMPA. This would result in an increase in acreage available for grazing in the Black Canyon, Dry Creek Bench, North Ridge Bully Creek, South Ridge Bully Creek, and Spring Mountain Key RNAs (see **Appendix 3**).

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce forage competition between wild horse and burro populations and livestock in some areas.

4.9 Lands and Realty (Including Wind and Solar)

4.9.1 Nature and Type of Effects

The effects on the lands and realty program are typically the result of management that excludes or avoids ROWs in certain areas, authorizes of leases or permits, or requires stipulations on land use activities.

Within a BLM ROW exclusion area, the authorization of new ROWs is not allowed under any conditions. A ROW avoidance area may be available for ROW location but may require special stipulations such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, Standards for Boundary Evidence risk assessment certificates, and timing limitations.

Management that restricts ROW development in a certain area will likely eventually increase the concentration of ROW development in adjacent areas where restrictions are not present. Increased ROW density can limit new siting options in non-restricted areas, decrease service reliability to rural areas, increase conflict among facilities, and intensify impacts on other resources and uses.

Collocating infrastructure in existing ROWs, corridors, or disturbed areas reduces land use conflicts, limits disturbance to the smallest footprint, and limits impacts on GRSG and their habitats. Where restrictions are applied, impacts would be mitigated where exceptions were allowed for co-location of new ROWs within existing ROWs. Collocation policies also clarify the preferred locations for utilities and potentially simplify processing on BLM-administered lands. However, collocating can limit options for infrastructure development and could reduce network redundancy and potentially affect service reliability in some areas and add mileage and construction costs to the transmission line.

Impacts Common to All Alternatives

All action alternatives for each state would increase the restrictions of ROWs in PHMA by applying exclusion and avoidance areas. This would result in adverse effects to lands and realty and renewable energy since it would decrease the acreage available to new development, which could lead to more complex designs, exclude infrastructure placement in cost effective locations, result in overall greater development cost and increased review periods. Additionally, such stipulations could limit future access, delay or increase the cost of energy supplies, or delay or restrict communications service availability. However, ROW exclusion and avoidance areas decrease the amount of land available for new development and could promote collocation. Collocating of new infrastructure within existing ROWs could reduce land use conflicts, additional land disturbances, and demarcate the preferred locations for utilities, which would simplify the processing on BLM-administered lands.

Avoidance areas require ROW applicants to meet additional project criteria, which could influence project location, delay the availability of energy supply (by delaying or restricting pipelines or transmission lines) or delay or restrict communications service availability. Within exclusion areas, new ROW development would be prohibited, which would prevent the lands and realty program from approving new applications in these areas and shifting them to GHMA and nonhabitat areas where fewer restrictions would apply. Where applied, these restrictions would prevent the BLM from accommodating future demand for ROW development within the decision area.

4.9.2 Alternative 1

Under alternative 1 the entire plan area with the exception of Wyoming would limit lands used for ROWs in PHMA (or IHMA in Idaho) and GHMA for GRSG. Variations range from blanket restrictions on ROW development in PHMA and GHMA to variable restrictions by industry or project type. Plan details are derived from each state's 2015 ARMPA. **Table 4-1** provides each state's proposed management of ROWs under Alternative 1 for all ROW types including wind and solar and acres associated with the RFD are in **Appendix 12**.

Under Alternative 1, the majority of the states would manage PHMA and GHMA as ROW avoidance areas. PHMA would be managed as exclusion areas for ROWs including wind and solar major ROWs if the state has sufficient solar potential and differentiates solar ROWs.

Key elements in the planning area include the following:

- All states except North Dakota, South Dakota, and Utah would each have some form of disturbance caps on surface disturbing activities.
- Colorado, Idaho, Southwest Montana, and Utah would have land use authorizations that require avoiding disturbance to any BSU.
- Nevada, Northeastern California, Idaho, Southwest Montana, Utah, and Wyoming would require lek buffers.
- All states except for Colorado and Oregon would have requirements and/or restrictions for power lines.
- In Nevada, Northeastern California, Idaho, Southwest Montana, and Utah ROWs would be allowed if they could be demonstrated to provide a net conservation gain for GRSG habitat. A further description of this is located in **Appendix 2**. Existing GRSG Management.

Additionally, in Oregon, BLM would manage SFA and PHMA outside of SFA as ROW exclusion areas for wind and solar, with the exception of Lake, Harney, and Malheur Counties. Within the avoidance areas of Lake, Harney, and Malheur Counties, Alternative 1 would establish a hierarchy to development opportunities, beginning with nonhabitat as the first preference, followed by poor quality GRSG habitat before considering high quality GRSG habitat.

Allowing future development in Lake, Harney, and Malheur Counties would accommodate future demand since these areas contain the most developable wind resources in the state. Demand for new transmission lines, access roads, and related ancillary features to serve new wind generation projects in Lake, Harney, and Malheur Counties, GHMA, and in nonhabitat or private lands could result in new ROW applications in PHMA.

As a result, in areas where the ROW avoidance and exclusion restrictions listed above would apply the impacts would be as described in the *Nature and Type of Effects*, above.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective or environmentally-suitable locations and potentially resulting in overall greater development costs. A corresponding effect could be a reduction in the number of authorization applications for activities and longer, more complicated review periods for those that are proposed in GRSG habitat.

4.9.3 Alternative 2

Alternative 2 is derived from each region's respective 2019 RMPA/EIS, if completed by the state. Three of the states updated their plans with respect to lands and realty management. Colorado, Idaho, Montana, Oregon, North Dakota, and South Dakota did not provide a new or updated management for lands and realty and thus impacts would be as described under Alternative 1 for these states.

State-Specific Environmental Consequences

In Nevada, Alternative 2 would update the HMA boundaries for PHMA, GHMA, and OHMA to reflect the best available science, and outline a process for periodically revising these boundaries in the future as new data becomes available. Updating the HMA boundaries would result in a relatively minor shift in PHMA (-0.5 percent) and GHMA (+0.5 percent); these changes would not result in discernible differences from Alternative 1. The decrease in OHMA (-17 percent) would have negligible impacts on land use and realty, as there are limited allocation decisions tied to OHMA; therefore, the difference between the nature and types of impacts described would be negligible. These impacts are discussed under Alternative 1.

In Utah, Alternative 2 would remove the GHMA designation for GRSG from the 2015 plan. This would decrease impacts on lands and realty projects by allowing site-specific GRSG habitat analysis and population information, as well as proponent-developed project design elements, to be considered on a project-specific basis. If those voluntary measures were to improve GRSG habitat, both the disturbance and density caps could be exceeded, allowing for more flexibility to allow consideration of infrastructure projects. Rather than lands and realty projects being precluded entirely if the cap were met, there would be an option to exceed the cap by proponents developing measures that improve GRSG habitat. This would provide more opportunities for ROW development within PHMA.

The mitigation strategy for Alternative 2 in Utah would no longer require proponents to provide for compensatory mitigation on a project-by-project basis to show a net conservation gain. While the strategy would be similar ("improve the condition of GRSG habitat"), it would be achieved by the totality of GRSG management actions applied by the BLM. Not requiring proponents to pay for vegetation and habitat treatments could decrease project costs, providing more opportunities for ROW development in PHMA; however, during project design, the BLM would consider voluntary compensatory mitigation actions as a component of compliance with the State of Utah law, statute, or policy or when offered voluntarily by a project proponent. If such mitigation were volunteered, impacts would be the same as those described under the No-Action Alternative of the 2019 EIS; however, determining which projects would apply such measures would be made on a project-by-project basis.

Under Alternative 2 in Utah, changes in MA-SSS-3B[1] that allow site-specific GRSG habitat analysis and population information and project design elements to be considered on a project-specific basis, could potentially lessen impacts on renewable energy as it would allow for more flexibility to allow infrastructure projects that exceed the disturbance cap if they meet the described criteria. However, this would likely have

[1] MA-SSS-3B – 2015 ARMPA Decision Number

little impact on renewable energy development because PHMA would still be closed to commercial wind and solar development unless the project meets the exception criteria identified in MA-SSS-1.

In Wyoming under Alternative 2, impacts on the lands and realty program as a result of changes to habitat management areas would likely be minor over the landscape, with site-specific impacts potentially occurring where new restrictions are applied in areas that previously did not have restrictions (i.e., new PHMA in what was previously GHMA). This would require some projects to have additional restrictions and others to have fewer restrictions (i.e., projects in areas that transitioned from PHMA to GHMA designations). Depending on the magnitude of the change in acreage, impacts on lands and realty would likely be negligible.

Wind development in PHMA in Wyoming would continue to be managed under the 2014 and 2015 decisions. If additional PHMA were identified in areas that were previously GHMA, then it could become more challenging for wind energy development to occur in those newly identified PHMA due to the restrictions on wind energy development in PHMA. However, if any areas were identified as GHMA (that were previously PHMA), those areas would then be available and open to wind energy development.

There would be no impact on solar energy development in Wyoming, beyond that identified under Alternative 1.

4.9.4 Alternative 3

Under Alternative 3 all HMAs would be managed as PHMA, there would not be GHMA classification and GRSG habitats would not be differentiated. This would result in all habitat being considered and managed as PHMA, which would result in the most restrictions to lands and realty of all the alternatives.

Limitations on new ROWs and above-ground linear features, such as transmission lines and pipelines could restrict the availability of energy or service availability and reliability for communication systems. ROW exclusion areas could extend the processing time for renewals of existing ROW authorizations and make siting of new linear or block ROWs more difficult. For linear ROWs, avoiding GRSG habitat could lead to the abandonment of the project based on increased costs or the inability to locate the project without using public lands. Costs also would be incurred as a result of requirements for mitigation in areas with limits on surface disturbance.

In some areas, there is a high concentration of intermixed landownership, corridors, oil, gas, and geothermal development, and existing authorizations. In these areas, restrictions on the ability to authorize ROWs and land tenure/landownership adjustments would have a greater impact than in areas with lesser degrees of intermixed ownership, ROW corridors, minerals development, and existing authorizations. Despite these restrictions, the existing network of developed ROWs could provide opportunities for the collocation of compatible authorizations however these could be limited due to size and availability but only if the upgrading can be accommodated within the existing ROW and as long as it does not affect the integrity of, or the ability to operate facilities or their ability to operate their facilities (43 CFR Part 2807.14)

Managing habitat as exclusion areas for utility-scale wind and solar energy ROW development would eliminate the BLM's ability to accommodate any new wind or solar energy demand on that portion of GRSG habitat. This would shift the burden to adjacent non-federal lands that do not have the siting requirements or mitigation standards and could potentially increase costs. ROW exclusions would also inhibit development on adjacent private and state land where transmission infrastructure would be needed across BLM-administered lands.

4.9.5 Alternative 4

Under Alternative 4, areas (regardless of P, G, or I HMA status) within 0.5 miles of PHMA/IHMA would be designated as ROW avoidance areas to address the impacts to adjacent PHMA/IHMA. If these areas are mapped, then the remainder of GHMA that lies outside the 0.5-mile buffer, would be managed as open to major ROWs. If these areas are not mapped, the entire GHMA would be managed as ROW avoidance areas and the habitats would be identified during implementation. These restrictions would have impacts as described under the *Nature and Type of Effects* section. Designated corridors would be managed as open to ROWs and all habitats would be subject to mitigation, this would result in a less restrictive planning process for projects. Additionally, GHMA would be managed as ROW avoidance areas within breeding, nesting, and limited-seasonal habitats. The identification of these habitats would be the responsibility of each state's wildlife agency. This would allow for states to have an additional involvement in the planning process.

Utility scale wind and solar projects in PHMA would be managed as ROW exclusion areas. IHMA would be managed as ROW exclusion areas within 3.1 miles of active leks, outside of the 3.1-mile buffer, and IHMA would be managed as ROW avoidance areas. Areas within 0.5 miles would be managed as ROW avoidance areas to address the indirect impacts to the adjacent PHMA and IHMA. GHMA not included in the 0.5-mile buffer would be managed as ROW avoidance areas for utility scale wind and solar projects. These restrictions would have impacts as described under the *Nature and Type of Effects* section.

The impacts under Alternative 4 would result in standardized management practices across the project area and would remove State-by-State restrictions. This would allow for easier planning for large interstate projects such as transmission lines and simplify management expectations across the planning area.

4.9.6 Alternative 5

Under Alternative 5, lands encompassing major ROWs and utility scale wind and solar in PHMA would be managed as ROW avoidance areas, while in GHMA they would be managed as open to ROWs. GHMA would be subject to mitigation measures for both major ROWs and utility scale projects. Designated corridors would remain open to ROW development and mitigation would not be required.

Similar to Alternative 4 the impacts would result in standardized management practices across the planning area. The impacts to ROWs would be less than all other alternatives since the BLM would not designate ROW exclusion areas, mitigation would not be required in corridors, and buffers would not be placed in areas surrounding HMAs.

4.9.7 Alternative 6

Impacts would be the same as Alternative 5. Additionally, management of ACECs as ROW exclusion under Alternative 6 could prevent ROWs from being developed, could increase costs, or could increase development pressure on adjacent lands.

4.10 Mineral Resources

4.10.1 Fluid Minerals (Including Geothermal)

Nature and Type of Effects

Closing areas within GRSG habitat to fluid mineral leasing would directly impact the fluid minerals program by prohibiting the development of those resources on federal mineral estate. In some cases, fluid mineral operations would be limited in their choice of project locations and might develop in areas that are more challenging to access or result in less efficient development because more ideal areas could be closed to leasing, or operators may choose not to develop within the area at all. Under more restrictive Alternatives, restrictions on BLM and federally administered lands might push development onto non-federal and private land and have indirect effects on GRSG and federal fluid minerals.

Management actions that prohibit or restrict surface occupancy or disturbance (such as TLs, NSO, CSU, and limitations on the density of surface disturbance) overlying federal fluid mineral resources would also directly impact the development of those resources by placing limitations on the siting, design, and operations of fluid mineral development projects. This, in turn, could force operators to use more costly development methods than they otherwise might have used. The application of widespread TLs could result in equipment shortages and other development inefficiencies because of bottlenecks during the limited time period in which certain activities would be allowed.

In areas where NSO stipulations are applied, federal fluid minerals could be leased, but the leaseholder/operator would have to use offsite methods such as directional or horizontal drilling to access and develop the mineral resource. The area where directional and horizontal drilling can be effectively used is limited, meaning some minerals may be inaccessible in areas where an NSO stipulation covers a large area, where no leasing is allowed on surrounding lands, or in geologic formations where horizontal drilling is ineffective.

Application of CSU stipulations allows some use and occupancy of the surface. While less restrictive than an NSO, a CSU stipulation allows the BLM to require special operational constraints beyond those specified in 43 CFR Part 3101.1-2, or to require protective measures (e.g., restrictions on noise levels) to protect GRSG. While not prohibiting surface-disturbing activities, a CSU stipulation can influence the location and level of operations within the subject area.

TL stipulations may be necessary to protect GRSG from impacts of development. These stipulations are necessary if impacts cannot be mitigated within the standard 60-day suspension of operation period afforded by regulation. Areas where TL stipulations are applied would be temporarily closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames based on seasons or GRSG breeding times. While some operational activities would be allowed at all times (e.g., production and maintenance), construction, drilling, completions, and other operations considered to be intensive in nature would not be allowed during the restricted time frame. Most activities, however, can be initiated and completed outside of the restricted dates specified in the TL stipulation.

Applying COAs, which include RDFs and conservation measures, to existing leases would directly impact fluid mineral operations. These RDFs and conservation measures would include standards such as noise restrictions, height limitations on structures, design requirements, water development standards, remote monitoring requirements, and reclamation standards. Application of these requirements through COAs could impact fluid mineral operations by increasing costs if it resulted in the application of additional requirements or use of more expensive technology (such as remote monitoring systems) than would otherwise have been used by operators. Impacts of these COAs would be mitigated where exceptions limit their application. This would occur where a COA was not applicable (e.g., a resource is not present on a given site) or where site-specific consideration merited slight variation. When considering exploration and development on areas leased for fluid mineral resources in PHMAs (and IHMA in ID), including geothermal, application of the RMP lease stipulations, minimization measures, and RDFs/BMPs as APD COAs will be considered through completion of the environmental record of review (43 CFR Part 3162.5 and 36 CFR Part 228.108), including appropriate documentation of compliance with NEPA.

Placing limits on geophysical exploration could reduce the availability of data on fluid mineral resources and could increase costs and risks of fluid mineral development if the limits required use of more expensive technology or did not allow detailed characterization of some areas. TLs on geophysical exploration would delay exploration and development activities and could cause equipment shortages because much of the exploration would need to occur during the same time period.

Requiring master development plans and unitization could cause direct impacts on fluid minerals through increased costs of fluid mineral extraction resulting from delays in the permit approval process until additional site-specific planning efforts are completed. However, unitization typically has been initiated at the operator's discretion and can increase development efficiency.

Management actions creating ROW exclusion or avoidance areas could prevent or increase the cost of fluid mineral extraction by limiting the available means for transporting fluid minerals to processing facilities and markets. For example, new natural gas pipelines could not be built in an ROW exclusion area. Impacts would be mitigated where exceptions were allowed for co-location of new ROWs within existing ROWs. Identification of ROW avoidance areas, while not creating absolute barriers to use of the area for access roads or pipelines, or for locating surface facilities on federal lands for the purpose of accessing private minerals, could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect costs that would make a project infeasible, for example, ROW collocating requirements applied to a new pipeline along an existing road that follows a long, indirect, or topographically difficult route. ROW exclusion and avoidance areas will limit natural gas line construction which would lead to more flaring of gas, which has resource waste and air quality implications. This would hamper the ability to get natural gas to domestic and export markets.

Alternative 1

Rangewide Environmental Consequences

All states include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. The exact language varies by state, see the state headings below for more details. This Alternative affirms habitat management area (HMA) boundaries from 2015 amendments (as maintained).

Most states are NSO (in PHMA and IHMA) and/or have seasonal restrictions. Wyoming and Montana are also subject to density and disturbance limits. Colorado closes PHMA within 1 mile of leks to fluid mineral leasing. This Alternative maintains the Sagebrush Focal Areas (SFAs) from the 2015 amendments.

If a state is not specifically mentioned under its own environmental consequences heading, the rangewide consequences would apply.

Colorado Environmental Consequences

Management actions related to lands and realty in conjunction with protection of GRSG and its habitats and use area could adversely impact fluid minerals leasing and development. This potential for impacts includes reduced availability, reduced accessibility, and increased costs.

Reduced availability is the least significant impact from lands and realty actions. This is because the BLM does not require a lands action (i.e., issuance of a ROW grant) for surface occupancy of federal lands to drill into federal minerals. However, accessibility to federal minerals with new leases could be significantly reduced or precluded when management of specific areas as ROW exclusion areas would prohibit access roads or pipelines into those areas.

Identification of ROW avoidance areas, while not creating absolute barriers to use of the area for access roads or pipelines, or for locating surface facilities on federal lands for the purpose of accessing private minerals, could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect costs that would make a project infeasible, for example, ROW collocating requirements applied to a new pipeline along an existing road that follows a long, indirect, or topographically difficult route.

Alternative 1 would manage all PHMA and GHMA (**Table 2-3**) as ROW avoidance areas with exceptions for pending large transmission lines. Additionally, no aboveground structures would be authorized within 1 mile of active leks. Avoidance areas would require that impacts be avoided. Nevertheless, the ROW could be allowed, subject to COAs, all applicable surface use stipulations, and any site-specific stipulations identified through the NEPA process. Potentially large local impacts on access of fluid minerals where the PHMA and GHMA are open for large transmission lines. Areas open to large transmission lines could preclude development of facilities required for access to fluid minerals.

New leasing would be prohibited within 1 mile of all active leks. Potentially large local impacts on access of fluid minerals where the PHMA and GHMA are open for large transmission lines. No modifications or waivers would be permitted, and the BLM Authorized Officer may grant an exception to this NSO stipulation only where the proposed action:

1. Would not have direct, indirect, or cumulative effects on GRSG or its habitat
2. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide a clear conservation gain to GRSG

Exceptions based on conservation gain (number 2, above) may only be considered in PHMA of mixed ownership where federal minerals underlie less than 50 percent of the total surface, or areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this RMP. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would endure for the duration of the proposed action's impacts.

Any exceptions to this NSO lease stipulation may be approved by the BLM Authorized Officer only with the concurrence of the State Director. The BLM Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies 1 or 2, above. Such finding would be made initially by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception would not be granted.

Approved exceptions would be made publicly available at least quarterly. Because all of PHMA would be managed as NSO with very rare potential for exceptions, impacts would be increased difficulty of access, increased costs, and decreased efficiency of oil and gas development in PHMA.

The following BMPs have the potential to significantly affect the economic feasibility of individual oil and gas projects. Those with the greatest potential for affecting future developments are the following:

- Place liquid gathering and storage facilities outside PHMA—Potentially cost prohibitive where a well pad would be located several miles from the storage tanks due to the additional piping costs when water or liquid condensates are produced in very small quantities from a natural gas well and more efficiently hauled off-site with trucks. However, because all PHMA would be NSO with limited exceptions under this alternative, very few well pads might be subject to this BMP.

- Place new utility developments in existing utility or road corridors—Potentially cost prohibitive where the road follows a long and topographically complex route, thereby lengthening the utility development and potentially requiring one or more lift stations for liquids.
- Bury electric distribution lines—Potentially cost-prohibitive where a well pad would be located a long distance from the nearest utility tie-in, compared to the cost of constructing an aboveground line fitted with raptor deterrents.
- Limit noise to less than 10 decibels above ambient levels at sunrise at a lek perimeter during the lek season and require noise shields during the lek, brood-rearing, and winter-use seasons—This could increase development costs if it were to require erecting expensive, site-specific, acoustical barriers for wells.
- Locate all new compressors outside PHMA—This could be cost prohibitive or not technically feasible in certain situations, depending on the topography over which gas-gathering pipelines are installed, the pressure of the natural gas at the wellhead, and the location and availability of a permissible compressor in relation to commercial pipelines, access roads, and other utilities.
- Incorporate GRSG habitat requirements in reclamation—This is unlikely to be an issue for well pad reclamation. However, very long road or pipeline corridors could be prohibitively expensive if they require including GRSG components if planting or transplanting sagebrush is required instead of including sagebrush in a seed mix with native perennial bunchgrasses and forbs.

Overall, a determination of the extent to which increased costs and decreased efficiency would affect fluid minerals development is a function of project- and site-specific considerations and of market forces at the time. However, it is possible that some well pads, access roads, pipelines, and other facilities would be affected to the extent that marginal projects are economically nonviable, reducing the number of future oil and gas wells to an extent that may be considered significant at the local, state, or regional levels.

Idaho Environmental Consequences

<u>Impacts from Lands and Realty Management</u>

Under Alternative 1, all PHMA and IHMA would be managed as ROW avoidance areas. However, because all acres in PHMA and IHMA would be either closed to leasing or open subject to NSO stipulations, no oil and gas activities on future leases within these areas would require new rights-of-way. Therefore, oil and gas activity in PHMA and IHMA would not be impacted by management of ROW avoidance areas under Alternative 1.

All GHMA would be managed as ROW avoidance for high voltage transmission lines and major pipelines but open to other fluid mineral-related ROW location under Alternative 1. Transportation of fluid minerals might be impacted by the major pipeline ROW avoidance but fluid minerals beneath those acres would be unlikely to be significantly impacted by the ROW avoidance area.

Application of RDFs, BMPs, buffers, and seasonal timing restrictions to ROW construction in all GRSG habitat would also limit construction of new ROWs for oil and gas development. If these limitations made it uneconomic to develop a ROW for oil and gas development, development of federal oil and gas resources in the planning area could decrease.

<u>Impacts from Fluid Minerals Management</u>

Under Alternative 1, approximately 257,400 unleased acres with medium development potential (33 percent of the federal oil and gas estate with medium development potential) would remain closed to oil and gas leasing. Closing unleased lands to leasing, especially those with medium potential, would have the greatest impact on fluid minerals resources in Idaho by prohibiting oil and gas development. Impacts of closing these areas to leasing are the same type as those described under Nature and Type of Effects.

Approximately 348,100 acres, or 44 percent of unleased federal oil and gas estate with medium development potential (including all areas in PHMA and IHMA not already closed) would be open to oil and gas leasing subject to NSO stipulations. Under this alternative there would be no waivers or modifications to the NSO stipulation, and only one exception would exist. A total of approximately 77 percent of unleased federal oil and gas estate with medium oil and gas potential in the decision area would be inaccessible, either due to closure or NSO, under Alternative 1.

Under Alternative 1, approximately 121,900 unleased acres, or 17 percent of the unleased federal oil and gas estate with medium development potential would be open to oil and gas leasing, subject to lek buffers and TL stipulations. This would include all areas in GHMA not already closed. These stipulations would restrict the timing and location of oil and gas exploration and development activities, as described under *Nature and Type of Effects*.

Under Alternative 1, it is reasonably foreseeable for planning purposes that 15 new oil and gas exploratory wells would be developed on federal fluid mineral estate in the decision area in the next 20 years.

The BLM could not apply COAs that would eliminate reasonable opportunities to develop an existing lease. Therefore, although restrictions on development would increase where COAs were applied, oil and gas development would still be allowed in these areas.

Geophysical exploration would be allowed on the over 8 million acres of federal mineral estate within PHMA but would be subject to TLs and other restrictions. Most notably, geophysical exploration would be allowed only for gathering information about fluid mineral resources outside PHMA. Because of these limitations and the fact that PHMA would be closed to fluid mineral leasing, geophysical exploration in PHMA would decrease under this alternative. Decreases in geophysical exploration in PHMA could impact the fluid minerals program, as described under *Nature and Type of Effects*.

Under Alternative 1, RDFs would be applied as COAs to existing leases on PHMA and GHMA overlying federal mineral estate. However, only management actions related to master development plans and unitization would apply. Impacts of these restrictions would be the same type as those described under *Nature and Type of Effects*.

Application of the 3 percent disturbance cap in PHMA and IHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities and new surface development on existing leases could be affected or temporarily delayed if the cap were exceeded. Application of lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Under Alternative 1, RDFs would be applied as COAs to existing leases on occupied habitat overlying federal mineral estate. These RDFs would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. The types of impacts from these COAs are the same as those described under *Nature and Type of Effects*. The BLM could not apply COAs that would eliminate reasonable opportunities to develop the lease. Therefore, although restrictions and costs on development would increase where COAs were applied, oil and gas development would still have reasonable opportunity to occur.

Geothermal

<u>Impacts from Fluid Minerals Management</u>

Under Alternative 1, 11,296,800 acres, or 44 percent of planning areas, would remain closed to geothermal leasing. This includes 2,832,200 acres with moderate to high geothermal potential (32 percent of the moderate to high geothermal potential acres in the decision area). An additional 8,464,000 acres (34 percent) with no or low geothermal potential would remain closed to geothermal leasing. Geothermal resource potential may be outdated or inaccurate in some areas and it is possible that developable resources exist in these areas. New technologies such as Enhanced Geothermal Systems (EGS) could make areas considered low or moderate feasible in the future, therefore it is difficult to predict the impacts of closure of low to moderate geothermal potential areas.

In addition to fluid mineral closures, 3,834,400 acres would be subject to TL and CSU stipulations (including 1,278,100 acres in moderate to high geothermal potential areas) and 9,630,000 acres would be subject to NSO stipulations (including 2,906,800 acres in moderate to high geothermal potential areas).

Under the Alternative 1, RDFs and BMPs would be applied as COAs when a geothermal drilling permit or other post-lease activity is approved. In addition to affecting new leases, the COAs would be applied to the 25,571 acres of existing leases within GRSG habitat, consistent with existing lease terms and special stipulations. These RDFs and proposed management actions would include such requirements as noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards.

The BLM could not apply COAs that would eliminate reasonable opportunities to develop an existing lease. Therefore, although restrictions on development would increase where COAs were applied, geothermal development would still be allowed in these areas.

<u>Impacts from Lands and Realty Management</u>

Under Alternative 1, 8,365,000 acres (33 percent) of BLM-administered surface in the decision area (including all PHMA) would be managed as ROW avoidance areas, where development of new ROWs for geothermal development could not occur unless the Anthropogenic Disturbance Development and Screening Criteria (AD-3 and AD-4) were satisfied (including the requirement that the project would not exceed the 3 percent disturbance threshold and would be collocated within existing the footprint of existing infrastructure). These restrictions would only allow new ROWs to be developed pursuant to a valid existing authorization.

Another 1,013,800 acres (4 percent) of BLM-administered surface in the decision area (including all IHMA) would be managed as ROW exclusion areas where development of new ROWs for geothermal development could not occur unless the Anthropogenic Disturbance Development Criteria (AD-4) were satisfied (including the requirement that the project would not exceed the 3 percent disturbance threshold). Lessees would be unable to site off-lease features, such as transmission lines, roads, and pipelines that may be necessary to transport the product to market, on public lands. These actions could result in the stranding of a geothermal lease and its resources, if surrounded by federal lands subject to these constraints.

Application of RDFs, BMPs, buffers, and seasonal timing restrictions to ROW construction in GRSG habitat would also limit the construction of new ROWs for geothermal development to certain times of the year or in certain locations. If these limitations made it uneconomic to develop a ROW for geothermal development, development of federal geothermal resources in the planning area could decrease.

Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination

Under Alternative 1, anthropogenic disturbance, including leasable mineral development, would be limited to 3 percent of nesting and wintering habitat within PHMA and IHMA within a Conservation Area (i.e., BSUs). In BSUs where the 3 percent cap is already exceeded, new development of federal leasable mineral resources would be prohibited until enough habitat was restored to maintain the area under the threshold. Development of federal leasable mineral resources that would result in exceedance of the 3 percent cap in a BSU would also be prohibited. Impacts would be greatest where these caps limit development in unleased portions of high geothermal potential because these areas have the highest potential for leasable mineral development. The uncertainty wrought by this limitation could decrease the value of any future lease, disincentivize geothermal energy development in the western United States, and could affect the ultimate scope of rights authorized under any lease offered in the future.

Montana Environmental Consequences

Under Alternative 1, priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA and GHMA, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in non-habitat areas first and then in the least suitable habitat for GRSG. Where a proposed fluid mineral development project on an existing lease could adversely affect GRSG populations or habitat, the BLM will work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts to the extent compatible with lessees' rights to drill and produce fluid mineral resources.

Alternative 1 would apply an NSO stipulation within all GRSG PHMAs and apply an NSO stipulation within 0.6 miles of GRSG leks in Restoration Areas and GHMAs. Development on existing leases within PHMAs would be subject to density and disturbance limits. CSU stipulations would be applied within RAs in order to maintain GRSG habitat. TL stipulations would be applied from March 1 to June 15 in GRSG nesting habitat within 3 miles of a lek within RAs and GHMAs, and from December 1 to March 1 within designated GRSG winter range within 3 miles of a lek.

In PHMA, this alternative would implement an anthropogenic disturbance cap of 5% at the BSU and project area scale and implement a density cap of an average of 1 energy and mining facility per 640 acres.

Nevada Environmental Consequences

Alternative 1 would require a 3 percent disturbance cap on human surface-disturbing activities in PHMA and would incorporate RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It would also require all human disturbances to result in a net conservation gain for GRSG and their habitat, and lek buffers would be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective locations, and potentially resulting in overall greater development costs.

A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA. Implementing the GRSG habitat conservation management actions listed above would also place NSO stipulations on fluid mineral development in PHMA, which would further reduce the demand for new ROW development in those areas.

North Dakota Environmental Consequences

Impacts from Lands and Realty

Under Alternative 1, all BLM-administered surface in PHMA (32,900 acres, or approximately 100 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance areas for oil and gas-related activities. However, because all fluid mineral development in PHMA would be subject to NSO stipulations under Alternative 1, managing ROW avoidance areas in PHMA would have no impact on fluid minerals.

All GHMA would be open to ROW location for oil and gas-related activities under Alternative 1. However, identification of conservation measures to minimize surface disturbance and disrupting activities could increase the expense of developing facilities for oil and gas operations by limiting routing options and requiring the use of more expensive technology.

Impacts from Fluid Minerals (Including Mineral Split Estate)

Application of the density and disturbance caps in PHMA and lek buffers in PHMA and GHMA could impact both new and existing oil and gas activities by preventing or restricting new surface development. New oil and gas activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the density and disturbance caps in a manner that would eliminate reasonable opportunities to develop an existing lease. Applying lek buffer distances when approving actions could also restrict development of infrastructure-related fluid mineral development. Under Alternative 1, except that the lack of waivers and modifications, combined with the limited exceptions for NSO stipulations under Alternative 1 Amendment, would further restrict oil and gas activities.

Under Alternative I, federal oil and gas estate in PHMA would be open to fluid mineral leasing subject to NSO stipulations. The unleased federal oil and gas estate in PHMA would be subject to these stipulations. Under this alternative, there would be no waivers and modification, and limited exceptions for NSO stipulations which would further restrict oil and gas activities.

All GHMA would be subject to CSU stipulations. Impacts of these stipulations would be the same type as those described under *Nature and Type of Effects* in **Section 4.2.1** above.

Under Alternative 1, it is projected that 51 new exploratory and development wells would be drilled on federal oil and gas estate in the short term. Of these new wells, 42 are expected to be producing oil and gas wells in the long term.

In addition to RDFs and limitations on disturbance, structure height restrictions would apply under Alternative 1. Closing areas within GRSG habitat to fluid mineral leasing would directly impact the fluid minerals program by prohibiting the development of those resources on federal mineral estate. Fluid mineral operations would be limited in their choice of project locations and may be forced to develop in areas that are challenging to access or have less economic resources because more ideal areas could be closed to leasing. No quantitative percentage limit, surface occupancy buffers, or TL would apply to surface disturbance; rather, surface disturbance would prevent or minimize disturbance to GRSG and their habitat. Unitization would occur on a case-by-case basis.

Geophysical exploration would be allowed, except for in PHMA, where geophysical exploration would be limited to use of existing roads and trails, as well as helicopter-portable methods on the 61,197 acres of federal oil and gas estate but would be subject to TLs and other restrictions, reducing exploration opportunities.

Oregon Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all BLM-administered surface in PHMA (totaling 4,547,000 acres, or approximately 36 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance areas for fluid mineral-related activities. However, because all PHMA would be subject to NSO stipulations on fluid mineral leases, no fluid mineral activities on future leases within these areas would require new ROWs. Therefore, managing PHMA as ROW avoidance areas would have minimal impact on fluid minerals development, but could impact the location of fluid mineral transportation pipelines if any were proposed.

All BLM-administered surface in GHMA (totaling 5,662,600 acres, or 45 percent of BLM-administered surface in the decision area) would be managed as ROW avoidance for high voltage transmission lines and major pipelines but open to other fluid mineral-related ROW location under Alternative 1. Fluid minerals beneath those acres would be impacted by the ROW avoidance area, as described in the *Nature and Type of Effects*.

Impacts from Fluid Leasable Minerals Management

Under Alternative 1, 4,333,700 acres (31 percent of the federal mineral estate decision area), including all federal mineral estate in PHMA, would be subject to NSO stipulations; 4,319,800 acres subject to NSO stipulations would be unleased, so this management would apply NSO stipulations to 31 percent of the 14,147,900 unleased acres in the decision area. Application of NSO stipulations to leases on these acres would directly impact the fluid minerals program in the manner described in the *Nature and Type of Effects*. The lack of waivers and modifications combined with the limited exceptions for NSO stipulations under Alternative 1 would further restrict oil and gas and geothermal activities. SFA would be subject to NSO stipulations with no waivers, exceptions, or modifications.

Approximately 4,847,400 acres of federal mineral estate would be subject to CSU and TL stipulations. This includes all federal mineral estate in GHMA not subject to other existing stipulations, or 34 percent of the federal mineral estate decision area; 4,715,500 of these acres are unleased. Application of CSU and TL stipulations to leases on these acres would directly impact the fluid minerals program in the manner described under *Nature and Type of Effects*.

Under Alternative 1, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. PHMA and GHMA would be designated, and the BLM would implement numerous conservation measures to reduce impacts from human activities in PHMA, including a maximum 3 percent disturbance cap to human activities, not including wildfire, in PHMA. Application of the 3 percent disturbance cap in PHMA and lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in an Oregon priority area of conservation (PAC; also known as BSU) and the proposed project area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease.

Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Geophysical exploration would be allowed on the 11,234,800 acres of federal mineral estate within GRSG habitat but would be subject to seasonal restrictions. Because of these limitations, geophysical exploration in GRSG habitat would decrease under this alternative. Decreases in geophysical exploration in GRSG habitat would impact the fluid minerals program, as described under *Nature and Type of Effects.*

Under Alternative 1, conservation measures in addition to RDFs would be applied as COAs to the five federal leases in PHMA. These RDFs and conservation measures would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. However, the only conservation measures applied would relate to master development plans and unitization. Impacts of these restrictions would be the same type as those described under *Nature and Type of Effects*.

South Dakota Environmental Consequences

<u>Impacts from Lands and Realty Management</u>

Under Alternative 1, all BLM-administered surface in PHMA, exclusive of GRSG winter range, would be managed as ROW exclusion areas for fluid mineral-related activities. GHMA and GRSG winter range would be ROW avoidance areas. However, because all PHMA would be subject to NSO stipulations on fluid mineral leases, no fluid mineral activities on future leases within these areas would require new ROWs. Therefore, managing PHMA as ROW exclusion areas would have minimal impact on fluid minerals development, but could impact the location of fluid mineral transportation pipelines if any were proposed.

<u>Impacts from Fluid Leasable Minerals Management</u>

Under Alternative 1, 152,100 acres (45 percent of the federal mineral estate decision area), including all federal mineral estate in PHMA and GRSG winter range in GHMA, would be subject to NSO stipulations. Application of NSO stipulations to leases on these acres would directly impact the fluid minerals program in the manner described in the *Nature and Type of Effects***.** The lack of waivers and modifications combined with the limited exceptions for NSO stipulations under Alternative 1 would further restrict oil and gas and geothermal activities.

Approximately 21,175 acres of federal mineral estate would be subject to CSU stipulations and 1,169 acres subject to TL stipulations. This includes all federal mineral estate in GHMA in nesting and brood-rearing habitat near leks. Application of CSU and TL stipulations to leases on these acres would directly impact the fluid minerals program in the manner described under *Nature and Type of Effects.*

Under Alternative 1, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. PHMA and GHMA would be designated, and the BLM would implement numerous conservation measures to reduce impacts from human activities in PHMA, including a maximum 3 percent disturbance cap to human activities in a BSU and 5 percent cap including wildfire and agriculture at the project level. Application of the disturbance cap in PHMA and lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in a BSU and the proposed project area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Under Alternative 1, conservation measures in addition to RDFs would be applied as COAs to federal leases in PHMA. These RDFs and conservation measures would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. Impacts of these restrictions would be the same type as those described under *Nature and Type of Effects*.

Utah Environmental Consequences

Application of the 3 percent disturbance cap in PHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Currently there are no population areas where the level of disturbance exceeds the disturbance cap. However, there are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Carbon and Uintah Population Areas where there is higher potential for oil and gas.

Application of lek buffers in GHMA could impact new and existing fluid mineral activities by restricting new surface development. Lek buffers in PHMA would not impact fluid mineral development because all PHMA would be subject to NSO stipulations. Any development for which the limited exception to the NSO stipulation were granted would not be within the lek buffer. In GHMA, applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, tall structures (including transmission lines), surface disturbance, and noise could also restrict development of infrastructure related to fluid mineral development, especially in areas of high potential for oil and gas.

In PHMA, the density of energy and mining facilities would be limited to one energy/mining facility per 640 acres. When calculated at the project level, this requirement would push developers to consolidate facilities and, where technically feasible, directionally or horizontally drill from outside of GRSG habitat.

RDFs would be applied in PHMA and GHMA. However, exceptions to the application of RDFs could mitigate impacts on fluid minerals. Exceptions would occur where a design feature was not applicable (e.g., a resource is not present on a given site) or where the design feature would not actually provide additional protection for GRSG or its habitat. In addition to the RDFs, disturbance cap, lek buffers, and density restrictions, additional conservation measures in PHMA would include net conservation gain requirements (also a requirement in GHMA), restrictions on noise and tall structures, and seasonal restrictions. All of these combined would restrict oil and gas development. In the Carbon and Uintah Population Areas, where oil and gas potential is relatively high and some areas are at or exceeding the disturbance cap, the cumulative effect of all of the restrictions would likely reduce opportunities for oil and gas development on public lands.

Exploration would be allowed on federal mineral estate within GRSG habitat but would be subject to seasonal restrictions.

<u>Infrastructure Development (including all ROWs and utility corridors)</u>

Management actions for programs related to infrastructure development other than lands and realty would not impact fluid minerals. Therefore, only the impacts from lands and realty management actions are discussed in the paragraphs below.

Under Alternative 1, all BLM-administered surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for new linear and site-type ROWs (including transmission lines, pipelines, and roads), except for within ROW corridors designated for aboveground use. However, because all acres in PHMA would be either closed to leasing or open subject to NSO stipulations, no oil and gas activities on future leases within these areas would require new ROWs.

Under Alternative 1, 3,219,000 acres (97 percent) of BLM-administered surface within the decision area in Utah would continue to be open to ROW location. However, wherever there is overlap between federal oil and gas leases and the 94,800 acres (3 percent) of BLM-administered surface in the decision area that would continue to be managed as ROW avoidance or exclusion under this alternative, the fluid minerals program could be indirectly impacted by the resulting limits on the available means for transporting fluid minerals to processing facilities and markets. Impacts would be mitigated where new ROWs could be collocated within existing ROWs. Additionally, leases within units would not be impacted as much because infrastructure within these unitized leases is exempt from ROW requirements.

Impacts would be mitigated for existing leases in PHMA because collocation of new ROWs close to existing ROWs and minimal construction of new roads would be allowed. In PHMA, ROW development that was able to occur would be subject to RDFs, lek buffers, the disturbance cap, and limitations for tall structures, and net conservation gain requirements, which could impact fluid minerals development. The expense of these mitigation activities would increase the costs of oil and gas development.

Under Alternative 1, GHMA would be available for the types of ROW location that could impact fluid minerals development, except for 17,600 acres already managed as exclusion. While fluid minerals development would not be directly impacted because of ROW avoidance or exclusion areas, ROW development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements, which could impact fluid minerals development. The expense of these mitigation activities would increase the costs of oil and gas, oil shale, and tar sands development.

Mineral Development

Management actions for mineral programs other than mineral materials and fluid minerals would not impact fluid minerals. Therefore, only the impacts from mineral materials and fluid mineral management actions are discussed in the paragraphs below.

Mineral Materials

Under Alternative 1, PHMA in Utah would be closed to commercial mineral material disposal. PHMA on lands in the Utah portion of the planning area would be closed to commercial mineral material disposal. This includes 1,196,000 acres with mineral material occurrence (92 percent of federal mineral estate with mineral material occurrence in the decision area). Closing these areas to mineral material disposal could indirectly impact fluid minerals in the areas by reducing the amount of readily available material for road and pipeline construction. This could limit the available means for accessing fluid mineral resources and transporting those resources to processing facilities and markets and could ultimately decrease the amount of development of federal fluid minerals in the planning area.

Free use permits and expansion of existing active pits in PHMA would be subject to the disturbance cap, density of energy/mining facilities restrictions, lek buffers, RDFs, noise restrictions, seasonal restrictions, and net conservation gain requirements. These requirements, particularly on the expansion of existing active pits, would further restrict access to mineral materials and increase costs associated with fluid minerals development.

Fluid Minerals

Outside of the areas closed to new fluid mineral leasing, the remaining PHMA would be open to new oil and gas leasing subject to an NSO stipulation. Of this area, NSO stipulations on approximately 7 percent of federal mineral estate would not be available with waivers, exceptions, or modifications. These areas are in the Rich and Box Elder Population Areas. The Box Elder Population Area does not have high potential for oil and gas, so impacts would be minimal. The potential in the Rich Population Area is high. Most federal mineral estate in the Rich Population Area is already under lease, and many oil and gas fields have already been depleted. Therefore, impacts of the 233,400 acres subject to NSO with no waivers, exceptions, or modifications would be minimal.

In the remainder of PHMA, an exception to the NSO stipulation could be granted if the activity would not have direct, indirect, or cumulative effects on GRSG or its habitat or is proposed as an alternative to a similar action occurring on a nearby parcel and would provide a clear conservation gain to GRSG. Any exception must have to concurrence of the state wildlife agency and the USFWS. As such, exceptions would only be granted on rare occasions. Any development that did occur in PHMA would be subject to the pertinent management for discretionary activities (e.g., mitigation measures, disturbance cap, minerals/energy density restrictions, lek buffers, seasonal restrictions, and RDFs). Impacts of which are discussed under Special Status Species – GRSG.

Approximately 30,000 acres in GHMA would also be closed to fluid mineral leasing. GHMA near leks would be managed as NSO, the NSO buffer from the leks would vary by office. In GHMA, development would be subject to the disturbance cap, mitigation, lek buffers, and RDFs.

Wyoming Environmental Consequences

Under Alternative 1, 883,670 acres in Wyoming would be closed to oil and gas leasing. This, in addition to other restrictions, such as NSO on 441,690 acres and CSU on 6,438,480 acres within PHMAs and GHMAs would reduce the number of projected oil, gas, and CBNG wells projected under this alternative. In total, 12,355 oil and gas and 2,462 CBNG wells are projected over the life of the plan under this alternative. Drainage of federal minerals on areas closed to leasing or on leases that are shut in on an annual basis due to timing and distance limitations may occur due to development on adjacent private or state lands.

Density limitations of one oil and gas or mining location per 640 acres and a 5% disturbance cap within PHMAs (core only) would slow mineral development and could also lead to the relocation of well pads, access roads, pipelines, and ancillary facilities. Relocation of these proposed facilities could cause temporary delays in developing oil and gas resources and limit oil and gas activities in these areas.

Applying BMPs to federal mineral estate where the surface ownership is non-federal could restrict the ability of mineral operators to efficiently develop mineral resources. Depending on the stipulations required, these requirements could increase delays in mineral development.

Avoiding primary and secondary roads within 1.9 miles of the perimeter of occupied GRSG leks and prohibiting other new roads within 0.6 miles of the perimeter of occupied GRSG leks within PHMAs could lead to the relocation of well pads, access roads, pipelines, and ancillary facilities. Relocation of these proposed facilities could cause temporary delays in developing oil and gas resources and could limit oil and gas activities in these areas.

Alternative 2

Rangewide Environmental Consequences

In PHMA management would be the same as Alternative 1, except Colorado has no closed areas. In GHMA, management would be the same as Alternative 1, except Colorado changed the closure areas to NSO.

Mitigation: The BLM in Montana, North Dakota, South Dakota, Nevada, California, and Oregon would apply the same mitigation as Alternative 1. BLM does not require compensatory mitigation but will enforce state mitigation policies and programs. Colorado and Idaho provide mitigation resulting in no net loss. Utah and Wyoming removed the net conservation gain requirement. Colorado, Idaho, Nevada/California, Oregon, Utah, and Wyoming specify that compensatory mitigation would be voluntary, unless required by laws other than FLMPA or by the State.

The 3% disturbance cap does not include wildfire or agriculture. In Idaho the cap can be exceeded in utility corridors if there is a demonstrated benefit to GRSG. In Utah the disturbance cap can be exceeded if it will benefit GRSG. The cap is applied at the BSU and project scale except in Idaho which just applies it at the BSU scale. In Montana and Wyoming, a 5% disturbance cap which includes disturbance from wildfire and agriculture, is applied at the project area scale in PHMA.

In Colorado, Idaho, Oregon, and Montana and Dakotas field offices, priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs, or within the least impactful areas within PHMA and GHMA if avoidance is not possible. In Utah, Nevada/California, and the Lewistown and Butte field offices no similar objective exists.

In Wyoming, Leasing would be allowed in PHMA, and if the BLM has a backlog of Expressions of Interest for leasing, the BLM will prioritize work to first process Expressions of Interest in non-habitat, followed by lower habitat management areas (e.g., GHMA). In Wyoming for fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

In Montana/Dakotas, Oregon, and Wyoming no waivers or modifications would be issued. An exception can be considered if the excepted action is an alternative to action on nearby parcels that would be more harmful to GRSG (with partner agency approval).

In Idaho no waivers or modifications would be issued in PHMA, IHMA or GHMA. An exception can be considered if the excepted action is an alternative to action on nearby parcels that would be more harmful to GRSG, no concurrent approval from other agencies is required.

Colorado, Nevada/California, and Utah developed state-specific exceptions, modifications, and waivers. If a state is not specifically mentioned under environmental consequences, the rangewide consequences would apply.

Colorado Environmental Consequences

In Colorado, the BLM anticipates differing effects for this fluid minerals. Under Alternative 2, approximately 224,200 acres that are closed to fluid mineral leasing under the Alternative 1 would be open for fluid mineral leasing subject to NSO stipulations. Opening the 224,200 acres for fluid mineral leasing means that there is the potential for revenue generation associated with leasing and developing fluid mineral resources.

Approximately 34 percent of the federal mineral estate in PHMA is currently unleased, including approximately 29 percent with high potential for oil and gas. There are numerous considerations that operators take into account before acquiring and developing leases, including market value of the commodity being produced (oil, natural gas, or associated hydrocarbons), operational costs, ease of access to lease minerals, practicality of necessary infrastructure such as roads and pipelines, and technological capabilities. As a result, it is difficult to predict if these changes to availability of leases and increased flexibility of the WEMs (Waivers, Modifications, and Exceptions) would lead to additional oil and gas development or a varied approach to the same level of development. In GHMA the closure to leasing under Alternative 1 would change to open to leasing with an NSO stipulation under Alternative 2, this would make more acres available for leasing, potentially resulting in increased production of fluid mineral resources.

Idaho Environmental Consequences

In Idaho, the BLM anticipates differing effects for fluid minerals. PHMA and IHMA not already closed to leasing would be open to oil and gas leasing subject to NSO stipulations. This alternative would maintain Sagebrush Focal Areas (SFAs) from Alternative 1.

Montana Environmental Consequences

Montana did not complete a 2019 Plan Amendment, management and impacts on fluid minerals under this alternative would be the same as described under Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under this alternative, all areas managed for GRSG would be PHMA and fluid minerals in these areas would be closed to leasing. Some states are considering expanding HMAs to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA. For valid existing rights, if a lease doesn't intersect a road, the ROW exclusion within PHMA could preclude development of a lease.

ACECs will be considered under this alternative, though because of the restrictive nature of the PHMA management under this alternative, there would be no different allocations between the PHMA and the potential ACEC boundaries.

In areas with development potential for oil and gas resources, closing PHMA to leasing would result in a reduction in oil and gas development and production as described under *Nature and Type of Effects*.

Alternative 4

Rangewide Environmental Consequences

The amount of fluid mineral acreage available for leasing under this alternative is similar to Alternative 1, but the amount that will be leased under Alternative 4 is difficult to predict because leasing in GRSG habitat areas will occur following a process in which parcels for lease are identified by received EOIs and evaluated based on fluid mineral and GRSG habitat criteria in order to determine which parcels are offered for lease. Parcels could be nominated and leased with potentially prohibitive stipulations which could discourage operators from further development. Geothermal leasing would occur following a similar process as described above but evaluation criteria would be adjusted to recognize the differences between geothermal development and petroleum fluid mineral development.

Compared to existing management this alternative would apply similar NSO stipulations to leasing in PHMA and IHMA, and around Leks in GHMA. In some states this alternative would make more acreage available for leasing, but because of the prioritization process for leasing EOIs it is possible that fewer acres could be offered for lease sale. State specific changes for Colorado and Oregon are discussed below. A 3% disturbance cap would apply at the HAF fine scale habitat selection area in PHMA/IHMA, which could limit development, however very few areas are over or near the disturbance cap at this time. This cap could result in a delay in the timing of future fluid mineral exploration or development; however, the magnitude of the delay would depend on site-specific factors including the current level of habitat assessment that has been conducted to date. If a state is not specifically mentioned under environmental consequences, the rangewide consequences would apply.

Colorado Environmental Consequences

In Colorado, the BLM anticipates differing effects for fluid minerals. Under Alternative 4 more acreage would be available for leasing EOIs and potential leasing than under Alternative 1, this is because under Alternative 4 the plan would no longer apply closures within one mile of leks in GHMA.

Oregon Environmental Consequences

In Oregon, the BLM anticipates differing effects for fluid minerals. Under Alternative 4 more acreage would be available for leasing EOIs and potential leasing than under Alternative 1, this is because under Alternative 4 the plan would no longer apply closures within one mile of leks in GHMA.

Wyoming Environmental Consequences

In Wyoming, the BLM anticipates differing effects for fluid minerals. Unlike in other states, in WY NSO stipulations would be applied to leasing only within 0.6 miles of leks in PHMA and within 0.25 miles of leks in GHMA. Compared to Alternative 1, this alternative would make more acres available for leasing without NSO stipulations.

Alternative 5

Rangewide Environmental Consequences

Impacts on fluid minerals under Alternative 5 would less than those described for Alternative 4 because fewer acres would be subject to an NSO stipulation (e.g., PHMA in WY would be 0.6-mi NSO around leks with TL stipulations in the rest of PHMA). Under this alternative more flexible WEMs would be considered in all states, allowing compensatory mitigation and the potential for more areas open to leasing with reduced major and minor operational constraints.

Alternative 6

Rangewide Environmental Consequences

Impacts would be the same as those described for Alternative 5 with the additional designation of ACECs. Management of ACECs as open to leasing subject to NSO stipulations with an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if it can be demonstrated that no direct or indirect impacts on GRSG will occur would increase impacts on fluid minerals compared with Alternative 1.

4.10.2 Non-Energy Solid Leasable Minerals

Nature and Type of Effects

Closing an area to non-energy solid mineral leasing would directly impact non-energy solid leasable minerals to the extent such minerals are known to exist by removing the possibility any such mineral resources in that area from being accessed and extracted.

Management actions creating ROW exclusion or avoidance areas would indirectly impact nonenergy solid leasable mineral extraction by limiting the available means for accessing mineral resources and transporting nonenergy solid leasable minerals to processing facilities and markets. For example, new roads to access a mine for nonenergy solid leasable minerals could not be built in a ROW exclusion area. Nonenergy solid leasable mineral operations may be moved to private lands where access is easier, thereby resulting in a loss of federal royalty income if the federal minerals could not be accessed from the private lands, but also reducing the number of operations on federal mineral estate. Because ROW avoidance areas could allow for limited ROW development, impacts of avoidance areas would be less severe than those of ROW exclusion areas. Impacts would be mitigated where exceptions were allowed for collocation of new ROWs within existing ROWs.

Application of RDFs, including such standards as noise restrictions, height limitations on structures, design requirements, water development standards, remote monitoring requirements, and reclamation standards, would place additional requirements on exploration and development.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1 most of the PHMA and IHMA in the planning area is closed to new leasing of non-energy leasable minerals but states can consider expansion of existing leases. However, in Idaho, all IHMA in Known Phosphate Lease Areas is open to leasing. Wyoming keeps the Known Sodium Leasing Area open to exploration and consideration for leasing and development and outside the Known Sodium Leasing Area considers sodium leasing on a case-by-case basis subject to conditional requirements. Wyoming has seasonal restrictions, and Wyoming and Montana are subject to density and disturbance limits. In GHMA most states propose minimization measures to protect GRSG.

Application of the 3 percent disturbance cap in PHMA and lek buffers in PHMA and GHMA could impact both new and existing non-energy leasable minerals activities by preventing or restricting new surface development and reducing ultimate recovery of the resource. New non-energy leasable minerals activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate all reasonable opportunities to develop an existing lease.

Applying lek buffer distances when approving actions could also restrict development of infrastructure related to non-energy solid leasable mineral development, as could application of RDFs.

Idaho Environmental Consequences

In Idaho, the BLM anticipates differing effects for non-energy leasable minerals.

<u>Impacts from Non-energy Solid Leasable Minerals Management</u>

In Idaho, all IHMA in Known Phosphate Lease Areas is open to leasing. No leases are currently on BLM-administered lands in IHMA. All other areas of IHMA would be closed to leasing except for consideration of the expansion of existing leases. Under Alternative 1, 16,270,500 acres, or 59 percent of the federal non-energy leasable mineral estate decision area (including all federal non-energy leasable mineral estate in PHMA outside Known Phosphate Lease Areas) would be closed to prospecting and leasing. Fringe leases and modifications to existing leases would be allowed in PHMA. Approximately 2,899,800 acres, or 10 percent of federal non-energy solid leasable mineral estate in the decision area (including all federal non-energy leasable mineral estate in IHMA outside Known Phosphate Lease Areas), would be open to leasing consideration but only if the Anthropogenic Disturbance Development and Criteria (AD-4) were satisfied (including the requirement that the project would not exceed the 3 percent disturbance threshold). Development on these acres would also be subject to RDFs, BMPs, and buffers for exploration and initial mine development, and compensatory mitigation once mining commences.

Development of federal non-energy leasable minerals within GHMA would also be subject to RDFs, BMPs, and buffers on exploration and initial mine development. These limitations could increase costs of federal non-energy leasable mineral development in the planning area.

Because Known Phosphate Lease Areas in IHMA would remain open to non-energy solid mineral leasing, which would allow continued development in most of the planning area, impacts on federal non-energy solid leasable mineral development in Idaho would be lessened compared to a full closure of all IHMA. The areas considered to have moderate potential for future development in the decision area would not be constrained by a closure. RDFs would be applied to phosphate development projects in IHMA. These RDFs could increase the cost of phosphate mining in the decision area.

<u>Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination</u>

Under Alternative 1, anthropogenic disturbance, including non-energy leasable mineral development, would be limited to 3 percent of nesting and wintering habitat on new leases and prospecting permits within IHMA within a Conservation Area (i.e., BSUs). In BSUs where the 3 percent cap is already exceeded, new parcels would not be offered for lease until enough habitat was restored to maintain the area under the threshold. New leases for federal non-energy solid leasable mineral resources that would result in exceedance of the 3 percent cap in a BSU would also be prohibited. This cap could potentially impact activities on 2,900,100 acres of unleased federal non-energy solid leasable mineral estate in IHMA, including 400 unleased acres within Known Phosphate Lease Areas. Impacts would be greatest where these caps limited development in unleased portions of Known Phosphate Lease Areas because these areas have the highest potential for non-energy leasable mineral development. The 16,270,500 acres that would be closed to non-energy solid mineral leasing under Alternative 1 would not be impacted by the disturbance cap because no new non-energy leasable solid mineral development could occur in the closed areas.

Nevada Environmental Consequences

In Nevada, the BLM anticipates some differing effects for non-energy leasable minerals.

Alternative 1 would require a 3 percent disturbance cap on human surface-disturbing activities in PHMA, and it incorporates RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It would also require all human disturbances to result in a net conservation gain for GRSG and their habitat. Lek buffers would also be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective locations and potentially resulting in overall greater development costs. A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA.

Management actions for mineral programs other than non-energy leasable minerals would not impact non-energy leasable mineral development. Therefore, only the impacts from non-energy leasable minerals management actions are discussed in the paragraphs below.

<u>Impacts from Non-energy Leasable Minerals Management</u>

Under the Alternative 1, 10,739,100 acres of the decision area would be closed to non-energy leasable mineral development. Expanding existing leases would be considered in PHMA. Impacts of this closure would be the same type as those described under Nature and Type of Effects.

Alternative 1 includes applying RDFs on all GRSG habitat, which would mean additional conservation measures for the protection of GRSG consistent with applicable law. Impacts from the RDFs would likely result in higher costs and longer time frames for developing non-energy leasable minerals. RDFs would require placing operations and facilities as close together as possible, would minimize site disturbance through site analysis and planning, and would phase development with concurrent reclamation.

Oregon Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all BLM-administered surface in PHMA would be managed as ROW avoidance areas for non-energy leasable-related activities. However, because all PHMA would be closed to new leases and prospecting permits, managing PHMA as ROW avoidance areas would have no impact on non-energy leasable minerals.

All BLM-administered surface in GHMA would be managed as ROW avoidance for high voltage transmission lines, major pipelines, but open to other non-energy leasable mineral-related ROW location under Alternative 1.

Impacts from Non-energy Leasable Minerals Management

The BLM would close all PHMA to non-energy solid mineral leasing under Alternative 1. This would result in 7,247,900 acres (51 percent) of federal mineral estate in the decision area being closed to prospecting and leasing.

Utah Environmental Consequences

As discussed in the Minerals section of **Chapter 3**, production rates for gilsonite and phosphate are expected to remain steady for the life of the LUPs covered by this LUPA. However, total phosphate production in the Utah Sub-region may increase with the possible opening of a new phosphate mine in Utah.

Application of the 3 percent disturbance cap in PHMA and lek buffers in PHMA and GHMA could impact both new and existing non-energy leasable minerals activities by preventing or restricting new surface development. New non-energy leasable minerals activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. However, the BLM would not apply the disturbance cap in a manner that would eliminate all reasonable opportunities to develop an existing lease. Currently there are no population areas where the density of disturbance exceeds the 3 percent cap. However, there are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Uintah Population Area where there is high occurrence and existing development of phosphate.

Applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, surface disturbance, and noise could also restrict development of non-energy leasable minerals.

RDFs would be applied as under the action alternatives in PHMA and GHMA. In addition to the RDFs, disturbance cap, lek buffers, and density restrictions, additional conservation measures in PHMA would include net conservation gain requirements (also a requirement in GHMA), restrictions on noise, and seasonal restrictions. All of these combined could further restrict non-energy leasable minerals development. Based on the disturbance cap and these other restrictions, it is unlikely that the existing phosphate and gilsonite mines could expand or that new phosphate or gilsonite mines would be approved on federal mineral estate in the decision area.

However, all sodium occurrence in the decision area is in PHMA and, under Alternative 1, PHMA would be closed to new non-energy minerals leases. However, the occurrence of sodium is largely present outside of GRSG HMAs, so the overall impact on sodium development in Utah would be minimal.

Approximately 673,600 acres (16 percent) of federal mineral estate in the decision area would be open to leasing consideration for both surface and underground mining, all of which would be in GHMA. In GHMA, development would be subject to mitigation and lek buffers.

Gilsonite. Under Alternative 1, all federal mineral estate with gilsonite potential in the decision area would be within GHMA and would be open to non-energy leasable mineral leasing. However, new leases in GHMA would be subject to mitigation and lek buffers. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would lie within GHMA and would be subject to current lease-specific surface disturbance limitations and/or BMPs included in those leases or approved plans governing the leases.

Phosphate. Under Alternative 1, 186,700 acres (88 percent) of federal mineral estate with phosphate potential in the decision area (including all federal mineral estate in PHMA) would be closed to new non-energy leasable mineral prospecting and exploration and leasing, including all of federal mineral estate with high phosphate potential in the decision area (42,700 acres), however new leases adjacent to existing operations would be allowed. This allowance for new leases adjacent to existing operations would reduce impacts on locatable minerals from the closure of PHMA to new non-energy leasable mineral leasing by allowing continued development around ongoing operations. These new leases would be subject to restrictive management which would likely preclude new surface development associated with new and existing phosphate leases, where existing surface infrastructure could be used for underground development on new leases development would continue, but if that were not feasible operations in PHMA could be forced to close once existing reserves are exhausted.

The mineral potential report for the Vernal RMP identifies continued development of phosphate on nonfederal mineral estate during the period of analysis (through 2017). It does not anticipate any development on federal mineral estate during the period of analysis. However, since completion of that report, the phosphate mine in PHMA has changed ownership. Given current mineral holdings on private lands, it is anticipated that mining operations will be able to continue on private lands for 15 years. However, as the current mine on private lands expands, it is foreseeable that existing mining operations would progress to the edge of the nonfederal mineral estate. Then, because development of federal mineral estate would likely not be consistent with the disturbance cap, the mine would have to be redirected to other areas with nonfederal minerals or change mining methods (e.g., underground mining).

These changes would increase the cost of phosphate mining or, if the cost were deemed too high by the developer, potentially result in phosphate ore being left in place on federal mineral estate. Depending on the size of the federal minerals tract, this could result in either a loss (temporary lack of mining) or waste (permanent lack of mining if the remaining federal mineral resource is not economical to return to develop later) of federal mineral resources. This is because the mine on private lands would be reclaimed, then, if at some future date the federal minerals are available for mining, the minerals on the federal tract would generally not be economical to return to mine. While mining operations would be able to continue, there would be an increase in costs to the mine to use underground mining, move operations around the federal tracts, or redirect to other portions of the private lands. Restricting access to phosphate could hamper the production of fertilizer products needed to produce food.

Sodium. Under Alternative 1, none of the federal mineral estate with sodium occurrence in the decision area would be open to non-energy leasable mineral leasing. This would reduce the availability and potentially the amount of development of sodium in Utah.

Wyoming Environmental Consequences

In Wyoming the Known Sodium Leasing Area would remain open to exploration and consideration for leasing and development but would be closed to prospecting permits. In the Kemmerer and Rock Springs Field Offices sodium leasing outside the Known Sodium Leasing Area would be considered on a case-by-case basis and would be subject to conditional requirements. Seasonal restrictions, and density and disturbance limits would be applied to nonenergy leasable mineral development.

Alternative 2

Rangewide Environmental Consequences

In PHMA all states would apply the same management and expect the same resulting impacts on non-energy leasable minerals as described under Alternative 1 above. The only change is that Nevada would add exception criteria to the closure in PHMA, described under the Nevada Environmental Consequences section below.

In GHMA all states would apply the same management and expect the same resulting impacts on non-energy leasable minerals as described under Alternative 1 above.

Montana, North Dakota, South Dakota, Nevada/California, and Oregon would apply the same mitigation as Alternative 1. BLM does not require compensatory mitigation but will enforce state mitigation policies and programs. Colorado and Idaho require mitigation resulting in no net loss. Utah and Wyoming removed the net conservation gain requirement. Colorado, Idaho, Nevada/California, Oregon, Utah, and Wyoming specify that compensatory mitigation would be voluntary unless required by laws other than FLMPA, or by the State.

Under Alternative 2, in all states except Montana and Wyoming, the 3% disturbance cap does not include wildfire or agriculture. In Idaho, the cap can be exceeded in utility corridors if it will benefit GRSG. In Utah the 3% disturbance cap can be exceeded if will benefit GRSG. The cap is applied at the BSU and project scale except in Idaho where it is applied at the BSU scale only. In Montana and Wyoming, a 5% disturbance cap is applied at the project area scale in PHMA, it includes disturbance from wildfire and agriculture.

Nevada Environmental Consequences

Nevada added exception criteria to the closure in PHMA, allowing leasing of non-energy leasable minerals under certain circumstances. This would improve the availability of non-energy leasable minerals in the planning areas compared to Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under this alternative, all PHMA and IHMA would be closed to new non-energy mineral leasing; there would be no GHMA. Impacts of this closure would be the same type as those described under Nature and Type of Effects. However, because 100 percent of the decision area (including acreage already closed) would be closed under Alternative 3, impacts would increase compared with Alternative 1. COAs would be applied to existing leases where applicable and feasible. These COAs would include no new surface occupancy on existing leases within 1 mile of active leks, and within 2 miles of active leks within PHMA. If the lease is entirely within the active lek buffer, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features. This Alternative would limit permitted disturbances to 1 disturbance per 640 acres average across the landscape in PHMA. Disturbances may not exceed 3 percent in PHMA in any biologically significant unit and proposed project analysis area.

Idaho Environmental Consequences

Impacts from Non-energy Solid Leasable Minerals Management

Impacts under Alternative 3 are the same as those described under Alternative 1, except that more acres would be affected by closures (21,629,700 acres, or 78 percent of the non-energy leasables decision area). As a result, the magnitude of impacts under this alternative would increase compared with Alternative 1 since 473 acres of existing phosphate leases on BLM-administered lands would occur in PHMA. Less than one percent of the acres closed to leasing would be within Known Phosphate Lease Areas. Because the number of unleased acres within Known Phosphate Lease Areas that are closed would increase compared with Alternative 1, impacts on non-energy solid leasable minerals would increase under this alternative.

Approximately 5,730 acres of existing unmined federal non-energy leasable mineral leases in PHMA and GHMA would be subject to RDFs. This would limit surface disturbance, vehicle use, siting, and design of mineral development operations, in addition to imposing reclamation requirements. Application of RDFs would have the types of impacts described under Nature and Type of Effects**.** Because these RDFs would not be applied under Alternative 1, impacts would increase under Alternative 3.

Under Alternative 3, 19,167,400 acres, or 69 percent of the federal non-energy solid leasable mineral estate decision area (including all federal non-energy solid leasable mineral estate in PHMA), would be closed to prospecting and leasing. New leases to expand existing mines for phosphate would not be permitted in areas managed as closed.

Utah Environmental Consequences

Under Alternative 3 all federal mineral estate in the federal mineral estate decision area (4,008,600 acres) would be closed to new prospecting and exploration and leasing. Management under this alternative would close more federal mineral estate to non-energy leasable mineral prospecting and exploration and leasing than management under Alternative 1. This allocation decision would impact gilsonite, phosphate, and sodium. New leases to expand existing mines for these minerals also would not be permitted. Closing areas to non-energy mineral leasing would result in the same type of impacts as those described under *Nature and Type of Effects*.

Under Alternative 3, exploration would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Closing the decision area to exploration could reduce the availability of data on non-energy leasable mineral resources outside the decision area and could increase costs of non-energy leasable mineral development if it resulted in the need to conduct exploration for resources outside the decision area via less easily accessible locations than the locations within the decision area from which exploration might otherwise occur. Operators with existing leases would still be able to conduct new exploration on those leases.

Alternative 4

Rangewide Environmental Consequences

Under this alternative, non-energy leasable minerals would be managed the same as under Alternative 1; the impacts would be the same as described under Alternative 1 above, but would be applied to different HMA areas. In Idaho, 1 acre of existing phosphate leases would be within IHMA and 472 acres would be within GHMA.

Nevada and Northeastern California Environmental Consequences

In Nevada and northeastern California, exceptions to the non-energy leasable mineral closure in PHMA under may allow for increased development of non-energy leasable minerals in some locations.

Alternative 5

Rangewide Environmental Consequences

Under this alternative, non-energy leasable minerals would be managed the same as under Alternative 1; ; the impacts would be the same as described under Alternative 1 above, but would be applied to different HMA areas. In Idaho, no existing phosphate leases would be within HMAs on BLM-administered lands.

Nevada and Northeastern California Environmental Consequences

Impacts would be the same as described for Alternative 4.

Alternative 6

Rangewide Environmental Consequences

Under this alternative, impacts would be the same as described under Alternative 5 except that any existing non-energy leasable operations within ACECs would not be able to expand on federal mineral estate and no new operations would be permitted in ACECs.

4.10.3 Coal

Nature and Type of Effects

Closing an area to new coal leasing would directly impact coal production. This would be the result of removing the possibility of coal resources in that area from being accessed and extracted. In some cases mining operations may move to nearby private lands, thereby reducing the number of operations on federal mineral estate. Indirect impacts include loss of coal production for public use and for generating sales and tax revenues and federal royalties from production, as well as higher cost of location of surface facilities and adverse financial impact on lessee to accessing a portion of mineral estate from nearby private land.

Reduced access to existing coal leases such as NSO or equivalent on all or parts of new leases, ROW exclusions on lands needed for road and utility access, and restrictions on amount or location of surface disturbing activities on new or existing leases would impact coal production. Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production.

In areas with reduced access, applying NSO stipulations would restrict the ability of coal resources to be developed or extracted. To avoid these restrictions, operators may relocate, which would reduce coal development on federal mineral estate and resulting royalties.

Management actions creating ROW exclusion or avoidance areas could indirectly impact coal extraction by limiting the available means for accessing coal resources and transporting coal to processing facilities and markets. For example, new roads to access a mine could not be built in a ROW exclusion area. Coal operations may be moved to nearby state or tribal lands where access is easier, thereby reducing the number of operations on federal mineral estate. Because ROW avoidance areas could allow for limited ROW development, impacts of avoidance areas would be less severe than those of ROW exclusion areas. Impacts would be mitigated where exceptions were allowed for collocation of new ROWs within existing ROWs. Impacts would be mitigated where the area needed for coal processing and transportation infrastructure is included in the lease boundary. Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production.

Measures such as seasonal closures, burial requirements for electric distribution lines, noise abatement, visual screening, and specialized fencing would reduce development in otherwise permissible areas (fewer leases, fewer or smaller expansions of existing mines), particular for marginal coal resource areas or during periods of low market prices for coal. Indirect impacts include reduced production of coal for public use and for generating lease sale and tax revenues and federal royalties from production as well as adverse financial impact on lessee (especially for restrictions on existing leases).

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming manage PHMA as "essential habitat" for unsuitability evaluation. In GHMA there is no state specified special coal management.

Idaho, Nevada, California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Colorado Environmental Consequences

Under this alternative, the BLM would find coal resources unsuitable for future leasing when GRSG cannot be adequately protected. In addition, the BLM would have flexibility in approving projects with adequate design and mitigation, subject to a 3 percent disturbance cap. Restrictions on land use and other authorizations would be included under the Alternative 1, as follows:

- Managing both PHMA and GHMA as ROW avoidance areas
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3 percent in PHMA

This Alternative provides opportunity for new or expanded mines, subject to restrictions on the amount of surface disturbance in PHMA and ADH areas.

Impacts of the restrictions and authorizations would be as described under *Nature and Type of Effects,* above.

Montana Environmental Consequences

Coal exploration under Alternative 1 would not be allowed on about 93,925 acres of BLM-administered coal mineral estate pursuant to 43 CFR Part 3410.1-1(a)(1) and 43 CFR Part 3465.1(d). About 13,659 acres where exploratory coal drilling would be disallowed fall within the areas designated as coal with development potential.

In areas where coal exploratory drilling would be allowed mitigation such as specialized design features, or requiring maintenance of habitat functionality or avoidance would likely be required. These actions would delay permitting and increase the operator's costs for exploratory coal drilling. However, requirements for specialized design features or mitigation would allow the operation to occur.

North Dakota Environmental Consequences

There has been no coal development within the planning area. While the Bowman-Gascoyne Known Recoverable Coal Resource Area intersects PHMA and GHMA, no additional development of this field is anticipated within the planning period. This Known Recoverable Coal Resource Area has low development potential, and no interest has been expressed in developing the area.

Lignite is being mined in other areas of the state. The Known Recoverable Coal Resource Area within the planning area was not designated as a Coal Study Area because it was determined not to have sufficient economic coal resources. Because no coal development is foreseeable in the planning area, coal resources in the planning area are not expected to be impacted by management actions proposed in this RMPA. However, potential future surface mining could be precluded as a result of suitability determinations in PHMA (87,443 acres) under Alternative 1.

Utah Environmental Consequences

Measures to protect GRSG and its habitat (disturbance cap, lek buffers, net conservation gain requirements, and restrictions on noise and season) could affect the feasibility of new underground coal leases or the expansion of existing underground operations (e.g., increased costs and development delays due to limits on the timing of activities) but would not preclude them.

Application of a 3.1-mile lek buffer could affect mine placement, though the required buffer distance could be adjusted based on local topography.

Wyoming Environmental Consequences

Consideration of coal leasing within GRSG core, connectivity, and general habitat areas would allow for future development of these resources. Areas available for coal leasing would be dependent on the results of the coal screening process and the application of appropriate mitigation measures. Allowing coal exploration would enhance the development of these resources. Designating PHMA as "essential habitat" for unsuitability evaluation would impact 338,533 acres which would restrict the ability to develop coal over 2% of GRSG habitat areas.

Alternative 2

Rangewide Environmental Consequences

In all states except Utah management and impacts on coal resources would be the same as described under Alternative 1. Colorado, Montana, North Dakota, South Dakota, and Wyoming all PHMA would be "essential habitat" for unsuitability evaluation. Idaho, Nevada California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Utah Environmental Consequences

In Utah essential habitat would be identified as part of future unsuitability criteria, compared to Alternative 1 where all PHMA would be considered as "essential habitat" for unsuitability evaluation this might give flexibility to consider leasing in small areas that were included in PHMA but do not meet the criteria for essential habitat, such as important connectivity areas. Impacts would likely be minimal because the amount of PHMA that does not meet essential habitat criteria is small. Impacts would otherwise be the same as described under Alternative 1.

Alternative 3

Rangewide Environmental Consequences

All areas managed for GRSG would be PHMA. All essential habitat would be identified as part of future unsuitability criteria. compared to Alternative 1 where all PHMA would be considered as "essential habitat" for unsuitability evaluation, this change in management might give flexibility to consider leasing in small areas that were included in PHMA but do not meet the criteria for essential habitat, such as important connectivity areas. Impacts of this management change would likely be minimal because the amount of PHMA that does not meet essential habitat criteria is small. Impacts of this alternative would otherwise be the same as described under Alternative 1.

Idaho, Nevada, California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Alternative 4

Rangewide Environmental Consequences

Under Alternative 4 the consideration of PHMA as essential habitat for unsuitability evaluation in CO, MT/DK, UT, and WY state that PHMA would be removed as some areas of PHMA do not meet essential habitat criteria. However almost all essential habitat is likely to overlap with PHMA so the impacts would be approximately the same as described under Alternative 1. The plan will not modify any existing suitability and unsuitable determinations. The proposed management under this alternative would apply rangewide, but the planning area in Idaho, Nevada, California, and Oregon does not have coal mineral in deposits with a reasonably foreseeable possibility of development so no impacts on coal would occur in these states.

Alternatives 5 and 6

Rangewide Environmental Consequences

The proposed management and impacts under Alternatives 5 and 6 would be the same as under Alternative 4.

4.10.4 Locatable Minerals

Nature and Type of Effects

Under Alternative 3, BLM would recommend that certain areas are withdrawn from location and entry under the Mining Law. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. However, the BLM could ask the Secretary of the Interior to propose and make a withdrawal of the land from location and entry under the Mining Law of 1872 pursuant to Section 204(a) of FLMPA. Proposing and making a withdrawal is not a land use planning process. Should the Secretary propose a withdrawal, the proposal would require environmental and other analysis under NEPA and other applicable authorities before the land could be withdrawn. For purposes of this planning initiative, the alternatives analysis includes a description of the likely environmental effects should the Secretary propose and make a withdrawal in the future (e.g., reduced potential for behavioral disturbance and habitat loss/alterations).

If lands are withdrawn by the Secretary, the only locatable mineral resources that may be developed on withdrawn lands during the term of the withdrawal are those associated with mining claims that the BLM has determined to be valid; consequently, production of locatable mineral resources on federal mineral estate may decrease during the term of the withdrawal if such resources are situated on lands where there are no valid mining claims. However, if minerals of interest are not known to occur on the lands within the withdrawal, then the withdrawal would not have an effect, even where there are no mining claims.

Even where there are valid claims existing as of the effective date of the withdrawal or preceding segregation, production of locatable mineral resources may also be reduced by a withdrawal due to the additional administrative and financial requirements associated with exploration and mining on withdrawn lands. For example, BLM will not approve a plan of operations to proceed on withdrawn lands until it verifies that each mining claim on the lands where the proposed surface disturbance will occur was valid before the date of withdrawal and continues to be valid. This BLM verification process can take several years in some cases. Additionally, operators are required by regulation to pay the cost for BLM's verification of mining claim validity. Taken together, the additional regulatory process and cost could delay or curtail mineral exploration and development on withdrawn lands during the term of the withdrawal, assuming minerals of interest occur within the withdrawn lands. Indeed, in BLM's experience, few operators have been willing to undertake the time and expense associated with verification of mining claim validity.

The BLM may designate areas as ACECs as a conservation measure. Designating areas as ACECs in an RMP could impact production of locatable mineral resources because such designations would impose additional administrative and financial requirements certain exploration operators. Specifically, operators are required to file a plan of operations for any surface disturbing activities in those areas greater than casual use, regardless of the acreage involved, in accordance with 43 CFR Part 3809.11(c)(3). The requirement for plans of operations within ACECs could result in longer timeframes and additional costs to developers (including the cost of preparing an EIS, if an EIS is required) for those exploration operations occurring on fewer than five acres that would otherwise have been allowed under a notice.

Under all alternatives, BLM would request that locatable mineral operations apply design features to locatable minerals operations to benefit GRSG. These measures could be voluntarily implemented by the operator and would become enforceable if incorporated in the plan of operations approval. To the extent a design feature or best management practice to benefit GRSG is required to comply with applicable state or federal law, or is otherwise required to prevent unnecessary or undue degradation as defined in 43 CFR Part 3809, BLM may require the operator to incorporate the design feature or best management practice in its plan of operations.

Where disturbance caps are applied, surface disturbance from locatable operations would be counted towards the disturbance cap, but BLM may not prevent, unduly restrict, or require operations to perform compensatory mitigation in areas where the disturbance cap was exceeded.

Alternative 1

Rangewide Environmental Consequences

In all states, Alternative 1 recommended the withdrawal of all SFAs from location and entry under the United States mining laws. After publication of the RODs in 2015, the BLM applied for these lands to be withdrawn and the Secretary accepted the application. The BLM then initiated a process to consider the withdrawal, pursuant to section 204 of FLPMA. That process is currently underway. If the Secretary decides to withdraw the proposed lands, this would likely result in a decrease in the exploration and development of locatable minerals in these areas. The types of impacts are the same as those described under *Nature and Type of Effects*. Application of seasonal restrictions, if deemed necessary in other areas, could restrict the timing, feasibility, or costs associated with locatable mineral development.

Colorado Environmental Consequences

Under Alternative 1, locatable minerals operations in PHMA would require appropriate effective mitigation for conservation to the extent necessary to comply with the standards and requirements under 43 CFR Subparts 3715, 3802, and 3809. Also, seasonal restrictions would be applied if deemed necessary to comply with the standards and requirements under 43 CFR Subparts 3715, 3802, and 3809. In ADH areas and in PHMA where mitigation is not otherwise required to comply with the standards and requirements, operators could be requested to voluntarily agree to suggested design features.

Access roads needed to access claims or mines would be constructed in accordance with 43 CFR Part 3809.420(b) and applicable MSHA or State standards. If it is determined by the authorized officer that an engineered road is warranted, then BLM would typically require engineered design by the operator. This would also apply where an engineered road is warranted for exploration activities.

Idaho Environmental Consequences

Under Alternative 1, 2,968,200 acres of federal locatable mineral estate (including all acres in the SFA) were recommended for withdrawal from location and entry under the United States mining laws. The BLM initiated a separate process for the Secretary to consider whether to withdraw these lands, pursuant to section 204 of FLPMA. That process is currently underway. If the Secretary ultimately withdraws all of these lands, when combined with the 5,380,200 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would total 8,348,400 acres, or 28 percent of the federal locatable mineral estate.

Of the 56 plans of operations and notices currently authorized within the decision area for Alternative 1, 7 (13 percent) are on lands that would be within the SFA under this alternative and therefore within the area previously recommended for withdrawal.

Nevada-California Environmental Consequences

Under Alternative 1, 2,731,600 acres of the decision area were recommended for withdrawal from mineral entry. As mentioned above, pursuant to the separate process currently underway, if the Secretary ultimately withdraws all of these lands, when combined with the 521,600 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would total 3,253,200 acres, or 20 percent of the federal locatable mineral estate, and 80 percent (13,273,400 acres) are not recommended for withdrawal.

Alternative 1 would require RDFs to all GRSG habitat as additional conservation measures where necessary to comply with the applicable standards and requirements under 43 CFR Subparts 3715, 3802, and 3809.

North Dakota and South Dakota Environmental Consequences

In North Dakota and South Dakota zero acres were recommended for withdrawal from mineral entry.

Oregon Environmental Consequences

Under Alternative 1, 1,835,800 acres of the decision area, specifically land designated as SFA, were recommended for withdrawal from mineral entry. As mentioned above, pursuant to the separate process currently underway, if the Secretary ultimately withdraws all of these lands, when combined with the 1,435,900 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would total 3,271,700 acres, or 23 percent of the federal mineral estate decision area.

Under this alternative, 117 mining claims, 1 plan of operations, and 9 exploration notices would be in the SFA. As such, all would be in the area that was recommended for withdrawal. This represents 21 percent of the 609 claims, plans, and notices in occupied GRSG habitat.

Under Alternative 1, 715,049 acres of BLM-administered surface in the decision area would be designated as ACECs. A plan of operations would be required for exploration operations disturbing five acres or less in these ACECs.

Utah Environmental Consequences

Under Alternative 1, 235,000 acres (6 percent) of the decision area, including the SFA, were recommended for withdrawal from mineral entry. As mentioned above, pursuant to the separate process currently underway, if the Secretary ultimately withdraws all of these lands, when combined with the 445,900 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would be total 680,900 acres.

Under Alternative 1, 1,800 acres (less than 1 percent) of federal mineral estate with high potential in the decision area was recommended for withdrawal.

Of the 39 existing authorized locatable mining operations in the decision area, none would be in the SFA under Alternative 1. However, 11 mining claims would be in the SFA. As mentioned above, pursuant to the separate process currently underway, if the Secretary ultimately withdraws all lands in SFA, as recommended under Alternative 1, BLM would not authorize new operations on any existing mining claims in SFA until BLM confirmed that the mining claim was valid on the date of the withdrawal and remains valid.

Under Alternative 1, BLM could limit surface-disturbance in PHMA if necessary to comply with the standards and requirements in 43 CFR Parts 3715, 3802, or 3809. Similarly, BLM would apply the disturbance cap, minerals/energy density, RDFs, and seasonal restrictions in PHMA and mitigation for net conservation gain and lek buffers in PHMA and GHMA if necessary to comply with the standards and requirements in 43 CFR Parts 3715, 3802, or 3809 and prevent unnecessary or undue degradation.

Wyoming Environmental Consequences

On BLM-administered lands the BLM previously recommended for withdrawal from mineral entry within SFA portions of PHMA of 1,146,130 acres. As mentioned above, pursuant to the separate process currently underway, if the Secretary ultimately withdraws all of the recommendation, these withdrawals in combination with existing withdrawals on 1,761,550 acres, the total acreage of withdrawn federal lands in the decision area would total 2,907,680 acres.

Alternative 2

Rangewide Environmental Consequences

No recommendations for the withdrawal of SFAs from mineral entry are made under this alternative, except in Montana which would continue the recommendation for withdrawal of SFAs as described under Alternative 1. In all states, except Montana, the removal of any recommendation for withdrawal under Alternative 2 would have no impact. Recommendations to withdraw lands from location and entry under the Mining Law of 1872 have no impact. Only the Secretary or her designee may withdraw lands and this is done not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Montana Environmental Consequences

Montana did not remove the recommendation for withdrawal of SFAs from mineral entry as described under Alternative 1. Impacts on locatable minerals in Montana under Alternative 2 would be the same as described under the *Montana Environmental Consequences* section of Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under Alternative 3, all PHMA would be recommended for withdrawal from mineral entry. Impacts would be similar in nature and type to those described under Alternative 1, but a much larger area would be recommended for withdrawal under this alternative (see **Table 2-3** which shows the acres of PHMA by state). If the Secretary were to decide to withdraw these areas, after the completion of the process outlined in section 204 of FLPMA, there may be limited opportunities for locatable mineral development in the decision area as described in the *Nature and Type of Effects*.

Alternatives 4 and 5

Rangewide Environmental Consequences

Alternative 4 would not designate any SFAs and would not recommend any areas for withdrawal from mineral entry. The impacts on locatable minerals under this alternative would be the same as described under Alternative 2. This alternative would not recommend the modification of any existing withdrawals or modify any existing recommendations for withdrawal not associated with GRSG management.

Montana Environmental Consequences

In Montana under Alternative 4, no SFAs would be designated and no recommendations for withdrawal would be made. Just as in Alternative 1, the removal of any recommendation for withdrawal under this alternative would have no impact.

Alternative 6

Rangewide Environmental Consequences

Alternative 6 would designate ACECs in the same areas as under Alternative 3, along with a requirement (per 43 CFR Part 3809.11(c)(3)) to prepare a plan of operations for exploration operations disturbing five acres or less. Processing plans of operations is more time-consuming than processing an exploration notice. Additionally, designation of an ACEC would increase costs to those operators who would otherwise conduct exploration under a notice, and potentially reduce development of locatable mineral resources on BLM-administered mineral estate in the planning area that would have resulted from exploration that could have been done under a notice.

4.10.5 Mineral Materials

Nature and Type of Effects

The predominant mining method for mineral materials is surface mining; therefore, any restrictions on surface-disturbing activities effectively close the subject areas to mineral material mining unless an exception is provided. Demand for mineral materials is generated primarily from road maintenance needs, as well as commercial projects and public use. Closing areas to mineral material disposal would directly impact mineral materials by removing the possibility of mineral resources in that area from being accessed and extracted for use. In areas closed to mineral material disposal users would have to transport materials needed for road maintenance and other uses from farther away resulting in increased costs associated with transportation of the material and make projects more expensive to pursue in some areas which would cause cancelled projects and poorer road conditions in some areas. Where areas are closed to mineral material disposal, new pits could relocate to nearby areas open to disposal if feasible. If demand for mineral materials could not be met by pits operated on federal lands, pits could be moved onto private or state lands where resources exist, this would generally increase costs associated with road construction and maintenance and other uses conducted by state, county and local governments which are able to develop federal mineral materials free of charge under free use permits. Closing an area to mineral material sales but not to new free use permits would remove this impact of increased costs from road maintenance and other mineral material uses by state, county, and local governments and non-profit organizations which are eligible for free use permits, but would still result in impacts on commercial and private users. Another effect is the potential for mineral materials mining to shift from BLM to state or private lands. In that case, the impacts of mining (such as noise, dust and truck traffic) could be shifted to areas where such impacts would be a nuisance to farmers and residential areas. Management which proposes closing existing mineral materials pits would exacerbate these impacts by causing more immediate relocation of sources and reductions in mineral materials production. In areas where closed but with an exception for expansion of existing pits impacts on both private users and state, county and local governments would likely be reduced in the short term as these users could continue using existing sources, but if resources at and around existing locations are exhausted as is likely at some locations in the longer term

Applying TLs and seasonal travel restrictions could delay extraction of mineral material resources. County road districts and other users would be required to schedule their projects around the TL, which could result in the need to stockpile materials off-site and handle materials twice, thereby increasing costs.

Management prohibiting or restricting the construction of new roads and limiting reroutes and upgrades could make accessing mineral material deposits more costly or infeasible.

Managing areas as ROW avoidance or exclusion would decrease new construction of infrastructure (e.g., roads) and thereby decrease demand for mineral materials in those areas. This, in turn, could result in a decrease in the amount of material extracted, and the number or size of mineral material pits on federal mineral estate. In some cases, new mineral material pits may not be able to be developed in areas managed as ROW avoidance or exclusion because new infrastructure to these pits could not be constructed in exclusion areas and would be difficult to construct in avoidance areas. However, in many cases access needed is to a mineral material development is included as part of the permitted operational area and as a result would not need a separate ROW permit. Also, in most cases areas managed as ROW exclusion would also be managed as closed to mineral material development.

In ROW avoidance areas BLM may manage and maintain existing routes. Some route improvements could be made for fuel breaks and to allow for quicker wildfire suppression response in GRSG habitat. In these situations, there will be a demand material for road maintenance and improvement (via Free Use Permit to BLM) from pits in GRSG HMAs.

Closing areas to fluid mineral leasing would preclude oil and gas development in those areas which would reduce demand for mineral materials for use constructing well pads and roads. Application of NSO stipulations could have the same effect if the stipulations prevented oil and gas development.

Alternatives requiring restoration of salable mineral pits in HMA that are no longer in use, to meet GRSG habitat conservation objectives could depending on application, reduce the availability of salable minerals in some cases, for example if a pit with a history of only being used once every few years were considered no longer in use and closed for restoration it would no long be available.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, PHMA would be closed to new mineral material sales, but open for new free use permits, and expansion of existing pits for both free use permits and material sales. As discussed under the *Nature and Type of Effects* heading this would prevent mineral materials from being sold from new locations, but would allow continued use of existing pits. It would also allow new free use permits in both existing and new locations, which would allow state, county, and local governments and non-profit organizations the flexibility to cost-effectively locate mineral material sources. This could result in the displacement of mineral material mining to different areas further from locations where they are needed which would increase costs associated with use. No states would close GHMA to mineral material disposal, but most would apply minimization measures such as RDFs/BMPs and mitigation. Colorado, Idaho and Wyoming would apply state specific management, discussed under the state specific headings for those states below.

Colorado Environmental Consequences

Under this alternative, PHMA would be closed to new mineral material sales, but open to new free use permits and expansion of existing pits where certain criteria are met.

Idaho Environmental Consequences

Under Alternative 1, 15,529,000 acres (56 percent) of federal mineral material estate in the decision area (including all PHMA) would be closed to mineral material disposal except for the expansion of existing pits, unlike other states, in Idaho this closure extends to new free use permits. Closing PHMA to new free use permits would result in increased costs to local government road departments for road maintenance and could result in worsening road conditions in these areas. Approximately 3,079,100 acres of federal mineral material estate in the decision area (including all IHMA) would be open to mineral material disposal but only if the Anthropogenic Disturbance Development and Criteria were satisfied (including the requirement that the project would not exceed the 3 percent disturbance threshold). Mineral material activities in IHMA and GHMA would also be subject to RDFs, buffers, and seasonal timing restrictions. The types of impacts from these closures are the same as those discussed under Nature and Types of Effects

Mineral material sales from the 47 existing community pits in GRSG habitat would be subject to timing restrictions. These timing restrictions could impact some operations and therefore reduce overall sales of federal materials in the planning area.

<u>Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination</u>

Under the Alternative 1, anthropogenic disturbance, including mineral material development, would be limited to 3 percent of nesting and wintering habitat within PHMA and IHMA within a Conservation Area (i.e., BSUs). In BSUs where the 3 percent cap is already exceeded, new development of federal mineral material resources would be prohibited until enough habitat was restored to maintain the area under the threshold. Development of federal mineral material resources that would result in exceedance of the 3 percent cap in a BSU would also be prohibited. This cap could potentially impact activities on 3,079,100 acres of federal mineral material estate in IHMA.

Nevada Environmental Consequences

Alternative 1 would require a 3 percent disturbance cap on human surface-disturbing activities in PHMA and would incorporate RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It would also require all human disturbances to result in a net conservation gain for GRSG and their habitat, and lek buffers would be required.

Collectively, these GRSG management actions would result in the impacts described under *Nature and Type of Effects*.

Oregon Environmental Consequences

Application of the 3 percent disturbance cap and in PHMA and lek buffers in PHMA and GHMA could impact mineral material activities by preventing new surface development. New mineral material pits or expansion of existing pits could be precluded if the cap were exceeded in an Oregon PAC (also known as BSU) and proposed project area. In cases where development was allowed, mitigation requirements would increase the cost of development. Applying lek buffer distances when approving actions would also restrict mineral material development in some areas.

Utah Environmental Consequences

Under Alternative 1, the application of the 3 percent disturbance cap in PHMA could impact mineral material activities by preventing new surface development. New mineral material pits or expansion of existing pits could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. In cases where development was allowed, mitigation requirements would increase the cost of development.

Applying lek buffer distances when approving actions for surface disturbance could restrict mineral materials development in GHMA and could cause development to move away from desired locations.

Under Alternative 1, all BLM-administered surface within GHMA would be available for ROW location, except for 17,600 acres already managed as exclusion. While these areas would be open, ROW development in GHMA would be subject to lek buffers and net conservation gain requirements, which could impact mineral material development as discussed above. If disturbance is pushed to areas without restrictions, then overall demand for mineral materials will not be affected. However, if the area of new disturbance decreases across the landscape, the demand for mineral materials could be reduced.

Under Alternative 1, PHMA would be closed to mineral material disposal. This includes 1,196,900 acres with mineral material occurrence. Impacts would be somewhat mitigated because new free use permits and expansion of existing pits would be allowed, subject to restrictions. The types of impacts from these closures would be the same as those discussed under *Nature and Type of Effects*. There are approximately 24,000 acres under a mineral material permit within GRSG habitat statewide. Further, with approximately 1,100 acres of existing disturbance associated with those mineral material pits there are opportunities for existing pits to expand within their existing permitted areas. Because less than 5 percent of the existing permitted area has been disturbed expansion would fall under the disturbance cap at the project level for most pits. Therefore, while there may be site-specific instances where a new pit in occupied GRSG habitat is denied, the potential for this is low because there is additional development opportunity at existing sites.

Wyoming Environmental Consequences

Under Alternative 1, in Wyoming salable mineral development (e.g., mineral material exploration, sales and free use permits) would be allowed in GRSG core, connectivity, general habitat areas which would allow for the continued use and development of these resources.

Prohibiting surface disturbing activities on 337,860 acres would result in the same type of impacts on mineral material development as those described under *Nature and Type of Effects*. Restricting surface disturbance on 160,630 acres Density limitations of a 5% disturbance cap within PHMAs (core only) would Prevent the development of new mineral material developments in areas at or above the cap. Prohibiting surface occupancy and disruptive activities within 0.6 miles of occupied leks and seasonal restrictions in GRSG nesting/early brood-rearing habitat and winter concentration areas could result increased cost associated with mineral material development as described under *Nature and Type of Effects*.

Applying RDFs as mandatory stipulations and conservation objectives and applying BMPs to federal mineral estate where the surface ownership is non-federal would result in increased development costs. Avoiding primary and secondary roads within 1.9 miles of the perimeter of occupied GRSG leks and prohibiting other new roads within 0.6 miles of the perimeter of occupied GRSG leks within PHMAs would reduce the area where new roads needed for mineral development could be constructed.

The management of ROW exclusion areas (285,930 acres) within PHMAs and GHMAs would prevent the construction of access roads for mineral material sites, however if mineral material development were otherwise allowed in the area, sites could be constructed along existing roads which could reduce the impacts of this management.

Alternative 2

Rangewide Environmental Consequences

Under Alternative 2 proposed management and impacts would be similar to those described under Alternative 1, except in Idaho and Nevada.

Idaho Environmental Consequences

Under Alternative 2 in PHMA and IHMA managed as closed to mineral material development, Idaho would allow consideration of new free use permits. Compared to Alternative 1 this would reduce impacts on road conditions and high road maintenance costs on local governments which would no longer have to transport mineral materials required for road maintenance from outside these areas. Impacts would otherwise be the same as described under Alternative 1.

Nevada Environmental Consequences

Under Alternative 2 Nevada would exception criteria to the mineral material disposal closure in PHMA. In PHMA, GHMA, and OHMA, the State Director (in coordination with NDOW, Sagebrush Ecosystem Technical Team, and/or CDFW) may grant an exception to the allocations and stipulations proposed if one of the following applies:

i. The location of the proposed activity is determined to be unsuitable (by a biologist with GRSG experience using methods such as (Stiver et al. 2015); lacks the ecological potential to become marginal or suitable habitat; and would not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions would not apply to those areas determined to be unsuitable because the area lacks the ecological potential to become marginal or suitable habitat.
ii. The proposed activity's impacts could be offset to result in no adverse impacts on GRSG or its habitat, through use of the mitigation hierarchy consistent with Federal law and the state's mitigation policies and programs. In cases where exceptions may be granted for projects with a residual impact, voluntary compensatory mitigation consistent with the State's management goals could be one mechanism by which a proponent achieves the RMPA goals, objectives, and exception criteria. When a proponent volunteers compensatory mitigation as their chosen approach to address residual impacts, the BLM can incorporate those actions into the rationale used to grant an exception. The final decision to grant a waiver, exception, or modification would be based, in part, on criteria consistent with the state's GRSG management plans and policies.
iii. The proposed activity would be authorized to address public health and safety concerns, specifically as they relate to federal, state, local government and national priorities. iv. Renewals or re-authorizations of existing infrastructure in previously disturbed sites or expansions of existing infrastructure that do not result in direct, indirect, or cumulative impacts on GRSG and its habitat.
iv. The proposed activity would be determined a routine administrative function conducted by federal, state, or local governments, including prior existing uses, authorized uses, existing rights, and existing infrastructure (i.e., rights-of-way for roads) that serve a public purpose and would have no adverse impacts on GRSG and its habitat, consistent with the state's mitigation policies and programs.
v. Exceptions to lands that are identified for retention would be considered for disposal or exchange if they were identified for disposal through previous planning efforts, either as part of the due process of carrying out Congressional Acts (e.g., the respective Lincoln and White Pine County

Conservation, Recreation, and Development Acts) or the agency can demonstrate that the disposal, including land exchanges, would have no direct, indirect or cumulative impacts on GRSG and its habitat.

These criteria could increase the time to get approval for new mineral material developments but would also provide certainty about the conditions under which exemptions would be granted.

Alternative 3

Rangewide Environmental Consequences

Under Alternative 3, all areas managed for GRSG would be PHMA and salable minerals would be closed to disposal in all PHMA. Some states are considering expanding HMAs to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA. Impacts would be the same as described under *Nature and Type of Effects* but would apply across a much larger area than under Alternative 1, the magnitude of all impacts would increase under this alternative.

ACECs would also be considered under this alternative, though because of the restrictive nature of the PHMA management under this alternative, there would be no different allocations between the PHMA and the potential ACEC boundaries.

Under Alternative 3 all PHMA would be managed as ROW exclusion (outside of designated corridors), however, because all PHMA would be closed to mineral materials disposal under this alternative, the ROW exclusion areas would not impact the mineral materials program.

This alternative has the greatest impacts on salable minerals because restrictions would be applied to the greatest number of acres, increasing the potential for reduced availability, reduced access, and increased development costs for accessing salable minerals.

Colorado Environmental Consequences

For existing mineral material disposal sites, no new road construction would be permitted within a 4-mile buffer of a GRSG lek. Road realignments or route upgrades could occur only in certain specified situations, and closing and revegetating unneeded routes to restore GRSG habitat would apply in ADH and PHMA.

Oregon Environmental Consequences

Under Alternative 3, existing mineral materials pits in occupied habitat would also be closed to new sales. The impacts from this closure would be the same as those discussed under *Nature and Type of Effects* but impacts on availability of mineral materials would occur more quickly in Oregon because existing sites in closed areas could not continue to supply mineral materials.

Alternatives 4 and 5

Rangewide Environmental Consequences

Under Alternatives 4 and 5, proposed management and impacts on mineral material development would be the same as described under Alternative 1, except in Idaho as discussed under the state specific heading below.

Idaho Environmental Consequences

In Idaho, exceptions to the mineral material closure in PHMA under Alternative 2 may allow for increased development of mineral materials in some locations.

Alternative 6

Rangewide Environmental Consequences

Under Alternative 6, proposed management and impacts on mineral material development would be the same as described under Alternative 4, except that ACECs would also be considered under this alternative. Under Alternative 6, ACECs would be closed to new all new mineral material sales and operations, except for free-use permits issued in order to support maintenance needs for existing local roads to ensure public safety. New mineral material sites for free-use should avoid ACECs, however if avoidance is not possible sites would need to comply with all the minimization measures identified for PHMA.

4.10.6 Oil Shale and Tar Sands

Nature and Type of Effects

Certain management actions and allocation-based decisions could impact the feasibility, amount, and type of development. For example, depending on the alternative selected, areas within GRSG habitat may be subject to surface disturbance thresholds, timing restrictions, and other GRSG protection measures. In addition, managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

Alternative 1

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources the same as fluid leasable minerals so management and impacts would be same as described under Fluid Minerals Alternative 1 in **Section 4.10.1**, above.

Proposed management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Alternative 1 does not include leasing allocation decisions for oil shale and tar sands in Utah because the ROD for the Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming closed all mapped occupied GRSG habitat on BLM-administered lands to oil shale and tar sands leasing and development with the exceptions of the pending lease application in the Asphalt Ridge Special Tar Sands Area and the White River Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area (BLM 2013). Within these two areas, leasing and development would be allowed to occur; however, certain management actions and allocation-based decisions being considered could impact the feasibility, amount, and type of development. For example, depending on the alternative selected, GRSG habitat that overlaps the above-mentioned areas may be subject to surface disturbance thresholds, timing restrictions, and other GRSG protection measures. In addition, managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

Under Alternative 1, no disturbance cap would be applied to anthropogenic disturbance in GHMA. Because the existing and pending leases would be in GHMA under this alternative, oil shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (for the White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses.

However, oil shale and tar sands development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements, which could impact oil shale and tar sands development by restricting new surface development. GHMA would be available for the types of ROW location needed for oil shale and tar sands development. However, ROW development in GHMA would be subject to lek buffers and net conservation gain requirements. Applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, tall structures (including transmission lines), surface disturbance, and noise could also restrict development of infrastructure related to oil shale and tar sands development.

Alternative 2

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources as fluid leasable minerals so management and impacts would be same as described in under Fluid Minerals Alternative 2 in **Section 4.10.1**, above. Management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Alternative 2 does not include leasing allocation decisions for oil shale and tar sands in Utah because the ROD for the Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming closed all mapped occupied GRSG habitat on BLM-administered lands to oil shale and tar sands leasing and development with the exceptions of the pending lease application in the Asphalt Ridge Special Tar Sands Area and the White River Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area (BLM 2013). Within these two areas, leasing and development would be allowed to occur; however, certain management actions and allocation-based decisions being considered could impact the feasibility, amount, and type of development. For example, depending on the alternative selected, GRSG habitat that overlaps the above-mentioned areas may be subject to surface disturbance thresholds, timing restrictions, and other GRSG protection measures. In addition, managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

Alternative 2, would allow exceptions for projects to exceed the disturbance and density caps in PHMA, and allow exceptions to avoidance and minimization measures in PHMA if the area is non-habitat and indirect impacts would not occur. Allowing an exceedance to the disturbance and density caps based on site-specific habitat condition, population information, and proponent-volunteered project design elements could allow mineral development to proceed in areas that might otherwise have been precluded by the No-Action Alternative. Allowing consideration or proposed developments that could exceed the 3 percent disturbance cap or density cap provides the ability to potentially avoid precluding leasing/permitting, development, or consideration of associated infrastructure. However, authorizing the exceedances to the disturbance and density caps would only be allowed if voluntarily developed minimization or mitigation improves GRSG habitat. As such, while there is more flexibility and projects may no longer be precluded by the caps, proponents with potential developments may still need to evaluate GRSG conditions or propose habitat improvement projects. While projects may not be precluded by the caps, voluntarily applying the criteria could result in additional costs to implement mitigating measures. This could increase project costs and could make a proposed project uneconomical. Allowing exceptions to avoidance and minimization measures in PHMA if the area is non-habitat and indirect impacts would not occur could allow consideration of leasing/permitting and development for mineral operations.

Alternative 2 would also would no longer require proponents to provide for compensatory mitigation on a project-by-project basis to show a net conservation gain. The BLM would cooperate with the State of Utah to analyze applicant-proposed, or state required or recommended compensatory mitigation to offset residual impacts. BLM may authorize such actions consistent with NEPA analysis and the governing RMP. Not requiring proponents to pay for vegetation and habitat treatments could decrease project costs, providing more opportunities for oil shale and tar sands development projects to move forward in PHMA and former GHMA.

Alternative 3

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources as fluid leasable minerals so management and impacts would be same as described in under Fluid Minerals Alternative 2 in **Section 4.10.1**, above. Management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Under Alternative 3, disturbance in PHMA would be subject to a 3 percent cap, which would include wildfire. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in PHMA. The Uintah Population Area, where the White River Oil Shale Preference Right Lease Area is located, is currently just under the 3 percent disturbance cap. New development could push the area over the cap and prevent new surface disturbance in this portion of the Preference Right Lease Area until areas are reclaimed to the point where disturbance is below the threshold. All BLM-administered surface in PHMA would be managed as exclusion under Alternative 3. There could be indirect impacts resulting from the limits on access and the available means for transporting oil shale and tar sands to processing facilities and markets.

Alternatives 4 and 5

Rangewide Environmental Consequences

Under Alternatives 4 and 5, proposed management and impacts on oil shale and tar sands development would be the same as described under Alternative 1.

Alternative 6

Rangewide Environmental Consequences

Under Alternative 6, proposed management and impacts on oil shale and tar sands development would be the same as described under Alternative 1, except that ACECs would also be considered under this alternative. Under Alternative 6, ACECs would have NSO stipulations applied to leases which could increase the costs of development or prevent the development of some oil shale and tar sands in the planning area.

4.11 ACECs and Research Natural Areas

4.11.1 Greater Sage-Grouse ACECs

General Description

ACEC designations highlight areas where special management attention is needed to protect important historical, cultural, and scenic values, or fish and wildlife or other natural resources. This analysis identifies impacts among the alternatives for other resources and resource uses to prevent irreparable damage to the relevant and important values associated with each ACEC within the rangewide planning area (see **Section 3.10.1**, Greater Sage-Grouse ACECs for existing conditions of ACECs that overlap mapped occupied GRSG habitat). The analysis of impacts on ACECs is necessarily an analysis of impacts on the relevant and important values that are given special management attention through the designation of ACECs. For a more nuanced exploration connecting the *Nature and Type of Effects* with specific relevant and important values, refer to **Appendix 5**, Evaluation of Areas of Critical Environmental Concern for Greater Sage-Grouse Habitat. A complete evaluation of impacts on these relevant and important values is incorporated here and into the appropriate impact analysis sections addressing Cultural Resources (**Section 4.16**), Soil Resources (**Section 4.14**), Water Resources (**Section 4.15**), Vegetation Management (**Section 4.3**), and Fish and Wildlife (**Section 4.5**).

4.11.2 Nature and Type of Effects

In general, management actions that protect resources (such as surface-disturbance restrictions and management for desired habitats) would help maintain and improve the relevant and important values within ACECs. Management actions that create the potential for resource degradation (such as mineral development, improper livestock grazing, infrastructure development, and other surface-disturbing activities) could impact the relevant and important values for which an ACEC is designated.

Improper livestock grazing could impact ACEC values, depending on what the values are for each ACEC, by increasing the potential for soil erosion, increasing annual grasses, reducing perennial native vegetation, and affecting the plant communities that are the values for which the ACEC was designated. As another group of large grazing ungulates, wild horses and burros, have the capability of overutilizing vegetation, causing degradation of soil and vegetative resources as described for livestock grazing. Closing ACECs to livestock grazing could help protect relevant and important values by eliminating soil and vegetation disturbance associated with livestock grazing; however, this could also increase the risk for wildfire due to increased fuel loads. Further, as described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of adverse effects.

Energy and mineral development could impact ACEC values by increasing soil erosion potential and by removing or disrupting unique vegetation. Where GRSG habitat exists, energy and mineral development could degrade and fragment habitat. Construction, operation, and maintenance could disturb GRSG populations. However, the protections and limitations needed to maintain the relevant and important values of each ACEC are included in the plans that manage those ACECs. Additionally, closing ACECs to fluid mineral leasing or applying NSO stipulations would help protect relevant and important values in unleased areas.

Identifying ACECs as ROW exclusion or avoidance areas would protect relevant and important values by reducing (for avoidance areas) or eliminating (for exclusion areas) impacts from development requiring a ROW permit. Such developments include utilities, access roads, and renewable energy projects. Impacts from ROW development on GRSG habitat include compaction, erosion, and potentially habitat fragmentation.

PHMA, IHMA, and GHMA allocations provide a comprehensive management framework, covering a diverse array of management actions and restrictions in Alternatives 1-6, effectively capturing GRSG habitat and most ACECs. However, ACEC designation adds a layer of specificity, enabling a more targeted approach to address unique relevant and important values that might not be fully covered by the broader allocations. ACEC designation emphasizes and prioritizes specific concerns within designated areas, offering a mechanism to address nuances that may not be sufficiently addressed by the overarching PHMA/IHMA framework.

4.11.3 Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, PHMA, IHMA and GHMA would continue to be available for livestock grazing, except in Oregon where all or portions of RNAs would be unavailable. The BLM would continue to prioritize monitoring and renewal of grazing in SFAs and PHMA outside of SFAs. Impacts on the relevant and important values from areas available to livestock grazing would continue to be determined by variations in site-specific management actions that strive to minimize concentrated compaction and aim to maintain or improve soil conditions. Within the areas available for livestock grazing, the appropriate BLM Authorized Officer may include or adjust permit terms and conditions needed to meet land health standards. In turn, these management actions would continue to help minimize local impacts on relevant and important values from the areas available to livestock grazing, which would also help minimize rangewide impacts for long-term relevant and important values as described under the *Nature and Types of Effects*.

Under Alternative 1, management of fluid minerals, salable minerals, and nonenergy mineral development in PHMA, GHMA, and IHMA would continue to vary by state and includes areas that are open or closed (see **Chapter 2** alternatives for minerals management). These various restrictions on areas of land protected from or open to surface disturbing activities within PHMA, IHMA, and GHMA would continue to help minimize impacts on the relevant and important values as described under the *Nature and Types of Effects*.

Classifying PHMA as exclusion or avoidance areas to major and minor ROWs and wind and solar would continue to decrease the potential for impacts on relevant and important values associated with ROW development, such as the surface-disturbing activities described under the *Nature and Types of Effects*. This is because development of ROWs would be prohibited in exclusion areas and would be considered on a case-by-case basis in avoidance areas.

Other restrictions on ROWs, such as requirements to meet the Anthropogenic Disturbance Screening Criteria and measures to encourage collocation would protect relevant and important values from the surface-disturbing activities as described under *Nature and Types of Effects*. GHMA in all states would continue to be open to minor ROWs with mitigation measures, except Wyoming would not require mitigation. Impacts on relevant and important values associated with these surface-disturbing activities could occur in these areas if developed, but mitigation measures would help to lessen the impacts.

State-Specific Environmental Consequences

In Oregon, where all or portions of RNAs would be unavailable to livestock grazing, the potential impacts on the relevant and important values from areas open to livestock grazing would be eliminated.

In Wyoming and Montana, fluid mineral development in PHMA would continue to be subject to density and disturbance limits. Implementing density and disturbance limits would continue to reduce potential impacts on relevant and important values associated with fluid mineral development as described under the *Nature and Types of Effects*, but to a lesser extent than if they were closed to fluid mineral development or classified as NSO. GHMA would continue to be subject to NSO stipulations for fluid mineral development within two

(Colorado), one (Oregon) or 0.25 (Wyoming) miles of leks. GHMA in Utah would also continue to be subject to NSO stipulations but the distance varies by site-specific management. PHMA and GHMA in Colorado and GHMA in Oregon would continue to be closed to fluid mineral development within one mile of leks. Fluid mineral development would continue to be subject to Controlled Surface Use (CSU, seasonal restrictions and/or buffers) stipulations in Idaho, Nevada/California Oregon, Wyoming GHMA. Applying these restrictions to fluid mineral development would continue to further reduce potential impacts on relevant and important values associated with fluid mineral development as described under *Nature and Types of Effects*.

For both salable mineral and nonenergy mineral development, Wyoming PHMA would continue to be subject to seasonal restrictions, while Wyoming and Montana PHMA would continue to be subject to density and disturbance limits. These additional restrictions would continue to further reduce potential impacts on the relevant and important values associated with salable mineral development as described under *Nature and Types of Effects*. In Idaho, IHMA would continue to be open to nonenergy mineral development in Known Phosphate Lease Areas; the impacts described under *Nature and Types of Effects* could occur in areas open to development.

PHMA in Wyoming would be open to minor ROWs with buffers and mitigation. Surface disturbance effects from ROWs could occur as described under *Nature and Types of Effects*; buffers and mitigation would help reduce the impacts on relevant and important values, but to a lesser extent than ROW exclusion and avoidance. GHMA in Wyoming would be open to minor ROWs and no mitigation measures would be required. There would be a greater potential for impacts on relevant and important values associated with ROWs in these areas.

Colorado, Nevada/California, Montana/Dakotas, and Oregon GHMA would continue to be identified as avoidance areas for major ROWs, which would continue to reduce impacts on relevant and important values associated with these surface-disturbing activities as described under *Nature and Types of Effects*. Idaho and Utah GHMA would continue to be open to major ROWs with minimization measures, while WY GHMA would continue to be open to major ROWs. Effects from ROWs could occur as described under *Nature and Types of Effects*; in Idaho and Utah, minimization measures would continue to help reduce the impacts, but to a lesser extent than ROW exclusion and avoidance.

In WY, PHMA would continue to be designated avoidance areas for wind development. Idaho IHMA would continue to be avoidance areas for solar and wind development. PHMA in Oregon would continue to be avoidance areas for wind and solar development in Lake, Harney, and Malheur Counties. Classifying PHMA as avoidance areas would continue to decrease the potential for impacts on relevant and important values from the surface-disturbing activities as described in *Nature and Types of Effects*, but to a lesser extent than exclusion areas. This is because development of ROWs would continue to be considered on a case-by-case basis in avoidance areas, whereas it would be prohibited in exclusion areas.

GHMA in Colorado, Nevada/California, and Oregon would continue to be avoidance areas for major ROWs and would continue to decrease the potential for impacts on relevant and important values associated with areas open to ROW development, such as the surface-disturbance as described in the *Nature and Types of Effects*. Opening Utah and Idaho GHMA to major ROWs with minimization measures would continue to increase the potential for impacts on relevant and important values, such as surface-disturbance, but mitigation measures would help to lessen the impacts. Opening GHMA in Wyoming to major ROWs would continue to increase the potential for impacts on relevant and important values, and there would be no mitigation measures to reduce the impacts.

GHMA in Colorado, Montana/Dakotas, Nevada/California, and Oregon would continue to be avoidance areas for wind development, and GHMAs in Colorado, Montana/Dakotas, and Oregon would be avoidance areas for solar development. GHMA in Nevada/California and Utah would continue to be exclusion areas for solar development. This would continue to decrease the potential for impacts on relevant and important values associated with areas open to wind and/or solar development. Because GHMA in Idaho, Utah and Wyoming would continue to be open to wind development and GHMAs in Idaho and Wyoming are open to solar development, there would continue to be a greater potential for impacts on relevant and important values as described in the *Nature and Types of Effects*.

4.11.4 Alternative 2

Rangewide Environmental Consequences

Under Alternative 2, impacts to relevant and important values from areas available to livestock grazing would be similar to those described under Alternative 1. However, there would be more exceptions to restrictions on areas available to livestock grazing than under Alternative 1, which would increase potential impacts on relevant and important values in PHMA or IHMA as described under the *Nature and Types of Effects*.

Impacts from areas open to fluid minerals in PHMA and GHMA would be similar to those described under Alternative 1, except in Colorado PHMA and Colorado GHMA (see state-specific environmental consequences below). Impacts from areas open to salable mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Idaho IHMA and Nevada PHMA (see state-specific environmental consequences below). Impacts from areas open to nonenergy mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Nevada PHMA (see state-specific environmental consequences below). Removing the recommendation for locatable mineral in SFAs in all states (except in Montana/Dakotas, which did not have a 2019 amendment), under Alternative 2, would increase the potential for impacts on relevant and important values caused by areas of land protected from or open to surface-disturbing activities. This is because locatable mineral activities could occur and cause negative impacts on relevant and important values as described under the *Nature and Types of Effects*.

Impacts from areas of land protected from or open to ROW and renewable energy management would be similar to those described under Alternative 1, with additional exception criteria in Nevada/California (see state-specific environmental consequences below).

Under Alternative 2, removing the prioritization objective for PHMA and GHMA would not directly impact relevant and important values because prioritization does not permit or preclude leasing in PHMA. The NSO stipulations and conservation measures in place for PHMA would protect relevant and important values; however, the prioritization objective could potentially result in temporarily deferring a parcel in PHMA from leasing to a later sale, but only in instances of large lease sales where staff capacity would be incapable to analyzing all the nominated parcels. In an area with high levels of disturbance, such a delay could provide time for vegetation conditions and soil health to improve before new developments are implemented. As the amount of development increases in former GHMA, the consecutive effects of mitigating disturbances in PHMA could mount and could possibly affect relevant and important values. Site-specific planning and other management from local resource management plans, and adhering to the land health standards, would reduce negative impacts on relevant and important values in former GHMA with the use of BMP and other project mitigation design features.

Under Alternative 2, a 5 percent disturbance cap would apply and would exclude wildfire. The disturbance cap would also not be calculated on all lands, regardless of ownership, but rather only federal and state lands.

By calculating the disturbance cap across such a large area, locally significant impacts could still occur even if the disturbance cap is not reached. As compared to Alternative I, Alternative 2 would allow the 3 percent cap to be exceeded if a technical team determines the project, in concert with all its design features, will improve the condition of GRSG habitat. This action would allow projects to exceed the disturbance cap; however, in so doing, it could result in voluntary habitat improvement projects that could change vegetation conditions in the project area to shift away from a vegetation community more dominated by trees to one more dominated by grasses and shrubs, which could impact relevant and important values as described in the *Nature and Type of Effects*.

Under Alternative 2, ACEC relevant and important values would be the most adversely impacted as compared with Alternative 1. This is because no additional stipulations and caps on surface-disturbing activities would be included under this alternative.

State-Specific Environmental Consequences

Under Alternative 2, removing the closure of Colorado PHMA to fluid mineral development would increase potential for surface-disturbing impacts on relevant and important values, as compared to Alternative 1. This is because mineral development activities could occur in previously closed areas and cause negative impacts as described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts on relevant and important values because the NSO stipulation would avoid potential for areas available to surface-disturbing activities.

Compared with Alternative 1, the additional exception criterion to salable and nonenergy mineral closures for Nevada PHMA and allowing consideration of new free use permits for salable minerals in Idaho IHMA would increase the potential for associated impacts on relevant and important values as described under the *Nature and Types of Effects*. This is because there would be a greater chance for salable and/or nonenergy mineral activities to occur in these areas.

Under Alternative 2, there would be an additional exception criterion for ROW and wind and solar development in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on relevant and important values associated with ROW and renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid major impacts on relevant and important values.

4.11.5 Alternative 3

All areas managed for GRSG would be PHMA (**Table 2-3**). **Table 2-14** presents the acreage totals for ACECs across different alternatives. Compared with Alternative 1, Alternative 3 would contain greater restrictions on other resources and would most greatly reduce the potential for impacts on relevant and important values as described under the *Nature and Type of Effects*.

Under Alternative 3, PHMA would be unavailable to livestock grazing and all allotments would be removed from the rangewide planning area. This would include any allotments completely or partially within PHMA. This would eliminate the possibility of the short-term, site-specific impacts from areas available to livestock grazing and the associated impacts on relevant and important values as described under the *Nature and Types of Effects*. Areas made unavailable livestock grazing under Alternative 3 could contribute to increased fine fuels, potentially heightening susceptibility to wildfires, which in turn could pose a threat to relevant and important values. Compared with Alternative 1, Alternative 3 contains the greatest restrictions on livestock grazing and would be the most protective of relevant and important values from impacts related to livestock grazing. See **Appendix 5**, Evaluation of Areas of Critical Environmental Concern for Greater Sage-Grouse

Habitat, for more detailed examination on location specific relevant and important values. Additionally, under Alternative 3 in GRSG ACECs, management actions will be implemented to address the presence of wild horses and burros, aiming to reduce similar impacts on the landscape.

Compared with Alternative 1, Alternative 3 would have greater restrictions on new areas of land protected from or open to ROWs, fluid mineral leasing, and other mineral developments and thus on development in these areas that would otherwise have lower potential to impact relevant and important values. PHMA in all states would be closed to fluid mineral leasing, salable minerals, and nonenergy minerals would reduce potential impacts on relevant and important values, such as areas available to surface-disturbance activities associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced to a greater extent than under Alternative 1. This is because areas closed to leasing could not be developed at any point. Recommendation to withdraw PHMA from location and entry under the United States mining laws would have no impact. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

New infrastructure development would be substantially limited as compared with Alternatives 1 and 2. All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA would decrease the potential for impacts on relevant and important values associated with ROW development. The inability to site ROWs in PHMA could lead to longer ROW routes to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on relevant and important values outside of PHMA and may result in increased impacts on relevant and important values on adjacent private lands.

Under Alternative 3, PHMA would be ROW exclusion for wind and solar energy development. Prohibiting wind energy development would eliminate impacts on relevant and important values from areas of land protected from or open to this type of surface-disturbing activity in these areas.

4.11.6 Alternative 4

Under Alternative 4, there would be no ACECs, and the relevant and important values that would have been protected through ACECs would instead by protected through management of PHMA, IHMA and GHMA.

Under Alternative 4, compared with Alternative 1, livestock grazing in GRSG PHMA, IHMA, and GHMA would generally be permitted, except in Oregon where availability is subject to further determination. Alternative 4 would emphasize monitoring and coordination at the implementation level to meet land health standards and ensure suitable GRSG habitat. Alternative 4 would incorporate thresholds, responses, and additional terms and conditions in areas lacking suitable habitat. Under Alternative 4, range infrastructure design would focus on minimizing impacts on GRSG and their habitat. Impacts on relevant and important values from areas available to livestock grazing within GRSG HMAs would not be considered, which would prevent aligning with the specific indicators of impacts for ACEC relevant and important values as described under the *Nature and Types of Effects*. However, Alternative 4 would aim to preserve GRSG habitat and, in turn, indirectly help protect relevant values through tailored management practices.

Under Alternative 4, specific management measures would be introduced for fluid mineral leasing in GRSG habitat areas, distinguishing it from Alternative 1. Under Alternative 4, the BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas, considering proximity to existing oil and gas developments, presence in important GRSG habitats or connectivity areas, and potential for development. Leasing decisions would be balanced based on established preferences. For areas already leased, the BLM would apply stipulations and measures to address exploration and development, focusing on minimizing impacts to GRSG habitat and, in turn, reduce potential impacts on the relevant and important values as described in the *Nature and Types of Effects*.

Under Alternative 4, the management approach for fluid mineral leasing in GRSG habitat areas would provide a comprehensive framework to minimize conflicts and impacts to the relevant and important values as described in the *Nature and Types of Effects*. The evaluation of parcels and the consideration of development proximity, habitat significance, and potential contribute to the preservation of relevant and important values. Additionally, the application of measures, stipulations, and conservation objectives would help in mitigating impacts on GRSG habitat. Collaboration with project proponents and the recognition of valid existing rights further enhance the conservation efforts and would help reduce the impacts to relevant and important values as described under the *Nature and Types of Effects.*

Under Alternative 4, there would be specific management measures for ROW areas in PHMA in all states and IHMA, compared with Alternative 1. PHMA would be designated as exclusion areas for utility-scale wind and solar development. This classification would decrease the potential for impacts on relevant and important values associated with ROW development as described under the *Nature and Types of Effects*. New ROWs in PHMA would generally not be allowed, except in accordance with Anthropogenic Disturbance Screening Criteria. In IHMA, new ROWs could be considered based on IHMA Anthropogenic Disturbance Development Criteria. The focus would be on collocating new ROWs with existing infrastructure which would help minimize the overall impacts on relevant and important values as described under the *Nature and Types of Effects*. Mitigation measures would be in place to address impacts on relevant and important values in GRSG GHMA for minor ROWs. While impacts could still occur in GHMA from surface-disturbing activities associated with ROWs, these measures would help mitigate the impacts on relevant and important values as described under the *Nature and Types of Effects*.

In terms of wind and solar development, under Alternative 4, PHMA would be excluded from utility-scale projects, IHMA would have an exclusion zone within 3.1 miles from active leks, and avoidance measures would be applied in the remainder. Areas within 0.5 miles of PHMA/IHMA would also be avoidance to address indirect impacts to relevant and important values as described under the *Nature and Types of Effects*. GHMA would be avoided for utility-scale wind and solar projects, with specific avoidance within breeding/nesting/limited-seasonal habitats. Designated corridors would remain open for transmission ROWs. These management actions would also help reduce impacts to relevant and important values as described under the *Nature and Types of Effects*.

4.11.7 Alternative 5

For Alternative 5, impacts would be similar to those described for Alternative 4 since no ACECs would be managed. Moreover, the relevant and important values that would have been protected through ACECs would instead be protected through management of PHMA, IHMA and GHMA. BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function.

4.11.8 Alternative 6

Under Alternative 6, compared with Alternative 1, livestock grazing in GRSG PHMA, IHMA, and GHMA would generally be permitted, with availability subject to further determination in Oregon. Alternative 6, compared with Alternative 1, would emphasize monitoring and coordination at the implementation level to meet land health standards and ensure suitable GRSG habitat. Alternative 6 incorporates thresholds, responses, and additional terms and conditions in areas lacking suitable habitat. Range infrastructure design under Alternative 6, similar to Alternative 1, continues to prioritize minimizing impacts on GRSG and their habitat. The impacts on relevant and important values from areas available to livestock grazing within GRSG HMAs are considered, aligning with the indicators of impacts for ACECs as described under the *Nature and Types of Effects*. Alternative 6 aims to preserve GRSG habitat and protect relevant and important values, as described under the *Nature and Types of Effects,* through tailored management practices.

Under Alternative 6, specific management measures are introduced for fluid mineral leasing in GRSG habitat areas, distinguishing it from Alternative 1. Under Alternative 6, the BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas, considering proximity to existing oil and gas developments, presence in important GRSG habitats or connectivity areas, and potential for development. Leasing decisions would be balanced based on established preferences. For areas already leased, the BLM would apply stipulations and measures to address exploration and development, focusing on minimizing impacts to GRSG habitat. Conservation objectives, consolidation of infrastructure, and collaboration with project proponents promote effective conservation and connectivity. Valid existing rights are respected, and efforts are made to site projects in the least sensitive habitats. Through these measures, Alternative 6 would mitigate impacts and ensure the conservation of relevant and important values associated with ACECs.

Under Alternative 6, ACECs would be open to leasing subject to NSO stipulations (major constraints) with an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if no direct or indirect impacts can be demonstrated. For areas already leased, the BLM would apply stipulations and measures to address exploration and development, focusing on minimizing impacts to GRSG habitat. Valid existing rights are respected, and efforts are made to site projects in the least sensitive habitats. The blanket NSO may have a negative impact on the relevant and important value of ACECs in areas where there are existing leases due to the restriction of options for siting projects in the least impactful areas. In areas where there are no existing leases the blanket NSO would preclude a surface disturbance during development of fluid minerals that may occur from a surface location outside the ACEC. The evaluation of parcels and the consideration of development proximity, habitat significance, and the potential to contribute to the preservation of relevant and important values. Additionally, the application of measures, stipulations, and conservation objectives demonstrate a commitment to mitigating impacts on GRSG habitat. Collaboration with project proponents and the recognition of valid existing rights further enhance the conservation efforts. Overall, Alternative 6 prioritizes the conservation of ACEC relevant and important values and promotes effective management within GRSG habitat areas.

Under Alternative 6, PHMA in all states would continue to be identified as ROW avoidance areas, allowing for management flexibility. PHMA would be designated as exclusion areas for utility-scale wind and solar development. This classification would further decrease the potential impacts on relevant and important values associated with ROW development. Development of ROWs would be prohibited in exclusion areas and evaluated on a case-by-case basis in avoidance areas. New ROWs in PHMA would generally not be allowed, except in accordance with the Anthropogenic Disturbance Screening Criteria. In IHMA, new ROWs could be considered if they meet the IHMA Anthropogenic Disturbance Development Criteria. The focus would be on collocating new ROWs with existing infrastructure and minimizing overall impacts on relevant and important values. Existing ROW corridors would be preferred for collocation, with limitations on widening beyond 50 percent of the original footprint. These measures would help protect relevant and important values from impacts associated with surface-disturbing activities as described under the *Nature and Type of Effects*. In terms of wind and solar development, PHMA would be avoided for utility-scale projects, GHMA would be open with minimization measures, and designated corridors would remain open.

Major ROWs in PHMA would be avoided, while GHMA would be open with minimization measures. Impacts on relevant and important values could still occur in these areas if developed, but mitigation measures would help mitigate the impacts as described under the *Nature and Type of Effects*. Alternative 6 provides a modified approach to protect relevant and important values associated with ACECs and GRSG habitat by emphasizing avoidance, minimizing impacts, and considering existing infrastructure.

4.11.9 Research Natural Areas (Oregon Only)

Restrictions on uses could also impact RNAs. RNAs could be impacted by management actions that prohibit natural processes to proceed to the detriment of the plant communities for which the RNAs were created. Management actions that do not promote the maintenance of plant communities could also impact RNAs.

For all alternatives, closing ACECs to livestock grazing could especially impact RNAs. Closing all or portions of RNAs that contain plant communities important to GRSG could provide the BLM with areas for baseline vegetation monitoring without the influence of BLM-permitted activities. This could allow natural succession processes to proceed, enabling the BLM to use these areas as comparative controls to treated areas. In addition, the BLM could research the impacts of climate change on plant communities within these undisturbed vegetation communities. However, the consequences of closing livestock grazing from all or portions of RNAs result in other impacts. This involves an escalation in fine fuels, contributing to an increased occurrence of wildfires. Furthermore, a conspicuous surge in annual invasive vegetation is observed—a concern that properly timed livestock grazing has demonstrated effectiveness in eliminating (see **Section 4.4**). Management to protect GRSG under the various alternatives would likely provide additional protections for existing ACECs and, at a minimum, would provide complementary management. This would be particularly true in ACECs where GRSG conservation was identified as a value. Additionally, RNAs would not experience impacts due to the restrictions and limitations on uses in place to protect RNAs. Impacts would not be expected to vary greatly between the alternatives.

4.12 Social and Economic Conditions (Including Environmental Justice)

4.12.1 Nature and Type of Effects

There are different types of social and economic impacts that could occur from BLM-management decisions outlined under the alternatives. Impacts could be associated with market conditions or nonmarket and social conditions. Effects on social and economic conditions and environmental justice populations could be temporary or long term. Communities and groups could be directly impacted or indirectly impacted. Lastly, impacts on economic contributions, social conditions, and environmental justice populations could vary across different geographical regions. These differences in types of social, economic, and environmental justice impacts are discussed in the following subsections with how they relate to potential changes from BLM-management decisions that change each resource.

Fluid Minerals (Oil and Gas) Management

BLM-management decisions regarding changes in restrictions and stipulations on mineral leasing for the protection of GRSG could affect local economies and social conditions within communities throughout the planning area by inhibiting new oil and gas development or by making it more difficult to sustain current levels of mineral activity in the future (See **Section 4.10.1**, Fluid Minerals, for the impacts of changes in restrictions and stipulations on oil and gas development and production).

Some market impacts from changes in oil and gas operations include changes in jobs, income, economic output, and tax revenue that result from drilling and completion expenditures as well as oil and gas production revenue. Direct market impacts are the changes in economic contributions that occur to the oil and gas industry, such as displaced mineral jobs. Secondary market impacts include changes in jobs, income, and economic output that occur in industries other than mining industries, such as job reductions in manufacturing industries that supply the equipment needed for mineral extractions or economic output reductions in the retail sector due to reduced personal expenditures of mineral employees.

Another secondary market impact could stem from changes in the provision of public services and infrastructure as a result of changes in spending by the government sector. Declines in production will reduce revenue streams to state and local governments and likely lead to budget shortfalls, which will create challenges to provide existing levels, quality, or quantity of public services as well as maintaining existing infrastructure. These public services and infrastructure that are funded by mineral revenue, such as education, road maintenance, parks and recreation, policy and fire management, as well as social services, provide lots of value to local communities because they help support and ensure safeguards are in place for those who might not have the resources themselves. These public services are especially important to small rural communities that have limited alternatives for these services.

Closely interconnected with the impacts on market and economic activity are impacts on nonmarket and social conditions.[2] These impacts on social and nonmarket conditions due to changes in fluid mineral development are impacts that cannot be measured through market mechanisms, and they include direct changes to the lifestyles and culture of those who rely on the mining industry for employment and income. Secondary nonmarket or social impacts on the surrounding communities from potential changes in oil and gas development and production could include changes in access to clean air, health and safety from changes in air quality and GHG emissions, and visitor and viewer enjoyment from changes in air quality (Su and Lee 2022). Communities could face adverse impacts on these resources under alternatives and in areas where fluid mineral leasing would be managed as CSU, if there is an increase in mineral development (see **Section 4.13**, Air Resources and Climate, for more information on impacts on air quality and GHG emissions).

Additionally, potential changes in oil and gas development could impact surrounding communities through changes in preservation of non-use values. Non-use values include those placed on protected open spaces and GRSG and other wildlife for future use, for the use of future generations, or for merely its existence, which would especially impact communities of interest who value protection of GRSG. The non-use values also include those placed on preserving the economics and culture of historical mining towns for potential future enjoyment, for the use of future generations or for merely its existence; these non-use values would especially impact those communities of interest who value mineral development.

Economic and social impacts from changes in fluid minerals due to BLM-management decisions would vary substantially across regions, depending on how reliant the regions are on the oil and gas and mineral sectors compared with the reliance on other sectors. The regions in the analysis areas that historically have relied on the mineral industry for employment and labor income and that have had large volumes of oil and gas production on federal lands are most of the analysis area in Colorado, southeastern and northeastern Montana, southern Nevada, southwestern North Dakota, northwestern South Dakota, central and northeastern Utah, and most of the analysis area in Wyoming (see **Figures A-1 to A-10** in **Appendix 13**). Changes to economic and social conditions from changes in the oil and gas industry as described above (i.e. market impacts on jobs and income, support for public services funding, and non-market factors such as quality of life factors and preservation of non-use values) would impact the communities in these regions more than other regions in the analysis areas (see **Section 3.11**, Social and Economic Conditions (Including

[2] Impacts on other social conditions that are not considered in this effort, such as impacts on social conditions due to changes in visual resources, will be considered during the implementation level NEPA analysis.

Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report, for more information on demographics and current economic and social conditions).

Many market and nonmarket impacts from changes in oil and gas operations are likely to occur gradually over the long term, with some impacts beginning in the near-term. This is due to the fact that management changes would generally be applied to new leases. Impacts would be concentrated in regions with economies that are dependent on mineral activities. In these regions, economic impacts would likely last until the displaced mining workforce can train and find jobs in other industries. Once the displaced employees find employment in other industries, there will likely be a return of social cohesion and culture across local communities. However, if the displaced workers are unable to find sufficient employment opportunities in other industries, then the impacts could continue. Communities that experience significant out migration due to workers searching for other employment opportunities may not recover the shared culture and sense of community that was enjoyed during more prosperous times.

Nonenergy Leasable Minerals Management

Many of the market impacts associated with potential changes in nonenergy leasable minerals due to changes in restrictions and stipulations on leasable minerals would be similar to the market impacts associated with changes in oil and gas operations (See **Section 4.10.2**, Nonenergy Leasable Minerals, for the impacts of changes in restrictions and stipulations on nonenergy leasable minerals extractions). These include changes in direct and secondary jobs, income, and economic output, tax revenue, and public services and infrastructure that result from changes in nonenergy leasable extraction expenditures expenditure and associated public revenues.

Additional economic and social impacts from potential changes in nonenergy leasable mineral extraction due to an increase in restrictions could occur from secondary impacts on prices and availability of household products, especially those products made from trona, which is a nonenergy leasable mineral largely found in southwest Wyoming (90 percent of trona comes from this region; see **Section 3.9.2**, Nonenergy Leasable Minerals, for more information on current conditions of trona). Restrictions on mineral leasing on BLM-administered lands could increase costs associated with mineral extraction by requiring operators to find other lands that are outside of GRSG HMAs, if other nearby lands are available and hold the desired subsurface minerals; however, there are often not nearby alternative lands, since nonenergy leasable minerals are not abundantly available. The increase in costs will likely be passed onto consumers in the form of higher prices for household products containing trona, such as glass and baking soda, in the short term. These household products are considered consumer staples and the demand for consumer staples tend to be inelastic, which means consumers are limited in their abilities to react or adjust their purchase quantities when there are fluctuations in price (Anderson et al. 1997). Impacts on prices of consumer staples tend to affect populations with lower income more than other populations due to the limited disposable income that is available to absorb the increases in prices (see the subsection on Environmental Justice below for more discussions on impacts from potential changes in trona extraction on low-income and other environmental justice populations). Restrictions on mineral leasing will likely not result in immediate closures of mines, and many current mines have stashes of trona built up that could be used to sustain production in the short term. However, as restrictions on nonenergy leasing continue in the long term or if it is not possible to find nearby lands outside of GRSG HMAs with nonenergy leasable materials, there could be impacts on the availability of household products made from trona due to the potential continued constraints on nonenergy leasable mineral extractions. These secondary impacts on product prices and availability can be just as important for local economies as the direct impacts, especially in areas where trona extraction plays a large role in the economic, such as in Wyoming, as well as in rural areas and areas with large low-income populations (see **Section 4.10.2**, Nonenergy Leasable Minerals, for more details on impacts from BLM management decisions on trona extraction).

Nonmarket and social impacts from changes in nonenergy leasable mineral extraction due to the BLM-management decisions are the same as those from changes in oil and gas operations.[3] These impacts include direct changes to lifestyles and culture, especially for those who rely on the mining industry for employment and income and those in the mineral communities of interest. Secondary nonmarket or social impacts on the surrounding communities from changes in nonenergy leasable minerals due to fewer restrictions could include changes in access to and clean air, health and safety from changes in air quality and GHG emissions, and visitor and viewer enjoyment from changes in air quality. Additionally, potential changes in nonenergy leasable minerals could impact surrounding communities through changes in preservation of non-use values. Non-use values include those placed on protected open spaces and GRSG and other wildlife for future use, for the use of future generations, or for merely its existence, which would especially impact communities of interest who value protection of GRSG. The non-use values also include those placed on preserving the economics and culture of historical mining towns for potential future enjoyment, for the use of future generations or for merely its existence; these non-use values would especially impact those communities of interest who value mineral development.

Economic and social impacts from changes in nonenergy leasable minerals would have larger impacts in regions that are reliant of leasable mineral sectors compared with the reliance of other sectors. These regions that have historically had higher percentages of employment and labor income than the state and have had nonenergy leasable mineral production on federal lands are Rio Blanco County in northwestern Colorado, Caribou County in southeastern Idaho, Carbon and Emery counties in central Utah, and Sweetwater County in southwestern Wyoming (see **Figures A-1 to A-10** in **Appendix 13** and **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current conditions).

Similar to impacts from changes in oil and gas operations, market and nonmarket impacts from changes in nonenergy leasable mineral extractions are likely to occur over the long term. This could result in some mining operations closing if they were unable to expand or moving future operations to other locations. These impacts are likely to last until the displaced mining workforce is able to gain employment with other companies or in other industries; however, if the workers are required to leave the area to find employment, then the social and economic impacts in the regions that were dependent on mining could last longer.

Locatable Minerals Management

The implications of potential withdraws from locatable mineral entry for the protection of GRSG are explained in detail in **Section 4.10.4**, Locatable Minerals. Many of the market impacts associated with potential changes in locatable mineral extraction would be similar to the market impacts associated with leasable mineral extractions. These include changes in direct and secondary jobs, income, and economic output, tax revenue, and public services and infrastructure that result from changes in locatable extraction expenditures and associated public revenues. If the Secretary were to withdraw lands pursuant to the separate process outlined in Section 204 of FLPMA, existing mining claims within the withdrawal area would not be withdrawn, even if they are within GRSG HMAs; however, BLM-management decisions on protection for GRSG would impact existing claims through the requirements of future validity examinations, which

[3] Impacts on social conditions due to changes in other resources that are not considered in this effort, such as impacts on social conditions due to changes in visual resources, will be considered during the implementation level NEPA analysis.

would increase costs to the claimants and could delay timing of development (see **Section 3.9.4**, Locatable Minerals, **Section 3.11**, Social and Economic Conditions (Including Environmental Justice), and **Appendix 13**, Socioeconomic Baseline Report for more information on current conditions of locatable minerals and validity examinations).

Nonmarket and social impacts from changes in locatable mineral extraction due to the BLM-management decisions are the same as those associated with changes in leasable mineral extractions. These impacts include direct changes to lifestyles and culture, especially for those who rely on the mining industry for employment and income and those in the mineral communities of interest. Secondary nonmarket or social impacts on the surrounding communities from changes in locatable minerals due to fewer restrictions could include changes in access to clean air, health and safety from changes in air quality and GHG emissions, and visitor and viewer enjoyment from changes in air quality. Additionally, potential changes in locatable mineral extraction could impact surrounding communities through changes in preservation of non-use values. Non-use values include those placed on protected open spaces and GRSG and other wildlife for future use, for the use of future generations, or for merely its existence, which would especially impact communities of interest who value protection of GRSG. The non-use values also include those placed on preserving the economics and culture of historical mining towns for potential future enjoyment, for the use of future generations or for merely its existence; these non-use values would especially impact those communities of interest who value mineral development.

Economic and social impacts from changes in locatable minerals would have larger impacts in regions that are reliant on locatable mineral sectors than other areas. Counties in the analysis areas in Nevada and Wyoming, where there are higher potential for locatable minerals, would likely face larger impacts on economic and social conditions due to the large number of existing open claims in the states (see **Figures A-1 to A-10** in **Appendix 13** and **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current conditions).

Similar to impacts from changes in leasable minerals, market and nonmarket impacts from changes in locatable mineral extractions are likely to occur over the long term. This could result in some mining companies closing or moving operations to other locations. The economic and social impacts would likely last until the displaced mining workforce is able to gain employment with other companies or in other industries; however, if the workers are required to leave the area to find employment, then the social and economic impacts in the regions that were dependent on mining could last longer.

Mineral Materials Management

Market impacts associated with potential changes in mineral materials extraction due to BLM-management decisions on lands closed to mineral materials disposal largely relate to changes in costs to those who extract mineral materials due to reduced access to free resources (see **Section 4.10.5**, Mineral Materials for impacts on mineral materials extraction due to the BLM-management decisions for the protection of GRSG). In areas where federal sources of mineral materials are closed to noncommercial disposal, those who extract mineral materials would likely need to relocate to nearby areas open to disposal on federal lands, if available. If nearby areas on federal lands are not available, extraction would need to relocate to nearby private or state lands where resources exist. This change in location of extraction would increase costs due to the need to transport the minerals from the new location to where they are needed; the further away the mineral materials pits are from where they are needed, the higher the cost and the more potential for increases in noise, dust, and truck traffic from transporting mineral materials. The increase in cost could cause delays or cancelations in projects that use mineral materials, such as road maintenance and construction of infrastructure. Delays and cancelations in construction and maintenance projects would impact the surrounding communities who rely on the roads and infrastructures (see **Section 3.10.5**, Mineral Materials, **Section 3.12**, Social and Economic Conditions (Including Environmental Justice), and **Appendix 13**, Socioeconomic Baseline Report for more information on current conditions of mineral materials).

Secondary impacts from BLM-management decisions on lands closed to mineral materials could occur from changes in the ability to use mineral materials to improve road access for fire suppression activities. The construction, maintenance, and effectiveness of fuel breaks can be impacted by availability of mineral material pits.

A change in access to mineral materials due to the BLM-management decisions would likely have impacts on nonmarket and social conditions for the surrounding communities. These impacts include access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality under alternatives with lands that are not closed to mineral materials disposal and extraction. On the other hand, in areas where the BLM-managed lands are closed to mineral materials disposal, and there is a shift of the mineral materials extraction to state or private lands, the sites of extraction could be closer to local residents and there could be more potential for interaction between local residents and communities and mining operations. This shift in location of mining activities could impact qualify of life in the nearby communities by resulting in an increase in noise, dust, and traffic. The magnitude of the impacts on the nearby communities depends on the local characteristics, and further analysis would need to be conducted during the implementation level NEPA to determine the location and intensity of impacts.

Economic and social impacts from changes in public access to mineral materials would have larger impacts in regions that have higher numbers of new or existing free-use permits issued or quantity of extractions under the free-use permits; these regions include counties in the analysis areas in Colorado, Idaho, Montana, Nevada, and Wyoming (see **Figures A-1 to A-10** in **Appendix 13** and **Section 3.12**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current conditions).

Market and nonmarket impacts from changes in public access of mineral materials are likely to be short term. The economic and social impacts, such as increased costs, would likely occur for near-term infrastructure construction or maintenance projects, which could range from a season to several years. Those with free-use permits would likely be able to locate other sources of mineral materials, given the wide-spread availability of the resource. In some areas, resources might be available in nearby BLM lands outside of HMAs, allowing for continued use of free-use permits; however, in other areas, users would need to purchase the extracted mineral materials, which could lead to impacts for as long as the minerals are needed.

Renewable Energy (Geothermal, Wind, and Solar) Management

BLM-management decisions regarding changes in restrictions and stipulations on renewable energy, including geothermal, wind and solar energy, for the protection of GRSG could affect local economies by restricting the siting of new renewable energy developments (See **Section 4.9**, Lands and Realty (Including Wind and Solar) and **Section 4.10**, Mineral Resources, for the impacts of changes in the amount of land managed as ROW avoidance and exclusions areas on wind and solar development and the changes in restrictions and stipulations on geothermal development and production, respectively). Changes in the land closed to leasing for geothermal development and the land open to leasing but with stipulations could impact the local jobs, income, economic output, and tax revenue that results from changes in well drilling and completion expenditures as well as production of geothermal energy and associated public revenues. Direct market impacts from changes in geothermal development include changes in economic activity that occur in industries related to renewable energy, such as water well drilling and related structures and electric power generation. Secondary market impacts include changes in economic contributions that occur in industries other than the renewable energy sector as well as changes in public services and infrastructure due to reduced tax revenues, including state tax revenues on wind, solar, and geothermal production and nameplate capacity. For wind and solar, changes in land managed as ROW avoidance and exclusions areas could result in operators choosing other locations for wind or solar facilities, however, choosing an alternative location might not be possible or feasible or it could be very costly if there is not available transmission, as ROW avoidance and exclusion areas also applies to transmission line projects. Potential secondary impacts could include impacts on economic conditions due to restrictions on siting of renewable energy facilities and transmission on federal lands that would also impact siting on nonfederal lands, especially in areas where the BLM-administered lands are not contiguous. These potential secondary impacts on economic conditions could include reductions in lease rents for renewable energy on state lands, which could impact disbursements to local governments and public services that rely on these funds.

In addition to impacts on economic conditions from changes in potential renewable energy development due to BLM-management decisions, there could be impacts on social and nonmarket conditions from the BLM-management decisions regarding renewable energy ROW. These impacts include access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality due to less restrictions. Way of life, culture, and visitor and viewer enjoyment could be affected if there is an increase in renewable energy development due to less restrictions, especially for those communities of interest that value open spaces and historical agricultural areas.

Economic impacts from changes in renewable energy development due to BLM-management decisions could vary across regions, depending on the quality of the renewable resource and the potential for renewable energy. The counties in the Nevada analysis area would be most impacted by BLM-management decisions that change geothermal development and production due to the high potential for future development (see **Appendix 12**, Reasonably Foreseeable Development Scenario for more information). The states that have operating wind and solar projects in the analysis areas are Nevada, Oregon, Utah, and Wyoming (see **Figures A-1 to A-10** in **Appendix 13)**. Changes in economic activity stemming from changes in renewable energy development would impact these regions more than other regions in the planning area (see **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current economic and social conditions). Counties in the analysis areas in Idaho, North Dakota, South Dakota, and Wyoming that collect taxes on wind, solar, or geothermal production and nameplate capacity would also be more impacted by potential changes in renewable energy activities than other areas due to the potential loss in tax revenue.

Impacts on economic conditions, such as increased construction costs, due to changes in lands available for ROW for wind and solar development would likely be short term, and the impacts would be diminished upon completion of the wind or solar facilities or transmission lines. However, if the changes in lands available for wind or solar ROW development prevent any solar or wind developments in nearby areas due to lack of available transmission lines, the impacts would likely be longer-term. Economic impacts from changes in potential geothermal development are likely to occur over the long term, as displace workers look for employment elsewhere or in other industries.

Livestock Grazing Management

BLM-management decisions regarding changes in lands available for livestock grazing for the protection of GRSG affects local economies and social conditions of communities throughout the planning area by restricting levels of livestock grazing in the future (See **Section 4.8**, Livestock Grazing, for the impacts of changes in lands available for livestock grazing on available forage).

Some market impacts from changes in livestock grazing include changes in jobs, income, and economic output. Direct market impacts are the changes in economic contributions that occur to industries associated with livestock animal production, such as reduced labor income for workers in these industries. Secondary market impacts include changes in jobs, income, and economic output that occur in industries other than livestock animal production industries, such as job reductions in manufacturing industries that supply the equipment needed for livestock grazing or ranching or economic output reductions in the retail sector due to reduced personal expenditures of workers in livestock animal production industries. Changes in livestock grazing due to BLM-management could also impact the local and regional economic resilience and stability for ranching and farming communities, especially if these communities also are susceptible to boom and bust economic cycles due to a reliance on mineral development for economics.

Another secondary market impact is associated with changes in prices and availability of meat products due to rangewide restrictions on livestock grazing. An increase in restrictions on livestock grazing on BLM-administered lands would likely require many ranchers and farmers to use private lands to provide forage for their livestock, which could result in increases in costs to ranchers and farmers. An increase in cost for forage could lead to ranchers passing on the costs to consumers in the form of an increase in price of meat and animal products, or an increase in cost could result in closures of ranches and farms that are unable to operate with the higher costs, especially as margins for meat producers have tightened recently (Casey 2023). If there are a large number of ranch closures, there could be impacts on availability of meat and animal products to the local and regional communities. In the long term, as restrictions continue, there will likely be greater impacts on prices and availability of meat and animal products. The level of impacts would depend on the level to which any proposed management resulted in changes to the overall availability of public land forage and livestock operators' ability to adapt production practices and mitigate increased production costs. While changes to the market are seen more at a regional or national scale, secondary impacts on prices and availability of meat can be a large concern for certain local economies, especially in rural areas and areas with large low-income populations (see the subsection on *Environmental Justice* for more discussions on impacts from potential changes in livestock grazing on low-income and other environmental justice populations, and see **Section 4.8**, Livestock Grazing, for more information regarding impacts on livestock grazing due to BLM-Management decisions).

Changes in livestock grazing on public lands can also impact other market mechanisms such as property values. Research has demonstrated that in most cases BLM-administered land grazing permits increase ranch property value beyond the additional price of forage provided because federal permits are perceived as adding semi-private open space to the property (see for example Rimbey, Torrel and Tanka 2007). Thus, restrictions to grazing on BLM-administered lands could affect property values for ranches that serve as base property for affect grazing permits. The extent of any impact could vary depending on the extent of restrictions of grazing on BLM-administered and National Forest System lands, whether a grazing permit is not renewed in its entirety, and the land management decisions in the selected alternative. It should be noted that any premium to property values associated with a federal grazing permit is a result of amenity perception rather than ownership – since federal grazing permits authorize the grazing of livestock on public lands but do not convey any right, title, or interest of the lands to the permit holder.

Closely interconnected with the impacts on market and economic activity associated with livestock grazing are impacts on nonmarket and social conditions. These impacts on social and nonmarket conditions due to changes in livestock grazing include direct changes to the lifestyles, culture, and sense of place of those who rely on access to forage on federal land for their farming and ranching operations. Some changes in access to the lifestyle value of ranching are associated with nonmarket values such as reduced access to use values of open spaces and western ranch scenery and non-use values of the cultural icon of the American cowboy that are important to some residents and visitors.

Many rural communities have expressed concerns that ranching operations could go out of business if there were more restrictions on livestock grazing on BLM-administered lands. Reductions in BLM-managed lands available for livestock grazing would likely require ranching operators to acquire leases or permits for forage from non-federal lands or purchase additional feed to continue livestock production. Purchased feed and forage from non-federal lands tend to be more costly, so the increase in input costs could put economic strain on some ranches. Due to the increased costs, some ranches might decide to sell all or part of their land to create ranchettes or for development activities, which could create land fragments with more fencing. Additional land fragmentation in GRSG habitat could have an adverse impact on GRSG populations. Selling and fragmenting longstanding ranches could affect social conditions and nonmarket values, such as social cohesion and loss of quality of nonmarket values associated with open space, and it could result in unexperienced or out-of-state buyers taking ownership of the land, which could further reduce social cohesion or lead to land degradation due to improper grazing techniques from the unexperienced buyers (Gosnell and Travis 2005). Additionally, ranch closures would affect the well-being of the local population and community as well as lead to less social cohesion across the communities and impact the quality of infrastructure and public services.

Economic and social impacts from changes in livestock grazing due to BLM-management decisions would vary substantially across regions, depending on how many permits within BLM-managed allotments would be affected, the availability of alternative forage in the area, , how reliant the region is on the agriculture industry compared with the reliance on other industries, and the type of ranches in the area (see **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for a discussion on types of ranches in the analysis area). Changes to economic and social conditions from changes in livestock grazing would more heavily impact the communities in regions that rely on grazing on federal lands and in regions that have a large quantity of small and midsize family farms and ranches where the operators' primary occupation is farming or ranching.[4] Small and midsize ranches tend to have fewer resources and flexibility to adjust business operations due to changes in livestock grazing on federal lands than other types of ranches. These ranches could be more sensitive to changes in cost, leading to more closures or more decisions to sell their private lands, which could lead to more land fragmentation, as discussed above. These small and midsize ranches are located across most of the analysis area in each state of the planning area (see **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current economic and social conditions).

[4] Small family ranches are those with annual gross cash farm income less than $350,000 and midsize family ranches are those with annual gross cash farm income of at least $350,000 but less than $1 million. See **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on the types of ranches in the analysis area).

Changes in livestock grazing from BLM-management decisions are likely to have long term impacts on market and nonmarket conditions, especially in rural areas that rely on the agriculture industry due to the limited alternative resources and opportunities for employment in these areas.

Wild Horse and Burro Management

As discussed in Chapter 3, some stakeholders value the existence of wild horses due to their symbolism in of the American west and value the opportunity to view wild horse and burros on the range. In the long term, removal of wild horses could therefore impact social values associated with the existence of wild horses, and the ability to view and enjoy horses and burros.

In addition, wild horses and burros can provide recreation opportunities (i.e. in terms of wildlife viewing), which in turn can result in visitor spending and associated economic contributions. One example is the opportunities provided for wild horse and burro viewing along scenic byways.

The level of impacts of management would depend on the degree to which wild horse and burros would remain part of the landscape on BLM administered lands, and the level to which the ability to continue to view wild horse and burros would be impacted. As noted in the Wild Horses and Burros section, the timeline for implementation of any management changes would be impacted by congressional funding and the associated wild horse management including gathers, storage capacity, and adoption rate. As a result, impacts to values associated with wild horse and burros would be likely occur over time.

Greater Sage Grouse Conservation

As described in Chapter 3, economists and policy makers have long recognized that rare, threatened, and endangered species have nonmarket values composed of use and non-use values as well as economic values, including those associated with active use through viewing or hunting and those associated with existence, option, and bequest values. Studies published in peer-reviewed scientific journals for bird species with similar characteristics find average stated willingness-to-pay between $19 and $77 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix 13**, Socioeconomic Baseline Report, for more information on nonmarket values of greater sage grouse conservation; Loomis and Ekstrand 1997; Stevens et al. 1991; Bowker and Stoll 1988; Kotchen and Reiling 2000; Reaves et al. 1999; Myers 2014). Since GRSG protection is a public good available to all households regardless of where they are located, if similar per-household values apply, then the aggregate regional nonuse value as well as impacts on access to these values if changes were made from BLM-management decisions could be substantial. However, the BLM did not quantify the aggregate value because of several factors, including uncertainty associated with the comparability of the existing studies to the GRSG context and the documented difference between stated and actual willingness-to-pay.

There are many resource and social values of GRSG ecosystems that could be impacted by BLM-management decisions. Non-market values associated with populations of GRSG, including use value associated with wildlife viewing as well as non-use value generally correspond to the degree of habitat protection associated with each alternative. In general, the more restrictive an alternative is on habitat disturbance, the more it will favor non-market values associated with the GRSG and their habitat, however, the specific level of habitat protection associated with maximizing non-market value has not been determined. Additional social impacts from BLM-management decisions on GRSG conservation include impacts on tribal interests and cultural resources, especially subsistence, from changes in GRSG populations. On the other hand, habitat conservation could negatively impact road realignment projects near tribal reservations and plans to expand reservation boundaries because the reservation is surrounded by PHMA.

Environmental Justice

Environmental justice populations could be disproportionately and adversely impacted directly and indirectly through changes in several resources due to BLM-management decisions.

Environmental justice populations could be directly disproportionately and adversely impacted by BLM-management decisions on GRSG through disturbance of cultural resources such as locations or landscapes associated with trust or treaty assets, traditional beliefs, sacred sites, resource gathering areas, hunting and fishing areas, ancestral sites, and human remains. Under alternatives with fewer stipulations and restrictions on resource use and less protection of GRSG populations, ground disturbance would likely impact these cultural resources. These ground disturbing activities that impact cultural resources in the planning area include mineral exploration and development, renewable energy development, construction of road or pipelines, and other surface disturbing activities. Cultural resources are especially important to those who identify as American Indian and Alaska Native for spiritual, traditional, and cultural activities, so BLM-management decisions that result in disturbance or alter visual qualities of these cultural resources could disproportionately impact American Indian and Alaska Native populations. These impacts on environmental justice populations are likely to be stronger in areas that were identified as containing environmental justice populations and areas that have more surface disturbing activities, such as mining and livestock grazing, and the impacts are likely to be long term and last until the end of the surface disturbing activity. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

BLM-management decisions that impact conservation of GRSG habitats and access to the cultural values of GRSG through fewer restrictions on surface disturbing activities would adversely and disproportionately impact environmental justice populations. For example, subsistence resource availability could be reduced from decisions and activities that impact wildlife habitats such as mineral development. Under alternatives with fewer restrictions on surface disturbing activities and less protection of GRSG habitats, changes to availability of subsistence resources and uses would adversely and disproportionately impact environmental justice populations. Subsistence is an important use of BLM-administered lands for American Indian and Alaska Native populations and some low-income populations across the analysis area. Decreased subsistence resource availability would adversely affect sociocultural systems due to the importance of subsistence in the cultural identity of American Indian and Alaska Native populations, social organization, social cohesion, transmission of cultural values, and community and individual well-being. Decreases in subsistence resource availability would reduce opportunities for engaging in subsistence activities potentially increasing social problems. Due to the importance to American Indian and Alaska Native populations of subsistence hunting, environmental justice populations would be disproportionately impacted from reduced access to big game habitats. Additionally, low-income populations would bear disproportionate effects of reductions in access to subsistence resources because they are more likely to lack the resources to purchase an equivalent quality of food or to travel greater distances to find it. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Environmental justice populations could be indirectly disproportionately and adversely impacted through regional or national market changes in prices and availability of meat and household products due to rangewide restrictions on grazing or restrictions on mineral development. As discussed in *Nonenergy Leasable Minerals* and *Livestock Grazing* subsections, above, restrictions in grazing or mineral development on BLM-administered lands could increase the costs of producing meat and household products (especially products made from trona), which could then be passed onto consumers through higher prices. Meat and household products are considered consumer staples, and consumption of these products is usually consistent across seasons, so they tend to have inelastic demands, which means consumers of these products have limited ability to adjust consumption as prices increase. Over the long term, if restrictions continue, there could be impacts on availability of meat and household products. Increases in prices and decreases in availability of food and household products tend to disproportionately impact low-income households and individuals, because low-income populations have more limited alternatives for food and household products than the general public and because food and household product purchases make up a higher percentage of disposable income for low-income households. These impacts on environmental justice populations are likely to be stronger in areas that were identified as containing environmental justice populations. The impacts on environmental justice populations from price and availability of food and household products through BLM-management decisions on greater restrictions are likely to occur over the long term, based on implementation of changes to GRSG management. See subsections in this section on *Nonenergy Leasable Minerals* and *Livestock Grazing* as well as **Section 4.10.2**, Nonenergy Leasable Minerals, and **Section 4.8**, Livestock Grazing, for more information.

BLM-management decisions that impact nonmarket and social conditions from changes in air quality through increased exposure to particulate matter, increased risk of wildfire smoke, and increased fugitive dust emissions, under alternatives with fewer restrictions on mineral extraction and surface disturbing activities, could disproportionately impact environmental justice populations. Environmental justice populations often face greater vulnerabilities to particulate matter pollution, wildfires, and fugitive dust from surface disturbance (Davies et al. 2018). Increased exposure to particulate matter can cause a variety of health problems, including respiratory infections, heart disease, or cancer. Because environmental justice populations are often located near sources of PM pollution, they are more likely to be exposed to higher levels of particulate matter pollution (Tabuchi and Popovich 2021). See **Section 4.13**, Air Resources and Climate for more information on air quality impacts.

BLM-management decisions that impact nonmarket and social conditions from changes in GHG emissions could disproportionately impact environmental justice populations, under alternatives with fewer restrictions on surface disturbing activities and in areas where fluid mineral leasing would be managed as CSU, if there is an increase in mineral development and activities. Environmental justice populations are often located in areas that are vulnerable to impacts from climate change, such as areas that are prone to drought or flooding (Cho 2020). If mineral exploration and development and other surface disturbing activities are not managed in a way that minimizes GHG emissions, environmental justice populations could be adversely and disproportionately impacted due to GHG emissions that could have a negative impact on the climate (Cho 2020). Vegetation disturbance could reduce the ability to absorb carbon dioxide and lead to decreased carbon sequestration around communities, including environmental justice populations. The decrease in carbon sequestration could contribute to climate change impacts, which could disproportionately and adversely impact environmental justice populations. See **Section 4.13**, Air Resources and Climate, for more information.

The loss of economic activity stemming from the closure of GRSG PHMA or making PHMA unavailable for authorized uses, as described in the subsections of the *Nature and Type of Effects* above in terms of affected jobs and labor income, may result in some additional communities meeting low-income criteria for consideration as potential environmental justice communities in the future. Additional screening and consideration of environmental justice populations and disproportionate impacts will occur at the implementation stage at a scale commensurate with the scope and scale of management actions being considered to provide additional protections for local GRSG populations.

4.12.2 Alternative 1

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

Table 4, in **Appendix 18**, Economic Contribution Supplemental Tables, show the average annual number of jobs, labor income, and total economic output that could result from projected oil and gas development from 2023 to 2042, under Alternative 1, for the analysis area counties combined as well as each state combined. On annual average, oil and gas production revenue and well development expenditures in the analysis areas is expected to result in a range of about 73,000 to 94,000 total jobs (from 28,000 to 34,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $5.8 billion to $7.6 billion in total labor income (from $3.0 billion to $3.8 billion in direct labor income), and about $27.6 billion to $34.2 billion in economic output (from $19.0 billion to $22.8 billion in direct economic output) combined across 8 states. Below is a discussion on quantitative impacts shown in this table as well as a qualitative discussion on the market and nonmarket impacts from potential changes in oil and gas operations in each state with reasonably foreseeable future development of oil and gas.[5]

As noted in **Section 3.11,** Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report, fiscal revenue is generated on the production of federal minerals at the federal, state, and in some states at the local level. Many western states and local governments are heavily dependent upon these mineral revenues for a significant portion of their annual budgets. For all states in the planning area, BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to change tax revenue and public services from current conditions. Below is a discussion on royalty and state tax revenues for each state. Additionally, for all states in the planning area, BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to change social and nonmarket values and conditions such as lifestyles and culture of those communities of interest that value mineral extraction from current conditions.

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho), except as noted under the state-specific sub-headings below, fluid mineral leasing would continue to be managed as NSO. In these areas, emissions sources and surface disturbing activities would continue to be eliminated, which would reduce impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and visitor and viewer enjoyment from changes in air quality. However, fluid mineral development will likely continue in other locations, which would lead to relocation of impacts on the nonmarket and social conditions associated with air quality and GHG emissions, as described in the *Nature and Types of Effects*.

Colorado

On annual average, oil and gas production revenue and well development expenditures in the Colorado analysis area is expected to result in a range of about 22,000 to 43,000 total jobs (from 7,000 to 13,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $1.9 billion to $3.7 billion in total labor income (from $791 million to $1.5 billion in direct labor income), and about $7.0 billion to $13.7 billion in economic output (from $4.0 billion to $7.7 billion in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 87.0 percent of the total economic output.

[5] California and Oregon did not have reasonably foreseeable future oil and gas development in the planning area, so they are not included in the discussion.

Under Alternative 1, the total royalty revenue generated from oil and gas production in Colorado could range from about $453 million to $878 million. The Colorado severance tax revenue is expected to range from about $31.8 million to $61.7 million, under Alternative 1, and the oil and gas conservation fee could generate a range of $3.0 million to $5.8 million. Assuming an average tax rate of 5 percent across counties in the analysis area, oil and gas production could generate a range of about $119 million to $230 million in county revenues from ad valorem taxes. These revenues that are disbursed to counties would continue to support local public services.

Idaho

On annual average, oil and gas production revenue and well development expenditures in the Idaho analysis area is expected to result in about 14 total jobs (about 6 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $759,000 in total labor income (about $360,000 in direct labor income), and about $3.2 million in economic output (about $1.9 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 94.1 percent of the total economic output.

Under Alternative 1, fluid mineral leasing would continue to be managed as NSO in Idaho IHMA and as CSU in GHMA. In IHMA, impacts on nonmarket and social conditions would be the same as described in *Rangewide Environmental Consequences*; however, within GHMA, if there is an increase in mineral development and activities, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*.

Montana

On annual average, oil and gas production revenue and well development expenditures in the Montana analysis area is expected to result in about 5,000 total jobs (about 2,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $485 million in total labor income (about $285 million in direct labor income), and about $1.9 billion in economic output (about $1.3 billion in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 97.6 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in Montana would be about $112 million. The Montana severance tax revenue is expected to be about $62.6 million, under Alternative 1, and the state is expected to generate about $1.8 million from the privilege and license tax. These revenues that are disbursed to counties would continue to support local public services.

Nevada

On annual average, oil and gas production revenue and well development expenditures in the Nevada analysis area is expected to result in about 42 total jobs (about 18 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $2.2 million in total labor income (about $249,000 in direct labor income), and about $11.7 million in economic output (about $6.4 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 98.0 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in Nevada would be about $520,000. The Nevada severance tax revenue is expected to be about $114,000, under Alternative 1. Additionally, oil and gas production could generate about $5,000 across the analysis area in administration fees. These revenues that are disbursed to counties would continue to support local public services.

Under Alternative 1, Nevada GHMA would continue to be managed as open to fluid mineral leasing, subject to CSU stipulations. If there are increased mineral development and activities in GHMA, there would likely continue to be impacts on nonmarket and social conditions due to changes in access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*.

North Dakota

On annual average, oil and gas production revenue and well development expenditures in the North Dakota analysis area is expected to result in about 573 total jobs (about 275 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $48 million in total labor income (about $32 million in direct labor income), and about $471 million in economic output (about $406 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 99.0 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in North Dakota would be about $51.6 million. The North Dakota severance tax revenue is expected to be about $14.7 million, under Alternative 1. Additionally, oil and gas production could generate about $15.5 million across the analysis area in oil extraction tax revenues. These revenues that are disbursed to counties would continue to support local public services.

South Dakota

On annual average, oil and gas production revenue and well development expenditures in the South Dakota analysis area is expected to result in about 271 total jobs (about 91 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $16.1 million in total labor income (about $7.2 million in direct labor income), and about $69 million in economic output (about $35 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 91.5 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in South Dakota would be about $2.4 million. The South Dakota severance tax revenue is expected to be about $644,000, under Alternative 1. These revenues that are disbursed to counties would continue to support local public services.

Utah

On annual average, oil and gas production revenue and well development expenditures in the Utah analysis area is expected to result in about 7,000 total jobs (about 2,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $454 million in total labor income (about $162 million in direct labor income), and about $2.5 billion in economic output (about $1.6 billion in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 86.7 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in Utah would be about $186 million. The Utah severance tax revenue is expected to be about $55.7 million, under Alternative 1, and the conservation fee is expected to generate about $223,000. Additionally, oil and gas production could generate about $55.6 million across the analysis area in county revenues from ad valorem taxes. These revenues that are disbursed to counties would continue to support local public services.

Under Alternative 1, Utah GHMA would continue to be managed as NSO near leks or CSU based on allocations in the plans that predate the 2015 amendment. In areas managed as NSO, impacts on nonmarket and social conditions would be the same as described in *Rangewide Environmental Consequences;* however, in areas managed as CSU, if there is an increase in mineral development and activities, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*.

Wyoming

On annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area is expected to result in about 37,000 total jobs (about 17,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $2.9 billion in total labor income (about $1.8 billion in direct labor income), and about $15.6 billion in economic output (about $11.6 billion in direct economic output) throughout the state. Most of the impacts on employment and economic output from oil and gas production revenue and well development expenditures would occur in the analysis area, accounting for about 99.9 percent of the total economic output.

Under Alternative 1, the total royalty revenue generated from oil and gas production in Wyoming would be about $972 million. The Wyoming severance tax revenue is expected to be about $350 million, and the oil and gas conservation tax could generate about $2.9 million, under Alternative 1. Additionally, oil and gas production could generate about $367 million across the analysis area in county revenues from ad valorem taxes. These revenues that are disbursed to counties would continue to support local public services.

Under Alternative 1, in Wyoming, GHMA would be managed as NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks, while PHMA would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside. In areas managed as NSO, impacts on nonmarket and social conditions would be the same as described in *Rangewide Environmental Consequences;* however, in areas managed as CSU, if there is an increase in mineral development or activities, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*.

Nonenergy Leasable Minerals Management

Under Alternative 1, most of the PHMA and IHMA in the planning area are closed to new leasing of non-energy leasable minerals but states can consider expansion of existing leases. Across all states in the planning area, there would continue to be economic activity and nonmarket and social values associated with the extraction of federal nonenergy leasable minerals. There could be economic and social impacts, as detailed in **Section 4.2.1**, *Nature and Type of Effects,* due to current BLM-management decisions regarding access to nonenergy leasable mineral extractions in certain locations, such as Wyoming, where nonenergy leasable minerals are important to the local economies; however, it is not anticipated that these impacts would be large due to the adaptive management and allowing the Known Sodium Leasing area to remain open to exploration and consideration for leasing development.

Locatable Minerals Management

Under the 2015 ROD, carried forward as Alternative 1, all states recommended the withdrawal of all SFAs from locatable mineral entry. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. In 2015, the Secretary proposed to withdraw the SFA lands and a separate process to consider this withdrawal is currently underway. If after the completion of this process, the Secretary decided to withdraw these lands, there could be impacts on economic activity and social conditions, as discussed in *Nature and Types of Effects*. There could be a decrease in jobs, labor income, and economic output due to the potential decrease in exploration and development. Potential for impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects,* from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho), except in all SFAs, if the Secretary withdraws these lands.

Mineral Materials Management

Under Alternative 1, except the states discussed below, PHMA in all other states would be closed to new mineral material sales, but open for new free use permits, and expansion of existing pits for both free use permits and material sales, which would lead to continued impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*. Additionally, extraction could take place in other locations outside of GRSG habitat. Given the other opportunities to extract mineral materials in other locations, the impacts on economic activities and social conditions associated with mineral materials is likely to be minimal, under Alternative 1.

Idaho

Under Alternative 1, all PHMA would be closed to mineral material disposal except for the expansion of existing pits, unlike other states, in Idaho this closure extends to new free use permits. Closing PHMA to new free use permits would result in increased costs to local government road departments for road maintenance and could result in worsening road conditions in these areas.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

Below is a discussion on the economic impacts from BLM-management decisions on restrictions and stipulations on geothermal leasing, under Alternative 1, for each state that had projected geothermal development. These include impacts on the number of jobs, labor income, and economic output from expenditures on geothermal development for each state in the planning area (as shown in **Table 10** in **Appendix 18**). The RFD does not anticipate future geothermal development in Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas. On annual average, geothermal development, across 7 states in the planning area, is expected to result in about 634 total jobs (about 330 direct jobs), $41.2 million in total labor income (about $20.0 million in direct labor income), and about $120 million in economic output (about $28.4 million in direct economic output). For the 7 states in the planning area that are anticipated to see geothermal development, BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to change tax revenue and public services from current conditions.

Under Alternative 1 the entire plan area with the exception of Wyoming would limit lands used for ROWs in PHMA (or IHMA in Idaho) and GHMA for Greater Sage-Grouse (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail). These BLM-management decisions could result in operators relocating development of wind and solar facilities to other locations that are not restricted.

However, if there are constraints on transmission in nearby areas, relocating wind and solar operations might be costly or it might not be possible, because ROW avoidance and exclusion areas would restrict transmission lines as well as renewable energy development. This could result in barriers to development, which could result in impacts on economic contributions of wind and solar. These impacts would more likely occur in Nevada, Oregon, Utah, and Wyoming, where there have been the most wind and solar developed on federal lands. There are various factors that operators use when deciding where to site wind and solar projects that prevent further analysis on state-level impacts on the level of solar and wind development and associated impacts on economic output due to BLM-management decisions (see **Section 4.9**, Lands and Realty (Including Wind and Solar) for more details).

California and Nevada

On annual average, geothermal development in the states of California and Nevada is expected to support about 540 total jobs (about 276 direct jobs), $36.0 million in total labor income (about $17.1 million in direct labor income), and about $106 million in economic output (about $24.4 million in direct economic output).

Colorado

On annual average, geothermal development in the state is expected to support about 16 total jobs (about 8 direct jobs), $1.1 million in total labor income (about $537,000 in direct labor income), and about $2.7 million in economic output (about $761,000 in direct economic output).

Idaho

On annual average, geothermal development in the state is expected to support about 36 total jobs (about 22 direct jobs), $1.8 million in total labor income (about $1.0 million in direct labor income), and about $4.9 million in economic output (about $1.4 million in direct economic output).

Under Alternative 1, in GHMA where lands would continue to be open for wind and solar development and in IHMA that would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, there would continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from changes in surface disturbance due to potential wind and solar development, as described in *Nature and Types of Effects.*

Nevada

Under Alternative 1, in GHMA that would continue to be managed as avoidance for wind projects or in PHMA that would be open for non-utility-scale solar and wind projects, there would continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from changes in surface disturbance due to potential wind and solar development, as described in *Nature and Types of Effects.*

Oregon

On annual average, geothermal development in the state is expected to support about 11 total jobs (about 6 direct jobs), $577,000 in total labor income (about $297,000 in direct labor income), and about $1.5 million in economic output (about $402,000 in direct economic output).

Under Alternative 1, in PHMA that would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, there would continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from changes in surface disturbance due to potential wind and solar development, as described in *Nature and Types of Effects*.

Utah

On annual average, geothermal development in the state is expected to support about 22 total jobs (about 12 direct jobs), $1.3 million in total labor income (about $743,000 in direct labor income), and about $3.6 million in economic output (about $1.1 million in direct economic output).

Under Alternative 1, in GHMA that would continue to be open to solar and wind projects and in PHMA that would continue to be open to wind projects within 5 miles of leks, there would continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from changes in surface disturbance due to potential wind and solar development, as described in *Nature and Types of Effects*.

Wyoming

On annual average, geothermal development in the state is expected to support about 9 total jobs (about 6 direct jobs), $432,000 million in total labor income (about $288,000 in direct labor income), and about $1.3 million in economic output (about $388,000 in direct economic output).

Under Alternative 1, in PHMA where it would still be open to solar and wind development, there would continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from changes in surface disturbance due to potential wind and solar development, as described in *Nature and Types of Effects*.

Livestock Grazing Management

Rangewide Environmental Consequences

Table 16, in **Appendix 18**, shows the average annual number of jobs, labor income, and total economic output that could be supported from projected billed AUMs (total for cattle and sheep), under Alternative 1, for the analysis area counties combined as well as each state combined. On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the analysis areas for all states combined is expected to support about 2,000 total jobs (about 841 direct jobs in the animal production and ranching sectors), $120 million in total labor income (about $67.6 million in direct labor income), and about $380 million in economic output (about $204 million in direct economic output) across all states in the planning area. Below is a discussion on quantitative impacts shown in this table as well as a qualitative discussion on the market and nonmarket impacts from potential changes in livestock grazing on BLM-administered lands in each state.

Under Alternative 1, PHMA, IHMA, and GHMA would continue to be available for livestock grazing, which would continue to support current levels of economic and social conditions. BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to impact social conditions such as lifestyles and culture of ranchers and farmers and those communities of interest that value livestock grazing on public lands, as those impacts described in the *Nature and Types of Effects* (see **Section 4.8**, Livestock Grazing, for more information).

California

BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to change economic contributions from livestock grazing from current conditions. On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the California analysis area is expected to support about 22 total jobs (about 7 direct jobs in the animal production and ranching sectors), $3.4 million in total labor income (about $2.1 million in direct labor income), and about $8.4 million in economic output (about $4.6 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing would occur in the analysis area, accounting for about 88.6 percent of the total economic output.

Colorado

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Colorado analysis area is expected to support about 82 total jobs (about 50 direct jobs in the animal production and ranching sectors), $3.2 million in total labor income (about $1.8 million in direct labor income), and about $9.8 million in economic output (about $5.1 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 91.9 percent of the total economic output.

Idaho

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Idaho analysis area is expected to support about 221 total jobs (about 77 direct jobs in the animal production and ranching sectors), $22.8 million in total labor income (about $13.3 million in direct labor income), and about $57.3 million in economic output (about $28.5 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 97.4 percent of the total economic output.

Montana

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Montana analysis area is expected to support about 381 total jobs (about 186 direct jobs in the animal production and ranching sectors), $21.0 million in total labor income (about $10.5 million in direct labor income), and about $67.3 million in economic output (about $33.2 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 96.5 percent of the total economic output.

Nevada

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Nevada analysis area is expected to support about 236 total jobs (about 82 direct jobs in the animal production and ranching sectors), $23.6 million in total labor income (about $13.7 million in direct labor income), and about $76.7 million in economic output (about $42.1 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 97.6 percent of the total economic output.

North Dakota

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the North Dakota analysis area is expected to support about 1 total jobs (about 1 direct jobs in the animal production and ranching sectors), $64,000 in total labor income (about $39,000 in direct labor income), and about $235,000 in economic output (about $143,000 in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 97.2 percent of the total economic output.

Oregon

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Oregon analysis area is expected to support about 206 total jobs (about 78 direct jobs in the animal production and ranching sectors), $14.1 million in total labor income (about $6.5 million in direct labor income), and about $50.0 million in economic output (about $25.2 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 95.4 percent of the total economic output.

South Dakota

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the South Dakota analysis area is expected to support about 10 total jobs (about 5 direct jobs in the animal production and ranching sectors), $402,000 in total labor income (about $186,000 in direct labor income), and about $2.5 million in economic output (about $1.4 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 95.0 percent of the total economic output.

Utah

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Utah analysis area is expected to support about 90 total jobs (about 54 direct jobs in the animal production and ranching sectors), $6.2 million in total labor income (about $4.6 million in direct labor income), and about $16.9 million in economic output (about $10.8 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 96.2 percent of the total economic output.

Wyoming

On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Wyoming analysis area is expected to support about 552 total jobs (about 301 direct jobs in the animal production and ranching sectors), $25.1 million in total labor income (about $14.7 million in direct labor income), and about $91.3 million in economic output (about $52.6 million in direct economic output) throughout the state. Most of the impacts on employment and economic output from livestock grazing on these allotments would occur in the analysis area, accounting for about 98.9 percent of the total economic output.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Management under Alternative 1 to conserve, enhance, and restore sagebrush ecosystems by separating GRSG habitat into SFAs, PHMAs, IHMAs, and GHMAs, would provide protection for GRSG conservation values. As a result, the BLM-management decisions would continue to support nonmarket values associated with GRSG conservation, which would especially impact habitat conservation communities of interest (see discussion in *Nature and Type of Effects* and **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) for more information on the values and beliefs of these communities of interest).

Under Alternative 1, BLM-management decisions would support the protection of GRSG ecosystems, which would continue to provide value to the surrounding communities through impacts on tribal interests and cultural resources, especially subsistence, from changes in GRSG populations. Conversely, habitat conservation could result in impacts to communities who would benefit from development. Some examples include impacts to road realignment projects near tribal reservations and plans to expand reservation boundaries if the reservation is surrounded by PHMA.

Environmental Justice

Rangewide Environmental Consequences

Under Alternative 1, cultural resources could be impacted by BLM-management decisions by allowing surface disturbing activities, such those discussed in *Nature and Type of Effects*. These impacts on cultural resources would result in disproportionate and adverse impacts on American Indian and Alaska Native populations who value and use these resources. These impacts could occur across all states in the planning area where there are cultural resources and where there are identified environmental justice populations (especially minority or American Indian and Alaska Native environmental justice populations), such as in Colorado, where there are known concentrations of archaeological resources in pinyon-juniper vegetation that provide value to American Indian and Alaska Native populations, and in California and Nevada, where there are traditional pine nutting areas that are valuable to American Indian and Alaska Native populations. However, project-specific Section 106 compliance and government-to-government consultation with tribes should mitigate the effects of development on BLM-administered lands outside of sagebrush-dominated areas. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 1, surface-disturbing activities could negatively impact subsistence resource availability, as discussed in *Nature and Type of Effects*. This would likely disproportionately impact environmental justice populations due to the importance of subsistence activities to American Indian and Alaska Native populations, low-income populations, and some minority populations. However, the disturbance cap, under Alternative 1, could help to reduce the impacts to wildlife and subsistence resources, which could reduce impacts on environmental justice populations. These impacts would occur across the planning area; however, level of impact would likely vary geographically depending on the level of subsistence use in the region and the location of surface disturbance; a site-specific analysis would be needed to further analyze the impacts. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho), except as noted under the state-specific subheadings below for Idaho, Nevada, Oregon, Utah, and Wyoming, current stipulations and BLM-management decisions would continue and would likely reduce the impacts on GHG emissions and air quality from particulate matter, risk of wildfire smoke, and surface-disturbing activities, as described in *Nature and Type of Effects*. However, mineral development will likely continue in other locations, which would lead to relocation of impacts on the nonmarket and social conditions associated with air quality, such as access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment, as described in the *Nature and Types of Effects*. The impacts on air quality would affect all communities, including environmental justice populations, and the extent to which these impacts would disproportionately affect environmental justice populations would depend on site-specific factors and would require a site-specific analysis. See **Section 4.13**. Air Resources and Climate for more information on air quality impacts.

Impacts from BLM-management decisions on environmental justice populations vary by geographic region. Many impacts would require site-specific analyses to determine if BLM-management decisions would result in disproportionate and adverse impacts on environmental justice populations at a local level; however, for the purposes of this rangewide EIS, a discussion of adverse and disproportionate impacts on environmental justice populations by state is included below, where information is available.[6]

California

BLM-management decisions, under Alternative 1, that impact low-income environmental justice populations would likely have disproportionate and adverse impacts on environmental justice populations in the California analysis area, since both counties in analysis area were identified as meeting the criteria for containing low-income populations. These impacts include impacts on access to subsistence resources, as discussed above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects*.

Colorado

BLM-management decisions, under Alternative 1, that impact low-income and American Indian and Alaska Native environmental justice populations would likely have disproportionate and adverse impacts on environmental justice populations in the Colorado analysis area, since seven of counties in analysis area were identified as meeting the criteria for containing low-income populations and two of the counties were identified as meeting the threshold for American Indian and Alaska Native populations. These impacts include impacts on access to cultural and subsistence resources, as discussed above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects*.

Idaho

The Idaho analysis area had 25 counties that met criteria for minority, low-income, and American Indian and Alaska Native environmental justice populations. All of the BLM-management decisions, under Alternative 1, that impact environmental justice populations, as described above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* would likely have disproportionate and adverse impacts on environmental justice populations in the Idaho analysis area.

Under Alternative 1, in GHMA, fluid mineral leasing would continue to be managed as CSU and lands would continue to be open to wind and solar development and in IHMA, only utility-scale wind and solar projects would be excluded. If there would be an increase in mineral and ROW development and activities in GHMA and IHMA, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*. These impacts could lead to disproportionate and adverse impacts on environmental justice populations, depending on where the environmental justice populations are located within each county in relation to the change in air quality.

Montana

The Montana analysis area had 18 counties that met criteria for minority, low-income, and American Indian and Alaska Native environmental justice populations. All of the BLM-management decisions, under Alternative 1, that impact environmental justice populations, as described above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* would likely have disproportionate and adverse impacts on environmental justice populations in the Montana analysis area.

[6] There were no counties in the North Dakota analysis area that met the threshold for environmental justice populations, so North Dakota is not included in the state-by-state discussion.

Nevada

The entire Nevada analysis area (a total of 10 counties) met criteria for minority, low-income, and American Indian and Alaska Native environmental justice populations. All of the BLM-management decisions, under Alternative 1, that impact environmental justice populations, as described above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* would likely have disproportionate and adverse impacts on environmental justice populations in the Nevada analysis area.

Under Alternative 1, within GHMA, where fluid mineral leasing would continue to be managed as CSU and lands would continue to be managed as avoidance for wind projects and in PHMA, where only utility-scale wind and solar projects would be excluded, if there is an increase in mineral development and activities, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*. These impacts could lead to disproportionate and adverse impacts on environmental justice populations, depending on where the environmental justice populations are located within each county in relation to the change in air quality.

Oregon

The Oregon analysis area had 7 counties that met criteria for minority, low-income, and American Indian and Alaska Native environmental justice populations. All of the BLM-management decisions, under Alternative 1, that impact environmental justice populations, as described above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* would likely have disproportionate and adverse impacts on environmental justice populations in the Oregon analysis area.

Under Alternative 1, in PHMA, where only utility-scale wind and solar projects would be excluded, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*. These impacts could lead to disproportionate and adverse impacts on environmental justice populations, depending on where the environmental justice populations are located within each county in relation to the change in air quality.

South Dakota

BLM-management decisions, under Alternative 1, that impact low-income environmental justice populations would likely have disproportionate and adverse impacts on environmental justice populations in Butte County, South Dakota, since the county was identified as meeting the criteria for containing low-income populations. These impacts include impacts on access to subsistence resources, as discussed above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects*.

Utah

BLM-management decisions, under Alternative 1, that impact low-income and American Indian and Alaska Native environmental justice populations would likely have disproportionate and adverse impacts on environmental justice populations in the Utah analysis area, as discussed above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* since 18 counties in analysis area were identified as meeting the criteria for containing low-income or American Indian and Alaska Native populations.

Under Alternative 1, within GHMA, where fluid mineral leasing would continue to be managed as NSO near leks or CSU based on allocations in the plans that predate the 2015 amendment and lands would continue to be open to solar and wind projects and in PHMA, where lands would continue to be open to wind projects within 5 miles of leks, if there is an increase in development, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in *Nature and Types of Effects*. These impacts could lead to disproportionate and adverse impacts on environmental justice populations, depending on where the environmental justice populations are located within each county in relation to the change in air quality.

Wyoming

The Wyoming analysis area had 15 counties that met criteria for minority, low-income, and American Indian and Alaska Native environmental justice populations. All of the BLM-management decisions, under Alternative 1, that impact environmental justice populations, as described above in the *Rangewide Environmental Consequences* subsection and *Nature and Type of Effects,* would likely have disproportionate and adverse impacts on environmental justice populations in the Wyoming analysis area.

Under Alternative 1, within GHMA, where fluid mineral leasing would continue to be managed as NSO within 0.25 miles of leks with seasonal limitations within 2 miles of leks, and within PHMA, where fluid mineral leasing would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside and where it would still be open to solar and wind development, if there is an increase in development and activities, there would likely continue to be impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality due to less restrictions than other areas, as described in *Nature and Types of Effects*. These impacts could lead to disproportionate and adverse impacts on environmental justice populations, depending on where the environmental justice populations are located within each county in relation to the change in air quality. In areas open to fluid mineral leasing with CSU stipulations or timing limitations, if there is an increase in mineral development and activities, potential for impacts on air quality would continue to exist.

4.12.3 Alternative 2

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells anticipated to be drilled and completed over the planning period would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming, so the market impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 5** in **Appendix 18**). Under Alternative 2, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to BLM-management decisions (see **Section 4.10**, Mineral Resources, for more information). On annual average, this increase is expected to support about 325 more jobs (almost 100 additional direct jobs), about $27 million more in total labor income (about $11.5 million in additional direct labor income), and about $102 million in additional economic output (about $58 million in additional direct economic output) than under Alternative 1, across these two states. Additional details on economic and social impacts specific to Colorado and Idaho are discussed below.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1, except for described below for impacts in Colorado and Idaho. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming would be negligible relative to those under Alternative 1. Below is a discussion on royalty and state tax revenues for Colorado and Idaho.

Under Alternative 2, impacts on nonmarket and social conditions such as impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in the *Nature and Types of Effects* would be the same as under Alternative 1, except in Colorado as described under the state-specific sub-heading below. Social values in terms of way-of-life, culture, and social cohesion for the communities who value mineral extraction in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming would be similar to those described under Alternative 1.

Colorado

Under Alternative 2, on annual average, oil and gas production revenue and well development expenditures and well development in the Colorado analysis area is expected to support about 320 more total jobs (about 95 additional direct jobs), about $27million more in total labor (about $11 million in additional direct labor income), and about $100 million in economic output (about $57 million in additional direct economic output) on annual average across the state relative to Alternative 1.

The increase in projected oil and gas activity could result in a small increase in tax revenues compared with Alternative 1. Under Alternative 2, the total royalty revenue generated from oil and gas production in Colorado could range from $459 million to $884 million, which is about $6.4 million to $6.5 million more than under Alternative 1. The Colorado severance tax revenue could range from $32.3 million to $62.2 million, which is almost $500,000 more than under Alternative 1. The oil and gas conservation fee could generate a range of $3.0 million to $5.8 million, slightly more than under Alternative 1. Additionally, oil and gas production could generate a range of $121 million to $232 million in county revenues from ad valorem taxes, which is about $1.7 million more than under Alternative 1). These revenues that are disbursed to counties would continue to support local public services, such as education.

The potential increase in oil and gas activity is not likely to result in large impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Under Alternative 2, PHMAs in Colorado would be designated as NSO for fluid mineral development. Compared with Alternative 1, changing GHMA from closed to fluid mineral leasing within 1 mile of leks and NSO within 2 miles of leks under Alternative 1 to NSO within 1 mile of leks under this alternative would likely result in an increase in air emissions because the amount of federal mineral estate available for leasing and development would be greater under this alternative. This could lead to less access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in the *Nature and Types of Effects*.

Idaho

Under Alternative 2, on annual average, oil and gas production revenue and well development expenditures in the Idaho analysis area is expected to support about 5 total additional jobs (about 2 additional direct jobs), $253,000 in additional total labor income (about $120,000 in additional direct labor income), and about $1.1 million in additional economic output (about $625,000 in additional direct economic output), across the state, compared to development under Alternative 1.

The small increase in projected oil and gas activity In Idaho could result in a small increase in tax revenues compared with Alternative 1, which would be disbursed to counties and would continue to support local public services, such as education.

The potential increase in oil and gas activity is not likely to result in large impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 2, economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area, except Nevada.

Nevada

Nevada added exception criteria to the closure in PHMA, allowing leasing of non-energy leasable minerals under certain circumstances. This would improve the access of non-energy leasable minerals in the planning areas compared to Alternative 1, which could improve economic and social conditions associated with non-energy leasable minerals, such as lifestyle, culture, employment, and economic output, through greater extraction of these mineral resources. However, BLM-management decisions under Alternative 2 could also lead to less access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, as described in the *Nature and Types of Effects*.

Locatable Minerals Management

Rangewide Environmental Consequences

Except for Montana, where recommendation for withdrawal of SFAs language would be as described under Alternative 1, Alternative 2 does not include recommendations for the withdrawal of SFAs from locatable mineral entry. Recommendations for withdrawal have no impact on economic activity.

Under Alternative 2, removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on nonmarket and social conditions from changes in air quality and GHG emissions because as discussed under Alternative 1, enacting the recommendation would be separate action and not occur under this RMPA.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 2, impacts on public access to mineral materials and social and nonmarket values associated with mineral material extraction would likely be similar to under Alternative 1, for all states except for Idaho and Nevada.

Under Alternative 2, impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from proposed management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal in PHMA and GHMA would be the same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Idaho

Under Alternative 2, PHMA and IHMA would be managed as closed to mineral material sales, however, Idaho would allow consideration of new free use permits. Compared to Alternative 1, this would reduce impacts on road conditions and high road maintenance costs on local governments which would no longer have to transport mineral materials required for road maintenance from outside these areas. Impacts would otherwise be the same as described under Alternative 1.

Under Alternative 2, allowing consideration of new free use permits for salable minerals in Idaho IHMA, would increase the potential for associated impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1. This is because there would be a greater chance for more acres of salable mineral activities to occur in these areas.

Nevada

Under Alternative 2, Nevada would allow exception criteria to the mineral material disposal closure in PHMA. These criteria could increase the time to get approval for new mineral material sales but would also provide certainty about the conditions under which exemptions would be granted and would reduce social and economic impacts associated with sourcing mineral materials from alternative locations.

Under Alternative 2, adding an exception criterion to salable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on nonmarket and social conditions due to changes in air quality and GHG emissions. This is because there would be a greater chance for more area of salable mineral activities to occur in these areas.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed, under Alternative 2, would be the same as those anticipated under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail), so the impacts on economic activity in terms of jobs, labor, income, economic output from future geothermal development would also be the same as those described under Alternative 1 (see **Table 11** in **Appendix 18**).

Under Alternative 2, BLM-management decisions related to ROWs for wind and solar energy would be the same as Alternative 1 for all states, except for Nevada, Utah, and Wyoming (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail). While BLM-management decisions vary slightly in Nevada, Utah, and Wyoming, the impacts of these decisions on ROWs for wind and solar energy would be minimal due to the projected small change in restricted acres in Nevada and Wyoming and the greater flexibility for infrastructure projects in Utah compared to Alternative 1. This means that for all states, economic contributions from wind and solar energy development would be similar to those under Alternative 1.

Under Alternative 2, impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from changes in GRSG habitat protected from major and minor ROWs and from solar and wind development would be the same as under Alternative 1, except in Nevada for solar energy development and major ROWs, and in Nevada and Utah for wind energy development, as described in the state-specific sub-headings below.

Nevada

Under Alternative 2, there would be an exception criterion avoidance for ROWs and to the closure to wind and solar development in Nevada PHMA and to wind development in Nevada GHMA. Compared with Alternative 1, this could increase the potential for impacts on nonmarket and social conditions due to changes in air quality and GHG emissions, as discussed in *Nature and Type of Effects*, because there would be a higher chance of development. However, the exception criteria would likely avoid impacts.

Utah

Under Alternative 2, areas outside PHMAs that are within 5 miles of leks in Utah would be avoidance for wind development. This could increase the potential for impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1. This is because there would be a higher chance of development in an avoidance area as opposed to an exclusion area that includes an exception criterion to closure.

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 2, would be the same as under Alternative 1 for all states and analysis areas, so impacts on economic activity in terms of jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 17** in **Appendix 18**). In addition, social impacts in terms of way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values would be similar to those described for Alternative 1.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Management under Alternative 2 to conserve, enhance, and restore sagebrush ecosystems would have similar impacts on nonmarket and social values of GRSG as those described in Alternative 1. Nonmarket impacts under Alternative 2 would be similar to those described in Alternative 1, with state analysis area specific differences. For GRSG conservation related values, removing SFAs in UT, WY, NV, and ID would reduce protections from development and provide fewer safeguards for nonmarket values associated with self-sustaining populations of GRSG, as discussed in *Nature and Type of Effect.*

Requirements for mitigation that achieves a net conservation gain in all HMA types in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. Enforcement of mitigation resulting in no net loss in HMA CO and ID would increase potential impacts to non-market values such as the nonuse values of preserving the species for future generations, as discussed in *Naure and Types of Effect,* compared to the net-conservation gain requirements under Alternative 1. Additionally, in UT and WY, the net conservation gain requirement would be removed, which would increase potential for impacts to conservation related values. Voluntary implementation of compensatory mitigation in CO, ID, NV/CA, OR, UT, and WY HMA, could also increase the potential for impacts on nonmarket values associated with GRSG preservation compared to Alternative 1.

Environmental Justice

Rangewide Environmental Consequences

Impacts on cultural resources under Alternative 2 would be similar to under Alternative 1, except as noted under the state-specific subheadings below for Colorado, Idaho, Nevada, Utah, and Wyoming. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 2, impacts on subsistence resources would be similar to those under Alternative 1, except for areas with fewer restrictions on fluid mineral development, and/or more allocable permits for salable minerals, where subsistence resources would likely be more at risk due to surface disturbance. Impacts on subsistence resources could disproportionately impact environmental justice populations, as discussed in Nature and Type of Effects. However, the extent to which the impacts on subsistence affects environmental justice populations depends on site-specific factors and analysis. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 2, impacts on air quality and GHG emissions would be the same as under Alternative 1, except as noted under the state-specific subheadings below for Colorado, Idaho, Nevada, and Utah. Impacts on air quality from risks of wildfire smoke and fugitive dust, under Alternative 2, would be the same as under Alternative 1. See **Section 4.13**, Air Resources and Climate for more information on air quality impacts.

Colorado

Impacts on environmental justice populations from potential impacts on cultural resources would be the same as described for Alternative 1, except in Colorado PHMAs, which would have no closed areas, and Colorado GHMAs, which would have NSO in place of closed areas. The exposure of areas in Colorado to fluid mineral leasing could increase the risk of potential impacts to cultural resources and decrease opportunities for American Indian and Alaska Native populations to maintain traditional cultural practices and values in areas where fluid mineral leasing occurs, although site specific NEPA analysis will be conducted to assess alternatives to avoid, minimize and/or compensate for identified impacts. This could have disproportionate and adverse impacts on environmental justice populations in the Colorado, especially on the American Indian and Alaska Native environmental justice populations located in Moffat County and Rio Blanco County (where American Indian and Alaska Native environmental justice populations were identified) as well as on American Indian and Alaska Native environmental justice populations that live outside of the analysis area that use the planning area for spiritual, cultural, and traditional uses. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

Under Alternative 2, BLM-management decisions on fluid mineral development would increase potential impacts on nonmarket and social conditions due to changes in GHG emissions and air quality, compared with Alternative 1, which would disproportionately impact environmental justice populations throughout the Colorado analysis area, as described in Nature and Type of Effects. However, the extent to which environmental justice populations are impacted would depend on site-specific factors.

Idaho

In Idaho, removing SFAs and allowing consideration of new free use permits for salable minerals would reduce protections for GRSG and habitat, which could have negative impacts on cultural resources and decreased opportunities for American Indian and Alaska Native populations to maintain traditional cultural practices and values, such as observing lekking behavior. Additionally, this could have disproportionate and adverse impacts on environmental justice populations in the Idaho, especially on the American Indian and Alaska Native environmental justice populations located in Adams, Bingham, Cassia, Clark, Custer, Elmore, Jefferson, Lemhi, Lincoln, Minidoka, Owyhee, Payette, Power, and Washington counties (where American Indian and Alaska Native environmental justice populations were identified) as well as on American Indian and Alaska Native environmental justice populations that live outside of the analysis area that use the planning area for spiritual, cultural, and traditional uses. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

Under Alternative 2, allowing consideration of new free use permits for salable minerals in Idaho IHMA, would increase the potential for associated impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1. This is because there would be a greater chance for more acres of salable mineral activities to occur in these areas. However, the impacts might be small due to the small amount of extraction.

Nevada

In Nevada, removing SFAs would reduce protections for GRSG and habitat, which could have negative impacts on cultural resources and decreased opportunities for American Indian and Alaska Native populations to maintain traditional cultural practices and values, such as observing lekking behavior. This could have disproportionate and adverse impacts on environmental justice populations in all counties in the Nevada analysis area (where American Indian and Alaska Native environmental justice population were identified) as well as on American Indian and Alaska Native environmental justice populations that live outside of the analysis area that use the planning area for spiritual, cultural, and traditional uses. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

Under Alternative 2, BLM-management decisions in Nevada would increase the potential for associated impacts on nonmarket and social conditions, as described in *Nature and Type of Effects*, due to changes in air quality and GHG emissions from the potential for more nonenergy leasable mineral and salable mineral activities to occur.

Utah

In Utah, removing SFAs would reduce protections for GRSG and habitat, which could have negative impacts on cultural resources and decreased opportunities for American Indian and Alaska Native populations to maintain traditional cultural practices and values, such as observing lekking behavior. This could have disproportionate and adverse impacts on environmental justice populations in the Utah, especially on the American Indian and Alaska Native environmental justice populations located in Daggett, Duchesne, Emery, Garfield, Grand, Iron, Juab, Kane, Rich, and Uintah counties (where American Indian and Alaska Native environmental justice populations were identified) as well as on American Indian and Alaska Native environmental justice populations that live outside of the analysis area that use the planning area for spiritual, cultural, and traditional uses. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

Under Alternative 2, areas outside PHMAs that are within 5 miles of leks in Utah would be avoidance for wind development. This could increase the potential for impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1. This is because there would be a higher chance of development in an avoidance area as opposed to an exclusion area that includes an exception criterion to closure. This could have a disproportionate impact on environmental justice populations in analysis area counties in Utah.

Wyoming

In Wyoming, removing SFAs would reduce protections for GRSG and habitat, which could have negative impacts on cultural resources and decreased opportunities for American Indian and Alaska Native populations to maintain traditional cultural practices and values, such as observing lekking behavior. This could have disproportionate and adverse impacts on environmental justice populations in the Wyoming, especially on the American Indian and Alaska Native environmental justice populations located in Fremont County and Weston County, (where American Indian and Alaska Native environmental justice populations were identified) as well as on American Indian and Alaska Native environmental justice populations that live outside of the analysis area that use the planning area for spiritual, cultural, and traditional uses. However, there currently are protections in place for cultural resources within existing RMPs that would mitigate impacts on environmental justice populations. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

4.12.4 Alternative 3

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

Table 6, in **Appendix 18**, shows the average annual number of jobs, labor income, and total economic output that could be supported by projected oil and gas development from 2023 to 2042, under Alternative 3, for the analysis area counties combined as well as each state combined. On annual average, oil and gas production revenue and well development expenditures in the analysis area for 8 states combined is expected to result in about 25,000 to 36,000 fewer total jobs (about 11,000 to 14,000 fewer direct jobs), about $2.0 million to $2.9 billion less in total labor income (about $1.2 million to $1.6 billion less in direct labor income), and about $9.2 billion to $12.8 billion less in economic output (about $6.5 billion to $8.5 billion less in direct economic output) than under Alternative 1. Below is a discussion on quantitative economic impacts as well as a qualitative discussion on the market and nonmarket impacts from potential changes in oil and gas operations in each state with reasonably foreseeable future development of oil and gas.[7]

Management actions that restrict oil and gas development in PHMA would likely adversely affect fiscal revenues and could contribute to future state and local government budget shortfalls, especially in jurisdictions that rely on the taxation of minerals in place of income taxes or where taxes on mineral production currently represent the single largest source of revenue. These budget shortfalls may affect the ability of states and local governments to maintain infrastructure and provide public services at current levels. Insufficient funding for infrastructure and public services would adversely affect quality of life in affected communities and could further limit rural residents' access to educational opportunities, health care, and social safety net programs. Below is a discussion on royalty and state tax revenues for each state.

Under Alternative 3, all PHMA would close all areas in PHMA to mineral and ROW development, and would make PHMA unavailable to livestock grazing, which would reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance from mineral development, as described under the *Nature and Types of Effects*. Due to closing PHMA, the effects on these nonmarket and social conditions would be the lowest out of the alternatives.

Colorado

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Colorado analysis area is expected to result in about 1,000 to 13,000 fewer total jobs (about 300 to 3,600 fewer direct jobs), about $104 million to $1.1 billion less in total labor income (about $36 million to $439 million less in direct labor income), and about $390 million to $4.0 billion less in economic output (about $210 million to $2.3 billion less in direct economic output) across the state compared to development under Alternative 1.

[7] California and Oregon did not have reasonably foreseeable future oil and gas development, so they are not included in the discussion.

The decrease in projected oil and gas activity, under Alternative 3, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in Colorado could range from $312 million to $454 million, which is about $140 million to $424 million less than under Alternative 1. The Colorado severance tax revenue could range from $29.3 million to $42.6 million, which is about $2.5 million to $19.2 million less than under Alternative 1. The oil and gas conservation fee could generate a range of $2.7 million to $4.0 million, which is about $240,000 to $1.8 million less than under Alternative 1. Additionally, oil and gas production could generate a range of $109 million to $159 million in county revenues from ad valorem taxes, which is about $9.5 million to $71.5 million less than under Alternative 1). The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a large effect on communities throughout the analysis area in Colorado, due to the reliance on the mineral industry and oil and gas development on federal estate for the local economies.

Idaho

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Idaho analysis area is expected to result in about 2 fewer total jobs (about 1 fewer direct jobs), $101,000 less in total labor income (about $48,000 less in direct labor income), and about $432,000 less in economic output (about $250,000 less in direct economic output) across the state compared to development under Alternative 1.

The small decrease in projected oil and gas activity in Idaho could result in reductions in tax revenues compared with Alternative 1, which could impact public services that are offered to the communities.

The potential decrease in oil and gas activity could result in impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Montana

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Montana analysis area is expected to result in about 1,400 fewer total jobs (about 550 fewer direct jobs), $127 million less in total labor income (about $76 million less in direct labor income), and about $499 million less in economic output (about $337 million less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 3, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in Montana would be about $75.7 million, which is about $36.8 million less than under Alternative 1. The Montana severance tax revenue is expected to be about $56.0 million, which is about $6.6 million less than under Alternative 1. Additionally, oil and gas production could generate about $1.6 million in the privilege and license tax revenue, which is about $186,000 less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a larger effect on communities in southeastern and northeastern Montana, where the local economies have relied on mineral industry and oil and gas development on federal estate.

Nevada

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Nevada analysis area is expected to result in about 29 fewer total jobs (about 13 fewer direct jobs), $1.5 million less in total labor income (about $173,000 less in direct labor income), and about $8.2 million less in economic output (about $4.5 million less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 3, could result in reductions in tax revenues, compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in Nevada would be about $111,000, which is about $409,000 less than under Alternative 1. The Nevada severance tax revenue is expected to be about $33,000, which is about $82,000 less than under Alternative 1. Additionally, oil and gas production could generate about $2,000 across the analysis area in administration fees, which is about $4,000 less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a larger effect on communities in southern Nevada, where the local economies have relied on extractive minerals and oil and gas development on federal estate.

North Dakota

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the North Dakota analysis area is expected to result in about 88 fewer total jobs (about 42 fewer direct jobs), $7.4 million less in total labor income (about $4.9 million less in direct labor income), and about $72 million less in economic output (about $62 million less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 3, would result in reductions in tax revenues, compared to Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in North Dakota would be about $32.7 million, which is about $18.8 million less than under Alternative 1. The North Dakota severance tax revenue is expected to be about $12.4 million, which is about $2.3 million less than under Alternative 1. Additionally, oil and gas production could generate about $13.1 million across the analysis area oil extraction tax revenues, which is about $2.4 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a larger effect on communities in southwestern North Dakota, where the local economies have relied on extractive minerals and oil and gas development on federal estate.

South Dakota

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the South Dakota analysis area is expected to result in about 13 fewer total jobs (about 4 fewer direct jobs), $764,000 less in total labor income (about $318,000 less in direct labor income), and about $3.4 million less in economic output (about $1.7 million less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity in South Dakota could result in reductions in tax revenues compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in South Dakota would be about $1.8 million, which is about $616,000 less than under Alternative 1. The South Dakota severance tax revenue is expected to be about $637,000, which is about $7,000 less than under Alternative 1. The reductions in tax revenues could impact public services that are offered to the communities.

The potential decrease in oil and gas activity could result in impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Utah

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Utah analysis area is expected to result in about 700 fewer total jobs (about 200 fewer direct jobs), $47 million less in total labor income (about $17 million less in direct labor income), and about $252 million less in economic output (about $167 million less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 3, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in Utah would be about $125 million, which is about $60.4 million less than under Alternative 1. The Utah severance tax revenue is expected to be about $50.0 million, which is about $5.6 million less than under Alternative 1. The conservation fee is expected to generate about $200,000, which is about $22,000 less than under Alternative 1. Additionally, oil and gas production could generate about $50.0 million across the analysis area in county revenues from ad valorem taxes, which is about $5.6 less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a larger effect on communities in central and northeastern Utah, where the local economies have relied on mineral industry and oil and gas development on federal estate.

Wyoming

Under Alternative 3, on annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area is expected to result in about 22,000 fewer total jobs (about 10,000 fewer direct jobs), $1.7 billion less in total labor income (about $1.1 billion less in direct labor income), and about $8.0 billion less in economic output (about $5.7 billion less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 3, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 3, the total royalty revenue generated from oil and gas production in Wyoming would be about $523 million, which is about $449 million less than under Alternative 1. The Wyoming severance tax revenue is expected to be about $251 million, which is about $99 million less than under Alternative 1. The oil and gas conservation tax is expected to generate about $2.1 million, which is about $824,000 less than under Alternative 1. Additionally, oil and gas production could generate about $264 million across the analysis area in county revenues from ad valorem taxes, which is about $104 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment. These impacts would have a large effect on communities throughout the analysis area in Wyoming, due to the reliance on extractive minerals and oil and gas development on federal estate for the local economies.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 3, all PHMA would be closed to new nonenergy mineral leasing, which would result in the economic and social impacts as discussed in the *Nature and Type of Effects* section. For example, this closure would result in impacts on economic contributions associated with nonenergy mineral extraction, such as reductions in jobs, labor income, economic output, and tax revenue, compared with Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities. Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on mineral extraction for employment. These impacts would have a larger effect on communities in northwestern Colorado, in Caribou County, Idaho, central Utah, and southwestern Wyoming, where the local economies have relied on nonenergy leasable mineral extraction on federal estate.

Closures in land to new nonenergy mineral leasing could result in increases in prices in the short term of household products, such as products made from trona, as discussed in *Nature and Type of Effects*, due to an increase in cost that would likely occur to mining operators. Restrictions on mineral leasing will likely not result in immediate closures of mines; however, as restrictions on nonenergy leasing continue in the long term, there could be impacts on the availability of household products made from trona due to the potential continued constraints on nonenergy leasable mineral extractions. Increases in prices and decreases in availability of household products can put large strains on households, especially those with limited resources for alternative products or those with low income, where the products already make up a larger percentage of disposable income. Over the long term, if closures in mines continue to put pressure on prices and limit availability, it could cause even more stress on the surrounding communities, including increases in conflicts and decreases in social cohesion and health and safety. See **Section 4.10.2**, Nonenergy Leasable Minerals, for more information regarding impacts on trona and other nonenergy leasable minerals due to BLM-Management decisions.

Under Alternative 3, all PHMA would be closed to nonenergy mineral leasing, which would reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance from mineral development, as described under the *Nature and Types of Effects*.

Due to closing PHMA, the effects on these nonmarket and social conditions would be the lowest out of the alternatives.

Locatable Minerals Management

Rangewide Environmental Consequences

Under Alternative 3, all lands in PHMA would be recommended for withdrawal from locatable mineral entry. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. However, the BLM could ask the Secretary of the Interior to propose and make a withdrawal of the land from location and entry under the Mining Law of 1872 pursuant to Section 204(a) of FLMPA. Proposing and making a withdrawal is not a land use planning process. Should the Secretary propose a withdrawal, the proposal would require environmental and other analysis under NEPA and other applicable authorities before the land could be withdrawn. For purposes of this planning initiative, the alternatives analysis includes a description of the likely environmental effects should the Secretary propose and make a withdrawal in the future (e.g., reduced potential for behavioral disturbance and habitat loss/alterations). Here, if the Secretary ultimately decided to withdraw the land, such a withdrawal would likely result in a reduction of economic activity in mining sectors, compared with under Alternative 1, as described in the *Nature and Type of Effects*. The reduction in economic activity could result in impacts on market and nonmarket conditions, such as reductions in jobs, labor income, economic output, tax revenue, public services, access to lifestyles and culture associated with mining. Additionally, for those mining operators with existing mining claims that might survive a withdrawal, costs could increase due to the additional requirement to verify mining claim validity before BLM will approve a notice or plan of operations. These impacts could put a lot of strain on communities, especially those that are dependent on the mining industry. These impacts would likely be larger in areas with high potential for locatable mineral development, assuming that there are existing mining claims on those lands as of the date of withdrawal. Such a withdrawal, if made by the Secretary, would not impact nonmarket and social conditions associated with changes in air quality and GHG emissions.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 3, all areas managed for GRSG would be PHMA and would be closed to mineral materials disposal. This would reduce federal, state, territorial, municipality, and non-profit access to mineral materials through free use permits, and would increase costs for these users by relocating mineral materials operations to nonpublic lands or to public lands that are further away from where the minerals are going to be used, which would increase transportation costs. The increases in cost of mineral materials extraction could cause delays or cancelations of public projects that use mineral materials, such as road maintenance and construction of infrastructure by states and municipalities. Delays and cancelations in construction and maintenance projects would impact surrounding communities who rely on the roads and infrastructures and could increase public safety concerns and residents' frustration with road construction and repairs. These impacts would likely be larger in areas with high potential for mineral materials extraction. If historical extraction is an indication of potential, then the analysis areas in Colorado, Idaho, Montana, Nevada, and Wyoming would likely be impacted more by BLM-management decisions on lands closed to mineral materials disposal.

Under Alternative 3, closing PHMA to mineral materials disposal would reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance, associated with mineral development as described under the *Nature and Types of Effects*.

Due to closing PHMA, the effects on these nonmarket and social conditions would be the lowest out of the alternatives.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

Impacts on economic activity from BLM-management decisions that could impact geothermal development, under Alternative 3, are discussed below for each state with reasonably foreseeable development. Montana, North Dakota, and South Dakota did not have any projected geothermal development in the analysis areas due to the limited geothermal potential. On annual average, across the 7 states with projected geothermal development, geothermal development is expected to result in about 76 fewer total jobs (about 43 fewer direct jobs), $4.3 million less in total labor income (about $2.4 million less in direct labor income), and about $11.5 million less in economic output (about $3.3 million less in direct economic output), compared with Alternative 1 (see **Table 12** in **Appendix 18**).

Under Alternative 3, there would be the most restrictions on ROWs for wind and solar development out of all alternatives (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail). These BLM-management decisions could result in operators relocating development of wind and solar facilities to other non-federal locations. However, relocating wind and solar operations might not be feasible in certain locations due to constraints on transmission line availability, and it could be very costly or not possible to develop transmission lines to the nearby area, because ROW avoidance and exclusion areas would apply to transmission lines as well. As noted in Alternative 1 discussion, if additional lines of transmission are needed, this could result in impacts on economic contributions of wind and solar. Under Alternative 3, impacts on economic conditions may be increased compared to Alternative 1 due to the highest level of restrictions on solar and wind site development, as discussed in **Section 4.12.1**, *Nature and Type of Effects*. However, there are many factors that operators consider when siting solar and wind development that are not influenced by BLM-management decisions, including resource potential, electricity prices, business decisions, among others. These factors can vary by site, operator, and technology, so a site-specific analysis would need to be conducted to further understand the economic impacts from changes in wind and solar development due to BLM-management decisions (see **Section 4.9**, Lands and Realty (Including Wind and Solar) for more information).

Under Alternative 3, all PHMAs would be managed as exclusion areas for major ROWs and wind or solar energy. Prohibiting development of wind, solar, and other major ROWs would eliminate the likelihood for impacts on nonmarket and social conditions from changes in air quality and GHG emissions from surface-disturbing activities in these areas.

California and Nevada

The number of geothermal plants developed in California and Nevada would be the same as under Alternative 1 because the amount of acreage under existing leases within GRSG HMAs is sufficient to meet the projected growth in geothermal production capacity (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail), so the impacts on jobs, labor, income, economic output from geothermal development would also be the same as described under Alternative 1 (see Table 12 in Appendix 18).

Colorado

Under Alternative 3, on annual average, geothermal development in the state is expected to result in about 16 fewer total jobs (about 8 fewer direct jobs), $1.1 million less in total labor income (about $537,000 less in direct labor income), and about $2.7 million less in economic output (about $761,000 less in direct economic output), compared with Alternative 1.

Idaho

Under Alternative 3, on annual average, geothermal development in the state is expected to result in about 18 fewer total jobs (about 11 fewer direct jobs), $892,000 less in total labor income (about $506,000 less in direct labor income), and about $2.5 million less in economic output (about $702,000 less in direct economic output), compared with Alternative 1. The reduction in geothermal activities, under Alternative 3 would likely lead to a slight reduction in tax revenue collected by the state for geothermal production and disbursed to the counties. This reduction in tax revenue would reduce the quality and level of public services that are funded by the geothermal production tax.

If there is a reduction in wind and solar energy activities, under Alternative 3, due to BLM-management decision, such as a reduction in development and production, there would likely result in a decrease in tax revenue collected by the state and distributed to the counties, which could result in a decrease in quality and quantity of public services in the analysis area, as described in the *Nature and Type of Effects* section.

Oregon

Under Alternative 3, on annual average, geothermal development in the state is expected to result in about 11 fewer total jobs (about 6 fewer direct jobs), $577,000 less in total labor income (about $297,000 less in direct labor income), and about $1.5 million less in economic output (about $402,000 less in direct economic output), compared with Alternative 1. However, existing leases could still be used for geothermal development, so if any of these leases are developed, the impacts on economic contributions would change.

North Dakota

If there is a reduction in wind energy activities, under Alternative 3, due to BLM-management decision, such as a reduction in development and production, there would likely result in a decrease in tax revenue collected by the state and distributed to the counties, which could result in a decrease in quality and quantity of public services in the analysis area, as described in the *Nature and Type of Effects* section.

South Dakota

If there is a reduction in wind and solar energy activities, under Alternative 3, due to BLM-management decision, such as a reduction in development and production, there would likely result in a decrease in tax revenue collected by the state and distributed to the counties, which could result in a decrease in quality and quantity of public services in the analysis area, as described in the *Nature and Type of Effects* section.

Utah

Under Alternative 3, on annual average, geothermal development in the state is expected to result in about 22 fewer total jobs (about 12 fewer direct jobs), $1.3 million less in total labor income (about $743,000 less in direct labor income), and about $3.6 million less in economic output (about $1.1 million less in direct economic output), compared with Alternative 1. However, existing leases could still be used for geothermal development. If any of these leases are developed, the impacts on economic contributions would change, but development is less likely, under Alternative 3.

Wyoming

Under Alternative 3, on annual average, geothermal development in the state is expected to result in about 9 fewer total jobs (about 6 fewer direct jobs), $432,000 less in total labor income (about $288,000 less in direct labor income), and about $1.3 million less in economic output (about $388,000 less in direct economic output), compared with Alternative 1.

If there is a reduction in wind energy activities, under Alternative 3, due to BLM-management decision, such as a reduction in development and production, there would likely result in a decrease in tax revenue collected by the state and distributed to the counties, which could result in a decrease in quality and quantity of public services in the analysis area, as described in the *Nature and Type of Effects* section.

Livestock Grazing Management

Rangewide Environmental Consequences

Under Alternative 3, all HMA (PHMA) would be unavailable for domestic livestock grazing, which would result in a substantial reduction in forage availability on federal lands. This reduction in forage availability would adversely affect ranching activity, including reducing billed AUMs, market, nonmarket, and social impacts associated with livestock grazing on public lands across communities. On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the analysis areas for all 10 states combined is expected to result in about 2,000 fewer total jobs (about 841 fewer direct jobs), $120 million less in total labor income (about $67.6 million less in direct labor income), and about $380 million less in economic output (about $204 million less in direct economic output), compared with Alternative 1 (see **Table 18** in **Appendix 18**).

The restrictions on livestock grazing in large portions of federal allotments could impact the economic resilience of ranching and farming communities, as discussed in *Nature and Type of Effects,* especially in areas that are also reliant on mineral development due to the boom and bust economic cycle of the resources.

In many cases, BLM lands may have importance for a broader level of ranch operations, for example when providing important seasonal rotation pastures, and impacts limiting access to livestock grazing on BLM lands can result in large economic and social impacts for affected ranchers. Making PHMA unavailable to livestock grazing could result in increases in costs to ranchers and farmers who would have to find alternatives for federal forage for their livestock. The cost increases may lead to increases in meat prices if passed on to consumers and, in the long term, decreases in availability of meat and animal products, as discussed in *Nature and Type of Effects*. Increases in prices and decreases in availability of meat and animal products could put additional strain on households, especially those with lower incomes in rural areas, where food prices tend to be higher and a larger percentage of their disposable income goes towards food purchases.

Under Alternative 3, BLM-management decisions to restrict livestock grazing would likely have large market and nonmarket impacts on the local communities and economies across the analysis areas, as discussed in *Nature and Type of Effects*. There could be higher potential for closures of ranches or ranches selling lands to create ranchettes, which could have substantial impacts on social and economic conditions in some surrounding communities. These impacts include impacts on communities' well-being and social cohesion and impacts on access and quality of the ranching lifestyle, culture, and sense of place for those who rely on access to forage from federal land for their farming and ranching operations as well as for those who are part of the farming and ranching communities of interest and value livestock grazing on public lands. The regions that would be disproportionately affected include those communities and economies that rely on the agriculture industry and that have large quantities of small and midsize family farms and ranches where the operators' primary occupation is farming or ranching.[8] These small and midsize ranches are located across most of the analysis area in each state of the planning area (see **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on demographics and current economic and social conditions).

The impacts on economic activity from restricting livestock grazing in PHMA by state shown in Table 17, in Appendix 18, and are discussed below. See **Section 4.8**, Livestock Grazing, for more information regarding impacts on livestock grazing from BLM-management decisions.

California

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the California analysis area is expected to result in about 22 fewer total jobs (about 7 fewer direct jobs), $3.4 million less in total labor income (about $2.1 million less in direct labor income), and about $8.4 million less in economic output (about $4.6 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely disproportionately impact those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Colorado

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Colorado analysis area is expected to result in about 82 fewer total jobs (about 50 fewer direct jobs), $3.2 million less in total labor income (about $1.8 million less in direct labor income), and about $9.8 million less in economic output (about $5.2 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely disproportionately impact those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Idaho

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Idaho analysis area is expected to result in about 221 fewer total jobs (about 77 fewer direct jobs), $22.8 million less in total labor income (about $13.3 million less in direct labor income), and about $57.3 million less in economic output (about $28.5 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely be substantial, especially for those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

[8] Small family ranches are those with annual gross cash farm income less than $350,000 and midsize family ranches are those with annual gross cash farm income of at least $350,000 but less than $1 million. See **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on the types of ranches in the analysis area).

Montana

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Montana analysis area is expected to result in about 381 fewer total jobs (about 186 fewer direct jobs), $21.0 million less in total labor income (about $10.5 million less in direct labor income), and about $67.3 million less in economic output (about $33.2 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely be substantial, especially for those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Nevada

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Nevada analysis area is expected to result in about 236 fewer total jobs (82 fewer direct jobs), $23.6 million less in total labor income (about $13.7 million less in direct labor income), and about $76.7 million less in economic output (about $42.1 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely be substantial, especially for those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

North Dakota

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the North Dakota analysis area is expected to result in about 1 fewer total jobs (1 fewer direct jobs), $64,000 less in total labor income (about $39,000 less in direct labor income), and about $235,000 less in economic output (about $143,000 less in direct economic output) throughout the state, compared with Alternative 1. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3, although to a lesser degree.

Oregon

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Oregon analysis area is expected to result in about 206 fewer total jobs (78 fewer direct jobs), $14.1 million less in total labor income (about $6.5 million less in direct labor income), and about $50.0 million less in economic output (about $25.2 million less in direct economic output) across the state compared with Alternative 1. These impacts on economic conditions would likely be substantial, especially for those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

South Dakota

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the South Dakota analysis area is expected to result in about 10 fewer total jobs (about 5 fewer direct jobs), $402,000 less in total labor income (about $186,000 less in direct labor income), and about $2.5 million less in economic output (about $1.4 million less in direct economic output) across the analysis area, compared with Alternative 1. These impacts on economic conditions would likely disproportionately impact those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Utah

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Utah analysis area is expected to result in about 90 fewer total jobs (54 fewer direct jobs), $6.2 million less in total labor income (about $4.6 million less in direct labor income), and about $16.9 million less in economic output (about $10.8 million less in direct economic output) across the analysis area, compared with Alternative 1. These impacts on economic conditions would likely disproportionately impact those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Wyoming

Under Alternative 3, on annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the Wyoming analysis area is expected to result in about 552 fewer total jobs (about 301 fewer direct jobs), $25.1 million less in total labor income (about $14.7 million less in direct labor income), and about $91.3 million less in economic output (about $52.6 million less in direct economic output) across the analysis area, compared with Alternative 1. These impacts on economic conditions would likely be substantial, especially for those communities in the analysis area with small family ranches that rely on federal lands for forage for their farming and ranching operations. Impacts on nonmarket and social conditions would likely be similar to those described in the *Rangewide Environmental Consequences* subsection under section 4.12.4, Alternative 3.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Alternative 3 would have the highest level of restrictions on development in all HMAs, including the fewest acres open and the most stringent restrictions for mineral extraction. Alternative 3 would also provide the most protection for wildlife and habitat within GRSG management areas because of increased restrictions, and in some cases the prohibition of surface disturbing activities (including mineral development, renewable energy development, and ROW development). As a result, Alternative 3 would provide the highest level of support for conservation related values.

BLM-management decisions, under Alternative 3, would support the protection of GRSG ecosystems, which would continue to provide value to the surrounding communities through impacts on tribal interests and cultural resources, especially subsistence, from changes in GRSG populations. Conversely, habitat conservation could negatively impact road realignment projects near tribal reservations and plans to expand reservation boundaries if the reservation is surrounded by PHMA.

Environmental Justice

Rangewide Environmental Consequences

Under Alternative 3, BLM-management decisions, such as those regarding mineral development and GRSG management, would offer the highest level of protection to cultural resources in GRSG habitat across all alternatives. This would result in reduced impacts on environmental justice populations, as those described in Nature and Type of Effects. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Adverse impacts on subsistence resource availability, under Alternative 3, would be minimal due to the highest level of restrictions for mineral development and other surface-disturbing activities, compared with Alternative 1. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 3, the impacts on nonmarket and social conditions due to changes in air quality from mineral exploration and development and surface disturbing activities would substantially reduce, compared with Alternative 1, due to the increase in restrictions on mineral development. This would reduce the impacts on environmental justice populations as discussed in Nature and Type of Effects. Due to restrictions in vegetation management, impacts on air quality from increased wildfire risk could increase, as described in Nature and Type of Effects. These impacts could disproportionately impact environmental justice populations, but the impacts would depend on site-specific factors such as location of changes in air quality compared with the locations of environmental justice populations that cannot be determined in this analysis. See **Section 4.13**, Air Resources and Climate for more information on air quality impacts.

Under Alternative 3, large swaths of public land would be unavailable for livestock grazing and closed to mineral leasing, which would likely increase production costs to ranchers and mining operators as they use alternative lands for forage and mining operations, if available. As described in *Nature and Type of Effects*, depending on the ability of the affected permittees and mining leases to adapt and mitigate to the loss of public land forage and public lands for mineral leasing, the increases in costs could lead to either higher prices of meat and household products (especially products made from trona) if the costs are passed on to consumers or closures in ranching and mining operations, which would lead to a decrease in availability of meat and household products, especially in the long term. These impacts would disproportionately affect low-income environmental justice populations, because marginal increases in prices of meat and household products make up a larger percentage of the disposable income from low-income households than the general public and low-income households tend to have fewer alternatives if meat and household products become unavailable. The restrictions in livestock grazing and mineral development that could lead to impacts on prices and availability are localized and vary across geographic regions; however, the impacts of meat and household product prices and availability would likely be observed regionally and nationally, especially in areas with higher low-income populations. See subsections in this section on *Nonenergy Leasable Minerals* and *Livestock Grazing* as well as **Section 4.10.2**, Nonenergy Leasable Minerals, and **Section 4.8**, Livestock Grazing, for more information on impacts on trona mining and livestock grazing.

Restrictions on mineral development in PHMA under Alternative 3 could contribute to budget shortfalls for state and local governments that are highly dependent on mineral revenues, like many counties in Wyoming, and may affect their ability to provide public services. Reductions in public services, like education, health care, and social safety net programs, could adversely affect the quality of life in affected communities. Since some public services are more heavily used by low-income individuals and families, insufficient funding for programs may disproportionately adversely impact low-income populations if access to those services was reduced.

As discussed in **Section 3.12**, Social and Economic Conditions (including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report, economic impacts, such as impacts on jobs, labor income, and economic output, on environmental justice populations from greater restrictions in livestock grazing and mineral and oil and gas development are not included in the discussion on environmental justice due to the lack of evidence that individuals employed in the agriculture and mining sectors have a higher percentage of people who meet the criteria for environmental justice. However, a discussion on economic output, jobs, and labor income impacts on the general population due to BLM-management decisions is included in other subsections (see the *Fluid Minerals (Oil and Gas), Renewable Energy (Geothermal, Wind, and Solar),* and *Livestock Grazing* subsections). The loss of economic activity stemming from the closure of GRSG PHMA or making PHMA unavailable for authorized uses, as described in the subsections above in terms of affected jobs and labor income, may result in some additional communities meeting low-income criteria for consideration as potential environmental justice communities in the future. Additional screening and consideration of environmental justice populations and disproportionate impacts will occur at the implementation stage at a scale commensurate with the scope and scale of management actions being considered to provide additional protections for local GRSG populations.

4.12.5 Alternative 4

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells drilled and completed would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming, so the impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 7** in **Appendix 18**). Under Alternative 4, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to more areas available for leasing and addition of more exceptions and waivers and oil and gas production revenue and well development expenditures are expected to decrease in Wyoming due to all land in PHMA managed as NSO (see **Section 4.10**, Mineral Resources, for more information). On annual average, this change is expected to result in about 9,000 to 10,000 fewer total jobs (about 4,000 to 5,000 fewer direct jobs), about $702 million to $762 million less in total labor income (about $482 million to $506 million less in direct labor income), and about $3.5 million to $3.7 million less in economic output (about $2.6 to $2.8 million less in direct economic output) than under Alternative 1, across these three states. Additional details on economic and social impacts specific to Colorado, Idaho, and Wyoming are discussed below.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1 except for described below for impacts in Colorado, Idaho, and Wyoming. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North Dakota, South Dakota, and Utah would be negligible relative to those under Alternative 1. Below is a discussion on royalty and state tax revenues for Colorado, Idaho, and Wyoming.

Under Alternative 4, impacts on nonmarket and social conditions associated with changes in air quality and GHG emissions from fluid mineral leasing would be similar to Alternative 1, except in some states as discussed under state-specific subheadings below for Colorado and Wyoming. Alternative 4 would minimize impacts on nonmarket and social conditions associated with air quality and GHG emissions, as describes under the *Nature and Type of Effects,* by promoting project designs that avoid, minimize, reduce, rectify, and compensate for direct and indirect impacts. Social impacts from way-of-life, culture, and social cohesion for the communities who value mineral extraction in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming would be similar to those described under Alternative 1.

Colorado

Under Alternative 4, on annual average, oil and gas production revenue and well development expenditures in the Colorado analysis area is expected to result in 1,300 to 2,000 additional total jobs (about 374 to 574 additional direct jobs), about $111 million to $172 million in additional total labor income (about $45 million to $68 million in additional direct labor income), and about $414 million to $639 million in additional economic output, compared with Alternative 1 (about $232 million to $357 million in additional direct economic output) throughout the state.

Under Alternative 4, the total royalty revenue generated from oil and gas production in Colorado could range from $482 million to $924 million, which is about $29.3 million to $45.8 million more than under Alternative 1. The Colorado severance tax revenue could range from $33.9 million to $64.9 million, which is about $2.1 million to $3.2 million more than under Alternative 1. The oil and gas conservation fee could generate a range of $3.2 million to $6.1 million, which is about 193,000 to 302,000 more than under Alternative 1. Additionally, oil and gas production could generate a range of $126 million to $242 million in county revenues from ad valorem taxes, which is about $7.7 million to $12.0 million more than under Alternative 1. This increase in revenues that are disbursed to counties could bolster public finances which may be used to support additional public services, compared with Alternative 1. Additionally, there could be more support and preservation of nonmarket values associated lifestyles and culture for those in mineral development communities of interest and those who value preservation of historical mining communities.

In Colorado, under Alternative 4, more acreage would be available for fluid mineral leasing than under Alternative 1, since closures within one mile of leks in GHMA would no longer apply. This could allow for more development-related impacts on nonmarket and social conditions associated with changes in air quality and GHG emissions, compared with Alternative 1.

Idaho

Under Alternative 4, on annual average, oil and gas production revenue and well development expenditures in the Idaho analysis area is expected to result in about 9 total additional jobs (about 4 additional direct jobs), $506,000 in additional total labor income (about $240,000 in additional direct labor income), and about $2.2 million in additional economic output (about $1.2 million in additional direct economic output) throughout the state, compared with Alternative 1.

The small increase in projected oil and gas activity In Idaho could result in a small increase in tax revenues compared with Alternative 1, which would be disbursed to counties and would continue to support local public services, such as education.

The potential increase in oil and gas activity is not likely to result in large impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Wyoming

In Wyoming, under Alternative 4, NSO stipulations would be applied to all land in PHMA and within 0.25 miles of leks in GHMA. This would reduce the acreage available for fluid mineral leasing, compared to Alternative 1. Under Alternative 4, on annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area are expected to result in about 11,000 fewer total jobs (about 5,000 fewer direct jobs), $874 million less in total labor income (about $551 million less in direct labor income), and about $4.2 billion less in economic output (about $3.0 billion less in direct economic output) across the state compared to development under Alternative 1.

The decrease in projected oil and gas activity, under Alternative 4, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 4, the total royalty revenue generated from oil and gas production in Wyoming would be about $829 million, which is about $143 million less than under Alternative 1. The Wyoming severance tax revenue is expected to be about $298 million, which is about $51.6 million less than under Alternative 1. The oil and gas conservation tax is expected to generate about $2.5 million, which is about $430,000 less than under Alternative 1. Additionally, oil and gas production could generate about $313 million across the analysis area in county revenues from ad valorem taxes, which is about $54.1 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities, including education, as described in the *Nature and Type of Effects* section.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment.

The reduction in the acreage available for fluid mineral leasing could reduce the development-related impacts on nonmarket and social conditions associate with changes in air quality and GHG emissions, compared with Alternative 1.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 4, many of the economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area.

Under Alternative 4, the BLM would manage minerals to minimize land use conflict and associated impacts from subsequent development through project designs that avoid, minimize, reduce, rectify, and compensate for indirect impacts. Under this alternative, the BLM would take a more adaptive approach to management and consider existing data and best available science to determine if conservation measures are reasonable. Under this approach, while the impacts on nonmarket and social conditions related to air quality and GHG emissions would be reduced or removed in some cases, compared with Alternative 1, under the scenario which management would result in more development, impacts could increase due to an increase in development and surface disturbing activities, compared with Alternative 1.

Nevada/California

In Nevada and northeastern California, exceptions to the non-energy leasable mineral closure in PHMA under Alternative 1 may allow for increased development of non-energy leasable minerals, which could lead to impacts on nonmarket and social conditions such as access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, in some locations.

Locatable Minerals Management

Rangewide Environmental Consequences

Under Alternative 4, there would be no areas recommend for withdrawal from locatable mineral entry. As noted above, recommendations for withdrawal do not restrict any activities; therefore, they have no effects. Similarly, not recommending an area for withdrawal does not have any effects. There would be no impact to jobs, income, economic output and social conditions, as discussed in *Nature and Types of Effects*, under Alternative 4 different from those under Alternative 1.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 4, impacts on public access to mineral materials and social and nonmarket values of mineral material extraction would likely be similar to under Alternative 1, for all states, except for Idaho.

Idaho

In Idaho, under Alternative 4, economic and social impacts from proposed management and impacts on mineral material development would be the same as described under the Alternative 2 *Idaho* section.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed would be the same as under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail), so the impacts on jobs, labor, income, economic output from geothermal development would also be the same as described under Alternative 1 (see **Table 13** in **Appendix 18**).

Utility scale wind and solar projects in PHMA would be managed as ROW exclusion areas, under Alternative 4 (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail). These BLM-management decisions could result in operators relocating development of wind and solar facilities to other locations that are not restricted. However, relocating wind and solar operations might not be possible or feasible, if access to transmission lines is limited, due to the high costs associated with building transmission lines and because ROW avoidance and exclusion areas would impact transmission lines as well. As noted in Alternative 1 discussion, if additional lines of transmission are needed, this could result in impacts on economic contributions of wind and solar. Under Alternative 4, impacts may be increased compared to the Alternative 1 due to increased restrictions on solar and wind site development due to ROW exclusion areas.

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 4, would be the same as under Alternative 1 for all states and analysis areas, so market impacts on jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 19** in **Appendix 18**). In addition, social impacts from way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values from designating GRSG habitat as HMAs would be similar to those described for Alternative 1.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Impacts would be similar to that described in Alternative 1, with some additional state analysis area variation in level of protection for GRSG and associated impacts on those groups prioritizing development or conservation values. The level of impacts to non-market values associated with GRSG would therefore vary by area based on the determination of site-specific development restrictions determined by state.

Environmental Justice

Rangewide Environmental Consequences

Under Alternative 4, impacts from BLM-management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. See **Section 4.17**, Tribal

Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Impacts on subsistence resource availability, under Alternative 4, could be reduced due to minerals management strategies that reduce possibilities of consequences from potential development in GRSG habitats or giving preference to lands that would not obstruct the suitability and proper operation of GRSG habitats. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 4 impacts on nonmarket and social conditions from changes in air quality and GHG emissions from mineral development may increase compared with Alternative 1 due to the wavers, exceptions, and modifications that would be allowed under Alternative 4, which could increase mineral extraction. This would likely result in adverse and disproportionate impacts on environmental justice populations, as discussed in Nature and Type of Effects. See **Section 4.13**, Air Resources and Climate for more information on air quality impacts.

4.12.6 Alternative 5

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells drilled and completed would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, and Utah, so the impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 8** in **Appendix 18**). Under Alternative 5, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to more areas available for leasing and addition of more exceptions and waivers and oil and gas production revenue and well development expenditures are expected to decrease in Wyoming due to all land in PHMA managed as NSO, relative to Alternative 1 (see **Section 4.10**, Mineral Resources, for more information). On annual average, this change is expected to result in about 560 fewer total jobs to 150 more total jobs (about 460 to 260 fewer direct jobs), about $34 million less in total labor income to $26 million more in total labor income (about $47 million to $23 million less in direct labor income), and about $54 million to $279 million less in economic output (about $141 million to $266 million less in direct economic output) than under Alternative 1, across these three states. Additional details on economic and social impacts specific to Colorado, Idaho, and Wyoming are discussed below.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1, except for described below for impacts in Colorado, Idaho, and Wyoming. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North Dakota, South Dakota, and Utah would be negligible relative to those under Alternative 1. Below is a discussion on royalty and state tax revenues for Colorado, Idaho, and Wyoming.

Impacts on nonmarket and social conditions associated with air quality and climate change to the surrounding communities and regions would be similar as described under Alternative 1. Social impacts from way-of-life, culture, and social cohesion for the communities who value mineral extraction in Montana, Nevada, North Dakota, South Dakota, and Utah would be similar to those described under Alternative 1.

Colorado

Under Alternative 5, the economic and social impacts of changes in oil and gas development in the Colorado analysis area due to the BLM-management decisions would be the same as under Alternative 4.

Idaho

Under Alternative 5, on annual average, oil and gas production revenue and well development expenditures in the Idaho analysis area is expected to result in about 8 total additional jobs (about 4 additional direct jobs), $456,000 in additional total labor income (about $216,000 in additional direct labor income), and about $1.9 million in additional economic output (about $1.1 million in additional direct economic output) throughout the state, compared with Alternative 1.

The small increase in projected oil and gas activity In Idaho could result in a small increase in tax revenues compared with Alternative 1, which would be disbursed to counties and would continue to support local public services, such as education.

The potential increase in oil and gas activity is not likely to result in large impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest.

Wyoming

Under Alternative 5, on annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area is expected to result in about 2,000 fewer total jobs (about 836 fewer direct jobs), about $146 million less in total labor income (about $92 million less in direct labor income), and about $695 million less in economic output (about $498 million less in direct economic output), compared with Alternative 1 throughout the state.

The decrease in projected oil and gas activity, under Alternative 5, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 5, the total royalty revenue generated from oil and gas production in Wyoming would be about $948 million, which is about $23.9 million less than under Alternative 1. The Wyoming severance tax revenue is expected to be about $341 million, which is about $8.6 million less than under Alternative 1. The oil and gas conservation tax could generate about $2.8 million, which would be about $72,000 less than under Alternative 1. Additionally, oil and gas production could generate about $358 million across the analysis area in county revenues from ad valorem taxes, which is about $9.0 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities, including education, as described in the *Nature and Type of Effects* section.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment.

The reduction in the acreage available for fluid mineral leasing could reduce the development-related impacts on nonmarket and social conditions associate with changes in air and GHG emissions, compared with Alternative 1.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 5, economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area.

Locatable Minerals Management

Rangewide Environmental Consequences

Under Alternative 5, the impacts on the economic activities and social conditions associated with locatable mineral resources would be the same as described under Alternative 4 above.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 5, impacts on public access to mineral materials and social and nonmarket values of mineral material extraction would likely be the same as under Alternative 4.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed would be the same as under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail), so the impacts on jobs, labor, income, economic output from geothermal development would also be the same as described under Alternative 1 (see **Table 14** in **Appendix 18**).

Under Alternative 5, lands encompassing major ROWs and utility scale wind and solar in PHMA would be managed as ROW avoidance areas, while in GHMA they would be managed as open to ROWs. The impacts of BLM-management decisions on economic activity and market conditions from wind, solar, and transmission line development across all states would be the same as under Alternative 4 (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail).

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 5, would be the same as under Alternative 1 for all states and analysis areas, so impacts on jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 20** in **Appendix 18**). In addition, social impacts from way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values from designating GRSG habitat as HMAs would be similar to those described for Alternative 1.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Impacts would be similar to that described in Alternative 1, with some additional state analysis area variation in level of protection for GRSG and associated impacts on those groups prioritizing development or conservation values. The level of impacts to non-market values associated with GRSG would therefore vary by area based on the determination of site-specific development restrictions determined by state.

Environmental Justice

Rangewide Environmental Consequences

Under Alternative 5, impacts from BLM-management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Impacts on environmental justice populations from changes in subsistence resource availability, under Alternative 5, would be similar to Alternative 1. See **Section 4.5**, Fish and Wildlife, for more information on impacts to wildlife habitats and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources, for more discussions on impacts on tribal and cultural resources.

Under Alternative 5, impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from mineral development would be minimized by promoting project designs that avoid, minimize, reduce, rectify, and compensate for indirect impacts. This would reduce the impacts on environmental justice populations as discussed in Nature and Type of Effects, compared with Alternative 1. See **Section 4.13**, Air Resources and Climate for more information on air quality impacts.

4.12.7 Alternative 6

All impacts would be the same as described for Alternative 5 except for the impacts described below.

Fluid Minerals (Oil and Gas) Management

Wyoming

Management of ACECs as open to leasing subject to NSO stipulations with an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if it can be demonstrated that no direct or indirect impacts on GRSG will occur could lead to a reduction in the number of wells drilled and completed as well as oil and gas production from these wells in Wyoming, compared with Alternative 1.

Under Alternative 6, on annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area is expected to result in about 2,000 fewer total jobs (about 1,000 fewer direct jobs), about $175 million less in total labor income (about $110 million less in direct labor income), and about $835 million less in economic output (about $599 million less in direct economic output), than under Alternative 1, throughout the state (see **Table 9** in **Appendix 18**).

The decrease in projected oil and gas activity, under Alternative 6, would result in reductions in tax revenues, compared with Alternative 1. Under Alternative 6, the total royalty revenue generated from oil and gas production in Wyoming would be about $943 million, which is about $28.7 million less than under Alternative 1. The Wyoming severance tax revenue is expected to be about $339 million, which is about $10.3 million less than under Alternative 1. The oil and gas conservation tax is expected to generate about $2.8 million, which is about $86,000 less than under Alternative 1. Additionally, oil and gas production could generate about $356 million across the analysis area in county revenues from ad valorem taxes, which is about $10.8 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities, including education, as described in the *Nature and Type of Effects* section.

Additionally, there could be impacts from BLM-management decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment.

The reduction in the acreage available for fluid mineral leasing could reduce the development-related impacts on nonmarket and social conditions associate with changes in air and GHG emissions, compared with Alternative 1.

Nonenergy Leasable Minerals Management

Under this alternative, impacts would be the same as described under Alternative 5 except that any existing non-energy leasable operations within ACECs would not be able to expand on federal mineral estate and no new operations would be permitted in ACECs. This limitation on expansion and new operations would result in the economic and social impacts as discussed in the *Nature and Type of Effects* section. However, the impacts would be limited to areas within ACECs.

Locatable Minerals Management

Under Alternative 6, requiring a plan of operations for exploration operations disturbing five acres or less in ACECs would increase administrative process and cost for operators conducting exploration. This could result in a reduction in exploration in ACECs which could lead to a reduction in development and production in these areas as well. If this results in a reduction development, there could be impacts on economic and social conditions in the surrounding communities, as discussed in *Nature and Type of Effects*.

Mineral Materials Management

Restrictions on mineral material development in ACECs could result in impacts on economic and social conditions, as discussed in *Nature and Type of Effects*; however, due to mineral materials being available in other locations, the impacts are not anticipated to be large.

4.13 AIR RESOURCES AND CLIMATE

4.13.1 Air Quality

This section presents potential impacts on air quality implementing management actions presented in **Chapter 2**. Existing conditions concerning air quality are described in **Chapter 3**.

Nature and Type of Effects

Air quality is measured by the concentration of air pollutants and changes in air quality-related values, such as visibility and atmospheric deposition (e.g., nitrogen and sulfur deposition on soils and vegetation, and acidification of sensitive water bodies). Emissions of hazardous air pollutants could potentially result in localized increased risk of impacts on human health. Criteria and hazardous air pollutants can negatively impact human health in a variety of ways. Exposure to air pollution most often affects the respiratory system, and is often also associated with pulmonary, cardiovascular, and neurological impairments (EPA 2023f). Children and other high-risk groups, such as the elderly, pregnant women, and individuals with chronic heart and lung diseases, are especially susceptible to impacts from air pollution (EPA 2023f).

Actions that increase emissions of air pollutants can result in negative effects on air quality related values, including visibility and atmospheric deposition. An increase in SO_2, NO_2, PM_{10}, and $PM_{2.5}$ emissions can result in decreased visibility, increased atmospheric nitrogen and sulfur deposition on soils and vegetation, and acidification of sensitive water bodies. Fugitive dust could potentially result in increases in ambient concentrations of PM_{10} and $PM_{2.5}$ resulting in localized impacts on vegetation and increases in atmospheric deposition. Particulate matter also contributes to haze and limits visibility (EPA 2023g). Ground-level ozone, which is formed by a chemical reaction between volatile organic compounds and nitrogen oxides, contributes to smog, which limits visibility (EPA 2023h). Particulate matter emissions (fugitive dust) are primarily caused by earth-moving activities and vehicular traffic on unpaved roads and surfaces associated with development and operation. While PM10 emissions are largely caused by fugitive dust, and primary PM2.5 emissions can be partially attributed to fugitive dust, secondary PM2.5 primarily stems from chemical reactions with gaseous emissions.

Greater Sage-Grouse Management

Implementing management for the protection of GRSG generally involves reducing or otherwise restricting land use and activities that disturb GRSG habitat. These land uses and activities often also emit air pollutants. Wildland fires, particularly uncontrolled wildfires, can significantly affect air quality by introducing large amounts of particulate matter, CO, atmospheric mercury, ozone precursors, and volatile organic compounds into the air, affecting both visibility and human health (British Columbia 2023). By improving landscape resiliency to wildfire and soil degradation, protection of the GRSG habitat would result in a general improvement in air quality. By restricting land uses that may emit air pollutants, protection of GRSG habitat would result in a general improvement in air quality.

Minerals Management

Activities related to fluid mineral leasing and development can result in emissions produced during all phases of mineral development—from exploration, construction, and operational phases of the project to well plugging, site closure, reclamation, and abandonment. Oil and gas development results in short-term and long-term emissions of criteria pollutants and hazardous air pollutants from vehicle use, drill rigs, construction equipment use, disturbance of soils, and leaks, flaring or venting of natural gas. Limiting oil and gas leasing and resultant development with the purpose of reducing disturbance to GRSG and their habitat could reduce air pollutant emissions or at a minimum, move sources to a different location.

Mining activities associated with the development of non-energy minerals and mineral materials (salable minerals), generate fugitive dust particles and gaseous tailpipe emissions from large mining equipment. Activities such as blasting, excavating, loading and hauling of overburden and mineral resources, and wind erosion of disturbed and un-reclaimed mine areas, produce fugitive dust. Crushing, storage, and handling facilities are common stationary point sources for particulate matter. Air pollutant emissions that could be expected to result from solid mineral development are CO, NOx, particulates (PM_{10} and $PM_{2.5}$), SO_2, ground level ozone, and some EPA listed hazardous air pollutants (e.g., Benzene, Formaldehyde, and Acetone). Actions that limit leasing or development of nonenergy leasable minerals and mineral materials within GRSG key habitat areas could reduce non-oil and gas emissions by limiting exploration, construction, and operations associated with mining. However, restrictions on travel associated with mining could result in creating longer trips by redirecting travel around sensitive areas, and thereby increasing travel-related emissions.

Lands and Realty Management

Activities related to surface disturbances (e.g., construction of facilities, roads, and transmission lines, wind and solar plants) can result in particulate emissions from fugitive dust, exhaust emissions, and other criteria pollutant emissions from soil disturbances, construction-related travel, use of heavy equipment, and long-term effects associated with road use and maintenance. A number of the management actions under the alternatives address surface disturbances pertaining to GRSG core and connectivity habitat areas, nesting/early brood-rearing habitats, winter habitats and winter concentration areas. In addition, some of the action alternatives restrict activities by date, density, and any reclamation activities proposed. All proposed actions associated with restricting or prohibiting surface disturbing activity for GRSG core and connectivity habitat areas, nesting/early brood-rearing habitats, and winter habitats and concentration areas specified could reduce air emissions by limiting travel and activity. However, the restrictions on travel could result in creating longer trips by redirecting travel around sensitive areas, and thereby increasing travel-related emissions. In addition, some of the actions that restrict activities in March through May could redirect emissions toward the other months (such as winter), thereby increasing ozone potential in areas subject to winter ozone formation.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho), except as noted under the state-specific sub-headings below, fluid mineral leasing would continue to be managed as NSO. While this would continue to eliminate emission sources in PHMA (IHMA in Idaho), impacts could be relocated within the planning area, and continue to impact air quality as described in the *Nature and Types of Effects*. Fluid mineral development and production would continue to be the primary source of emissions from BLM-authorized activity in the planning area. BLM has conducted the 2032 Western US Photochemical Air Quality Modeling study to assess the impacts of fossil fuel development and production and other cumulative sources on air quality and air quality related values in BLM-administered lands in the seven US intermountain western states (Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming); modeling results represent emission sources in year 2032 anticipated future oil, gas, and coal development, other human-caused (anthropogenic) emissions, and natural sources on air quality and air quality related values (visibility and deposition) for the year 2032 (Ramboll 2023). Modeled emissions from new federal oil and gas development in circa 2032 for states that overlap with the planning area are shown in **Table 4-5**. Under Alternative 1, potential emissions from oil and gas development in the Greater Sage-Grouse planning area can be assumed to be a fraction of the modeled emissions (circa 2032) from new federal oil and gas development. That is because the GRSG planning area represents a portion of the area that was modeled in each state. Under Alternative 1, circa 2032 emissions in each of the modeled planning area states are used as proxy to represent an upper limit to potential new federal oil and gas emissions in the planning area.

Under Alternative 1, except as noted under the state-specific sub-headings below, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal within the planning area GHMA where there is no specific allocation, and within PHMA (IHMA in Idaho) from new free use permits and expansion of existing leases would continue.

Under Alternative I, potential for impacts on air quality from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho).

Under Alternative 1, except as noted under the state specific sub-heading below, potential impacts on air quality from major and minor ROWs in PHMA/IHMA and GHMA, where it would continue to be managed as avoidance for major ROWs and open to minor ROWs, would continue. Under Alternative I, except as noted under the state-specific sub-headings below, wind and solar development would continue to be managed as avoidance in GHMA and as exclusion in PHMA (IHMA in Idaho). This would continue to reduce potential impacts on air quality associated with emissions and surface-disturbing activities in GHMA and eliminate sources of impacts on air quality in PHMA, as described in the *Nature and Types of Effects*.

Under Alternative 1, impacts on air quality from changes in livestock grazing would continue in PHMA (IHMA in Idaho) and GHMA across the planning area. Impacts would continue to largely be determined by variations in site-specific management actions that minimize surface-disturbing actions. These management actions would continue to indirectly reduce impacts on air quality from changes in livestock grazing described in the *Nature and Types of Effects*.

Colorado Environmental Consequences

Under Alternative 1, Colorado GHMA would continue to be managed as closed to fluid mineral leasing within 1 mile of leks, NSO within 2 miles of leks, and seasonal limitations elsewhere, while PHMA would continue to be closed to fluid mineral leasing within 1 mile of leks. While in areas that remain as closed or as open with NSO stipulations for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area where fewer restrictions on fluid mineral leasing exists.

Idaho Environmental Consequences

Under Alternative 1, fluid mineral leasing would continue to be managed as NSO in Idaho IHMA and as CSU in GHMA. Within GHMA, potential for impacts on air quality from fluid mineral leasing would continue to exist while in areas that remain designated NSO for fluid mineral leasing, emissions sources would be eliminated. However, the potential for displacement of impacts to elsewhere within the planning area where fewer restrictions on fluid mineral leasing exist would continue.

Under Alternative 1, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal would continue to exclude impacts from new free use permits and continue to be limited to impacts from expansion of existing permits.

Under Alternative 1, potential for impacts on air quality from wind, solar, and other major ROWs would continue within GHMA in Idaho where it would continue to be open to such use. Potential for impacts on air quality from solar and wind development in Idaho IHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, would continue to be higher compared with PHMA in other planning area states.

Nevada/California Environmental Consequences

Under Alternative 1, potential for impacts on air quality from fluid mineral leasing would continue in Nevada and California GHMA where it would continue to be open to fluid mineral leasing, subject to CSU stipulations.

Under Alternative 1, potential for impacts on air quality from solar and wind projects would continue to exist in Nevada and California PHMA from non-utility-scale solar and wind, and from major ROWs or wind projects in GHMA, which would continue to be managed as avoidance. No air quality impacts from solar development within the Nevada and California PHMA would occur, where it would continue to be managed as exclusion for solar projects.

Oregon Environmental Consequences

Under Alternative 1, while potential for impacts on air quality from fluid mineral leasing within 1 mile of leks would continue to be eliminated, potential for impacts outside of the 1-mile radius, where it would continue to be open to fluid mineral leasing and subject to CSU stipulations, would continue to exit.

Under Alternative 1, potential for impacts on air quality from solar and wind projects would continue in Oregon PHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects (except in Lake, Harney, and Malheur Counties where it is avoidance and impacts could occur within PHMA).

Utah Environmental Consequences

Under Alternative 1, potential impacts on air quality from fluid mineral leasing in Utah GHMA would continue, where it would continue to be managed as NSO near leks or CSU based on allocations in plans that predated the 2015 amendment. While in areas that remain designated as NSO for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations, potential for impacts on air quality would continue to exist.

Under Alternative 1, GHMA in Utah would continue to be open to wind and other major ROWs (subject to minimization and mitigation), which would continue to result in air quality impacts that are associated with emissions and surface-disturbing activities. Under Alternative 1, potential for impacts on air quality from wind projects would continue to exist in PHMA in Utah to within 5 miles of leks.

Wyoming Environmental Consequences

Under Alternative 1, in Wyoming, GHMA would be managed as NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks, while PHMA would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside. While in areas that remain designated as NSO for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations or timing limitations, potential for impacts on air quality would continue to exist.

Under Alternative 1, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for salable sales or disposal would continue to exist within PHMA in Wyoming, where it would continue to be managed as open, subject to occupancy, seasonal limitations, disturbance, and density for such use.

Under Alternative 1, potential impacts on air quality would continue to exist from major and minor ROWs, and from solar and wind development, in Wyoming PHMA, where it would be open to such use.

Alternative 2

Rangewide Environmental Consequences

Under Alternative 2, impacts on air quality from closure to leasing or stipulations applied to fluid mineral leasing in PHMA and GHMA would be the same as under Alternative 1, except in Colorado as described under the state-specific sub-heading below.

Under Alternative 2, impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal in PHMA and GHMA would be the same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Under Alternative 2, removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on air quality because as discussed under Alternative 1, recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 2, impacts on air quality from changes in GRSG habitat protected from major and minor ROWs and from solar and wind development would be the same as under Alternative 1, except in Nevada for solar energy development and major ROWs, and in Nevada and Utah for wind energy development, as described in the state-specific sub-headings below.

Under Alternative 2, impacts on air quality from changes in livestock grazing would be similar to those described under Alternative 1. However, there would be more exceptions to restrictions on livestock grazing than under Alternative 1, which could result in increased potential localized impacts on air quality in PHMA or IHMA.

Colorado Environmental Consequences

Under Alternative 2, PHMAs in Colorado would be designated as NSO for fluid mineral development. Compared with Alternative 1, under which areas within 1 mile of leks would remain closed to fluid mineral leasing, this would increase potential impacts on air quality. Compared with Alternative 1, changing GHMA from closed to fluid mineral leasing within 1 mile of leks and NSO within 2 miles of leks under Alternative 1 to NSO within 1 mile of leks under this alternative would likely result in an increase in air emissions because the amount of federal mineral estate available for leasing and development would be greater under this alternative.

Idaho Environmental Consequences

Under Alternative 2, allowing consideration of new free use permits for salable minerals in Idaho IHMA, would increase the potential for associated impacts on air quality compared with Alternative 1. This is because there would be a greater chance for more acres of salable mineral activities to occur in these areas.

Nevada/California Environmental Consequences

Under Alternative 2, adding an exception criterion to salable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on air quality. This is because there would be a greater chance for more area of salable mineral activities to occur in these areas.

Under Alternative 2, there would be an exception criterion avoidance for ROWs and to the closure to wind and solar development in Nevada PHMA and to wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on air quality associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on air quality.

Utah Environmental Consequences

Under Alternative 2, areas outside PHMAs that are within 5 miles of leks in Utah would be avoidance for wind development. This could increase the potential for impacts on air quality associated with changes in land protected from wind development compared with Alternative 1. This is because there would be a higher chance of development in an avoidance area as opposed to an exclusion area that includes an exception criterion to closure.

Alternative 3

Under Alternative 3, closing PHMA to fluid mineral leasing, salable mineral sales and disposal, and nonenergy mineral leasing would reduce potential impacts on air quality from actions such as surface disturbance, associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced compared with Alternative 1. The recommendation to withdraw all PHMA from location and entry under the United States mining laws would not impact air quality because considering whether to withdraw certain lands is a separate action with its own NEPA analysis.

New infrastructure development would be substantially limited compared with Alternative 1. Under Alternative 3, prohibiting development of wind, solar, and other major ROWs would eliminate the likelihood for impacts on air quality from changes in land protected from or open to such surface-disturbing activities in these areas.

Compared with Alternative 1, Alternative 3 contains greater restrictions on other resources and would most greatly reduce the potential for impacts on air quality from changes in land protected from or open to livestock grazing as described under the *Nature and Type of Effects*. However, removing grazing may result in the accumulation of fine fuels, potentially leading to wildfires that could impact air quality.

Alternative 4

Under Alternative 4, impacts on air quality from fluid mineral leasing would be similar to Alternative 1. Under Alternative 4, impacts on air quality from management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal, would be the same as under Alternative 1, except in some states as discussed under state-specific subheadings below.

Under Alternative 4, PHMA in all states, and IHMA to within 3.1 miles from active leks, would be managed as exclusion for utility-scale wind and solar energy projects. Therefore, no air quality impacts from utility-scale wind or solar projects would be expected in those areas, similar to IHMA in Idaho, and PHMA in Nevada/California and Oregon (except in Lake, Harney, and Malheur Counites where potential for impacts remain, because it would be managed as avoidance under Alternative 1). Under Alternative 4, potential for impacts on air quality from utility-scale solar or wind development would be less than the potential for impacts from construction of such projects in Wyoming and Utah under Alternative 1, where the management action is either avoidance, or exclusion with exception criterion.

Under Alternative 4, site-specific management actions would continue to have impacts on air quality resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. The emphasized flexibility under Alternative 4, compared to Alternative 1, would help ensure that grazing practices remain in compliance with established guidelines, reducing impacts on air quality compared with Alternative 1.

Alternative 5

Under Alternative 5, impacts on air quality from mineral development would be similar to Alternative 1. Under Alternative 5, PHMA would be designated as avoidance for utility-scale wind and solar projects, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on air quality as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for utility-scale wind and solar development, accompanied by specific minimization measures to mitigate potential impacts on air quality as described under the *Nature and Type of Effects*.

The measures under Alternative 5, compared with Alternative 1, would improve disturbance management and mitigate potential degradation, which could have long-term benefits on air quality conditions for GRSG's sagebrush habitat across different states and specific boundaries.

Under Alternative 5, like Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA for GRSG, except for certain RNAs in Oregon that may be partially or entirely unavailable for grazing. Changes in livestock grazing would be determined by site-specific management actions aiming to decrease surface disturbance activities which would have impacts on air quality as described under the *Nature and Types of Effects*.

Alternative 5 introduces a targeted approach for the inclusion of thresholds and responses. which, compared with Alternative 1, would focus efforts on the priority areas, promoting the establishment of suitable habitat and thus minimizing impacts on air quality by reducing land disturbance as described under the *Nature and Type of Effects*.

Alternative 6

Under Alternative 6, impacts on air quality would be similar to Alternative 5. ACECs under Alternative 6 would restrict some uses, in accordance with the ACEC boundaries and restrictions under Alternative 3, which could reduce potential sources of pollutants.

4.13.2 Climate Change and Greenhouse Gases

Nature and Type of Effects

Management actions that can affect climate change include actions that emit GHGs, and those that create, eliminate, or damage carbon sinks and sequestration on BLM-managed lands. These include mineral exploration, development, and production activities; livestock grazing, wild horses and burros, and wildlife; wildland fire; vegetation management; rangeland management; and infrastructure development. Protection of GRSG habitat may move sources of GHGs to different locations.

Greater Sage-Grouse Management

In general, management activities that plan to protect and enhance GRSG populations involve management that restrict or reduce land use and activities that can involve surface disturbance and/or GHG emissions. Conservation activities to this effect can be expected to increase vegetation cover (e.g., sagebrush habitat) and enhance the soil, thereby increasing the amount of carbon that can be sequestered from the atmosphere and stored in the landscape in plants and organic soil.

Minerals Management

Emission of GHGs occurs during all phases of mineral exploration, development, operation, and reclamation. Vehicles and construction equipment that are used in mineral development emit GHGs from combustion of fossil fuels. Restricting or closing areas to mineral exploration and development activities would reduce or eliminate GHG from such activities where such restrictions or closures occur. Surface disturbance from mineral development and exploration activities can also reduce the carbon sequestration potential of the land.

Lands and Realty Management

ROW projects that involve construction activities would continue to emit GHGs (e.g., from operation of heavy construction equipment and vehicles), and result in surface disturbance which can reduce carbon sequestration potential of the land (e.g., from damaged soils and vegetation). Impacts from solar and wind projects are typically on large areas (several thousand acres) and can require major land disturbance which can reduce carbon sequestration potential in the land. At the project construction stage, solar and wind projects emit GHGs from heavy equipment and vehicles which are used to transport workforce and building material. However, less available acreage for solar and wind energy projects could increase the use of fossil fuel for energy development, which emit higher levels of GHGs from operation and downstream emissions.

Livestock Grazing Management

Grazing, in addition to wild horses and burros and big game wildlife herds, can impact emission of GHGs and improper grazing can affect vegetation, soils, and water resources (Beschta 2012; Ripple et al. 2014; Gerber et al. 2013). GHG emissions of livestock grazing include methane emissions that can result from manure management and digestive process of most livestock and GHG emissions from vehicles and heavy equipment use (e.g., rangeland management or transporting livestock). Other potential impacts of livestock grazing on climate change involve spread of noxious weeds and plants and the reduction in soil nutrient contents, which exacerbate carbon storage and climate change impacts. Conversely, sustainable livestock grazing can have beneficial effects by reducing fuel loads, reduction in wildfire potential, and improving soil conditions and biological diversity. Grazing, under improved management, can increase carbon sequestration potential of the soil and promote root production (Chen et al. 2015). Further, as described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of adverse effects.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, except as noted under the state-specific subheading below, in most of the planning area PHMA (IHMA in Idaho), fluid mineral leasing would continue to be managed as NSO. While this would continue to eliminate emission sources and improve carbon sequestration in PHMA (IHMA in Idaho), development could be relocated within the planning area, and continue to result in increased GHG emissions and changes to carbon sequestration, as described in the *Nature and Types of Effects*.

Similar to the analysis of emissions for air quality (**Section 4.13.1**), GHG emissions under Alternative 1 were assumed to represent a fraction of the BLM's circa 2032 modeled emissions (**Table 4-6**) from oil and gas development from BLM-administered lands in the US intermountain western states that overlap with the planning area Ramboll (2023). Modeled emissions (circa 2032) from the states that overlap with the planning area are used as proxy to represent an upper limit to potential new federal oil and gas development emissions, under Alternative 1.

Under Alternative 1, except as noted under the state-specific sub-headings below, potential impacts on GHG emissions and carbon sequestration from management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal within the planning area GHMA where there is no specific allocation, and within PHMA (IHMA in Idaho) from new free use permits and expansion of existing leases would continue.

Under Alternative I, potential for impacts on GHG emissions and carbon sequestration from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho).

Under Alternative 1, most states would continue to manage PHMAs (or IHMA in Idaho) as avoidance areas for major ROWs, and exclusion for wind and solar ROWs (Idaho, Nevada/California, and Oregon have exclusion for utility scale solar and wind projects only). In most states, GHMAs would continue to be managed as either avoidance or open for major ROWS, wind, and solar projects. In exclusion areas which do not allow for ROWs, there would be no impacts on GHG emissions or changes to carbon sequestration. In avoidance areas, while the potential for impacts would remain, this would be less than the potential for impacts in areas that would remain open to ROWs or have fewer restrictions.

Impacts on GHG emissions and carbon sequestration from changes in livestock grazing would continue to largely be determined by variations in AUMs and site-specific management actions that involve surface-disturbing actions. Management actions that would continue to indirectly reduce impacts on climate change from changes in livestock grazing include managing for riparian vegetation, applying the principles of prescriptive livestock grazing to control time and timing of grazing during the hot season, and retiring grazing privileges on a voluntary basis.

Colorado Environmental Consequences

Under Alternative 1, Colorado GHMA would continue to be managed as closed to fluid mineral leasing within 1 mile of leks, NSO within 2 miles of leks, and seasonal limitations elsewhere, while PHMA would continue to be closed to fluid mineral leasing within 1 mile of leks. Emission sources and impacts to carbon sequestration could be displaced and would continue to result in overall impacts on climate change.

Idaho Environmental Consequences

Under Alternative 1, fluid mineral leasing would continue to be managed as NSO in Idaho IHMA and as CSU in GHMA. Within GHMA. Emission sources and impacts to carbon sequestration could be displaced and would continue to result in overall impacts on climate change.

Under Alternative 1, potential impacts on GHG emissions and carbon sequestration from management of BLM-administered federal mineral estate as closed to or available for salable mineral sales or disposal would continue to exclude impacts from new free use permits and continue to be limited to impacts from expansion of existing permits.

Under Alternative 1, potential for impacts on GHG emission and carbon sequestration from wind, solar, and other major ROWs would continue within GHMA in Idaho where it would continue to be open to such use. Potential for impacts on GHG emissions and carbon sequestration from solar and wind development in Idaho IHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, would continue to be higher compared with PHMA in other planning area states.

Nevada/California Environmental Consequences

Under Alternative 1, potential for impacts on GHG emissions and carbon sequestration from fluid mineral leasing would continue in Nevada and California GHMA where it would continue to be open to fluid mineral leasing, subject to CSU stipulations.

Under Alternative 1, potential for impacts on GHG emissions and carbon sequestration from solar and wind projects would continue to exist in Nevada and California PHMA from non-utility-scale solar and wind, and from major ROWs or wind projects in GHMA, which would continue to be managed as avoidance. No impacts from solar development within the Nevada and California PHMA would occur, where it would continue to be managed as exclusion for solar projects.

Oregon Environmental Consequences

Under Alternative 1, while potential for impacts on GHG emissions and carbon sequestration from fluid mineral leasing within 1 mile of leks would continue to be eliminated, potential for impacts outside of the 1-mile radius, where it would continue to be open to fluid mineral leasing and subject to CSU stipulations, would continue to exit.

Under Alternative 1, potential for impacts on GHG emissions and carbon sequestration from solar and wind projects would continue in Oregon PHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects (except in Lake, Harney, and Malheur Counties where it is avoidance and impacts could occur within PHMA).

Utah Environmental Consequences

Under Alternative 1, potential impacts on GHG emissions and carbon sequestration from fluid mineral leasing in Utah GHMA would continue, where it would continue to be managed as NSO near leks or CSU based on allocations in plans that predated the 2015 amendment. Emission sources and impacts to carbon sequestration would be displaced and would continue to result in overall impacts on climate change.

Under Alternative 1, GHMA in Utah would continue to be open to wind and other major ROWs (subject to minimization and mitigation), which would continue to result in GHG emissions and carbon sequestration impacts that are associated with emissions and surface-disturbing activities. Under Alternative 1, potential for impacts on climate change from development of wind projects would continue to exist in PHMA in Utah to within 5 miles of leks.

Wyoming Environmental Consequences

Under Alternative 1, in Wyoming, GHMA would be managed as NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks, while PHMA would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside. While in areas that remain designated as NSO for fluid mineral leasing, emission sources and impacts on carbon sequestration would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations or timing limitations, potential for impacts on GHG emissions and carbon sequestration would continue to exist.

Under Alternative 1, potential impacts on GHG emissions and carbon sequestration from proposed management of BLM-administered federal mineral estate as closed to or available for salable sales or disposal would continue to exist within PHMA in Wyoming, where it would continue to be managed as open, subject to occupancy, seasonal limitations, disturbance, and density for such use.

Under Alternative 1, potential impacts on GHG emissions and carbon sequestration would continue to exist from major and minor ROWs, and from solar and wind development, in Wyoming PHMA, where it would be open to such use.

Alternative 2

Rangewide Environmental Consequences

Under Alternative 2, impacts on GHG emissions and carbon sequestration from changes in land protected from or open to fluid minerals in PHMA and GHMA would be the same as under Alternative 1, except in Colorado as described in the state-specific sub-headings below.

Under Alternative 2, impacts on GHG emissions and carbon sequestration from changes in land protected from or open to salable minerals in PHMA and GHMA would be same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Under Alternative 2, impacts on GHG emissions and carbon sequestration from nonenergy mineral management in PHMA and GHMA would be the same as under Alternative 1, except in Nevada PHMA as described in the state-specific sub-headings below.

Under Alternative 2, removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on GHG emissions and carbon sequestration compared with Alternative 1, because as discussed under Alternative 1, recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 2, impacts on GHG emissions and carbon sequestration from changes in land protected from or open to renewable energy management would be the same as under Alternative 1, except in Nevada and Utah as described in the state-specific sub-headings below.

Impacts on GHG emissions and carbon sequestration from changes in livestock grazing would be similar to those described under Alternative 1. However, there would be more exceptions to restrictions on livestock grazing than under Alternative 1, which could have increased potential impacts on climate change in PHMA or IHMA.

Colorado Environmental Consequences

Under Alternative 2, PHMAs in Colorado would be designated as NSO for fluid mineral development. Compared with Alternative 1, under which areas within 1 mile of leks would remain closed to fluid mineral leasing. This would increase potential impacts on climate change from increased emissions and surface disturbance.

Idaho Environmental Consequences

Under Alternative 2, allowing consideration of new free use permits for salable minerals in Idaho IHMA, would increase the potential for associated impacts on GHG emissions and carbon sequestration. This is because there would be a greater chance for more area of salable and/or nonenergy mineral open to activities to occur, increasing potential GHG emissions and reducing carbon storage in the land from surface disturbance.

Nevada/California Environmental Consequences

Under Alternative 2, adding an exception criterion to salable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on GHG emissions and carbon sequestration as described in the Nature and Types of Effects. This is because there would be a greater chance for more area of salable and/or nonenergy mineral open to activities to occur in these areas, increasing potential GHG emissions and reducing carbon storage in the landscape from surface disturbance.

Under Alternative 2, there would be additional exception criteria for areas open to wind/solar development in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for development, increasing impacts on GHG emissions and carbon sequestration associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development.

Utah Environmental Consequences

Under Alternative 2, areas outside PHMAs in Utah would be avoidance for wind development. This could increase the potential for impacts on GHG emissions and carbon sequestration associated with changes in land protected from wind development compared with Alternative 1. This is because there would be a higher chance of development in avoidance areas as opposed to exclusion areas under Alternative 1, which would not allow any development.

Alternative 3

Under Alternative 3, all GRSG management areas would be managed as PHMAs which would be closed to fluid mineral leasing, salable minerals, and nonenergy minerals and would be recommended for withdrawal from locatable mineral entry. All PHMAs would be managed as exclusion areas for major ROWs and wind or solar energy and unavailable to livestock grazing. ROW exclusion would preclude development of Class VI projects. Due to a reduction in the level of use from added restriction under Alternative 3, fluid, salable, and nonenergy mineral development, renewable energy development, livestock grazing, and most other major surface disturbing activities would result in the least amount of GHG emissions and surface disturbance, compared with all alternatives. Any reduction in development of minerals under the Mining Law of 1872 would only occur if the Secretary were to propose and make a withdrawal pursuant to section 204 of FLPMA.

Alternative 4

Under Alternative 4, the BLM would manage minerals to minimize land use conflict and associated impacts from subsequent development through project designs that avoid, minimize, reduce, rectify, and compensate for indirect impacts. PHMAs and IHMAs would be managed as avoidance for major ROWs within 0.5-mile buffer zone. GHMA would be managed as avoidance areas within breeding, nesting, and limited-seasonal habitats where mapped. Under this alternative, the BLM would take a more adaptive approach to management and consider existing data and best available science to determine if conservation measures are reasonable. Under this approach, while the impacts on climate change would be reduced or removed in some cases, compared with Alternative 1, under the scenario which management would result in more development, impacts would include an increase in GHG emissions and reduction of carbon sequestration would increase compared with Alternative 1.

Alternative 5

Under Alternative 5, similar to Alternative 4, the BLM would apply a balanced approach to development by managing to minimize potential for conflict in important habitat. This would result in an increase in GHG emissions and carbon sequestration in situations where more development would occur while can result in a reduction in impacts where less development would occur. Alternative 5 would be less restrictive than Alternative 4 in terms of allowing for mineral and renewable energy development. Consequently, any alterations in impacts, wherein a decrease in development is anticipated under Alternative 4 compared to Alternative 1, would likely result in a greater reduction of impacts under Alternative 5.

Alternative 6

Under Alternative 6, impacts on GHG emissions and carbon sequestration would be similar to Alternative 5. ACECs under Alternative 6 would restrict some uses, in accordance with the ACEC boundaries and restrictions under Alternative 3, which could reduce surface disturbance and potential sources of GHGs.

4.14 SOIL RESOURCES

4.14.1 Nature and Type of Effects

Activities that disturb, compact, contaminate, or remove vegetation from soils are generally considered to degrade soil productivity. In some cases, soil compaction aids in plant establishment and growth. However, too much compaction decreases water infiltration rates and gas exchange rates. Decreased gas exchange rates can cause aeration problems, induce nitrogen and potassium deficiency, and negatively impact root development, which is a key component of soil stabilization. As soil compaction increases, the soil's ability to support vegetation diminishes because the resulting increase in soil strength and change in soil structure (loss of porosity) inhibit root system growth and reduce water infiltration. Vegetation diminishment could lead to a shift of soil resources more dominated by trees to one more dominated by grasses and shrubs. As vegetative cover, water infiltration, and soil stabilizing crusts are diminished or disrupted, the surface water runoff rates increase, further accelerating rates of soil erosion (Weltz et al. 2017).

Impacts on soil productivity and erosion can result from a number of causes, including improper livestock grazing, wild horses and burros, surface-disturbing activities, vegetation treatment projects, prescribed burns, and wildfires. The intensity and extent of impacts on soil productivity and erosion are determined in part by the type and location of the activities. Impacts on soil productivity and erosion can also be affected by any applicable stipulations and plans of operations that address site-specific environmental concerns and require mitigation to stabilize soil, to prevent unnecessary erosion, and to revegetate disturbed surfaces.

Impacts on soil productivity and erosion can be mitigated by avoiding or minimizing the impact. This can be done by managing certain lands as closed or unavailable for surface-disturbing activities, or by restricting the activity by managing certain lands as ROW avoidance areas or attaching such stipulations as NSO or CSU to fluid minerals leases. As described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of adverse effects. Impacts that cannot be avoided can be minimized through project design and the application of COAs and BMPs. In addition, to protect GRSG, disturbance cap requirements and the application of lek buffers can locally eliminate impacts from disturbance. However, there could be impacts elsewhere if the disturbance is pushed to another location to minimize impacts on GRSG.

4.14.2 Alternative 1

Livestock Grazing Management

Under Alternative 1, PHMA, IHMA (Idaho only), and GHMA would continue to be available for livestock grazing, except in Oregon where all or portions of 13 key RNAs would be unavailable. The BLM would continue to prioritize monitoring and permit renewal of grazing per IM 2018-024 or subsequent updated policy. SFAs and PHMA outside of SFAs should be considered high priority areas to assess. Impacts on soil productivity and erosion from changes in livestock grazing would be determined by variations in site-specific management actions that strive to minimize concentrated compaction and aim to maintain or improve soil conditions. Within the areas available for livestock grazing, the BLM Authorized Officer may include or adjust permit terms and conditions needed to meet land health standards and GRSG habitat objectives. In turn, these management actions would continue to help minimize local impacts on soil productivity and erosion from the changes in livestock grazing, which would continue to also help minimize rangewide impacts for long-term soil productivity as described in the *Nature and Types of Effects*.

Management of Surface-disturbing Activities

Management actions proposed in this alternative that minimize, preclude, or stipulate surface disturbance would help maintain or improve soil productivity, such as the 3 percent disturbance cap. Management of fluid minerals, salable minerals, and nonenergy mineral development in PHMA, GHMA, and IHMA varies by state and includes areas that are open, closed, and withdrawn (see **Chapter 2** alternatives for minerals management).These various restrictions on land protected from surface-disturbing activities and areas closed to surface-disturbing activities from mineral activities within PHMA, IHMA, and GHMA would continue to help minimize impacts on soil productivity and erosion as described under the *Nature and Types of Effects*.

PHMA and IHMA in all states would continue to be identified as ROW avoidance areas to allow for management flexibility, except for minor ROWs in Wyoming. PHMA would continue to be designated as ROW exclusion for wind and solar (utility scale solar only in Idaho, Nevada/California, and Oregon) development, with exceptions in Wyoming, Oregon, and Idaho. Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts on soil productivity and erosion associated with ROW development, such as the surface-disturbing activities described in the *Nature and Types of Effects*. This is because development of ROWs would be prohibited in exclusion areas and would be considered on a case-by-case basis in avoidance areas.

New ROWs in PHMA would continue to not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in the Proposed Plan. In IHMA, new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would continue to collocate new ROWs with existing infrastructure when possible. BLM would retain management flexibility to route ROWs to minimize overall impacts on soil productivity and erosion. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50 percent greater than the original footprint. These measures would continue to reduce negative impact to soil productivity from the surface-disturbing activities as described in *Nature and Types of Effects*. GHMA in all states would be open to minor ROWs with mitigation measures, except Wyoming would not require mitigation. Impacts on soil productivity and erosion associated with these surface-disturbing activities could occur in these areas if developed, but mitigation measures would help to lessen the impacts.

4.14.3 Alternative 2

Livestock Grazing Management

Under Alternative 2, impacts from changes in livestock grazing would be similar to those described above under Alternative 1.

Management of Surface-disturbing Activities

Changes to the disturbance cap would apply and include allowing the cap to be exceeded in all states except Oregon under certain circumstances. This action could impact soil productivity and erosion as described in the *Nature and Type of Effects*.

Under Alternative 2, impacts from changes in land open to fluid minerals in PHMA and GHMA would be similar to those described above under Alternative 1, except in Colorado PHMA and Colorado GHMA where fluid mineral development would be open and would increase potential for surface-disturbing impacts on soil productivity and erosion, as compared to Alternative 1. This is because mineral development activities could occur in previously closed areas and cause negative impacts as described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts on soil resources because the NSO stipulation would avoid potential for land available to surface-disturbing activities.

Impacts from changes in land open to salable mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Idaho IHMA and Nevada PHMA. Impacts from changes in land open to nonenergy mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Nevada PHMA. As compared with Alternative 1, the additional exception criterion to salable and nonenergy mineral closures for Nevada PHMA and allowing consideration of new free use permits for salable minerals in Idaho IHMA would increase the potential for associated impacts on soil productivity and erosion as described under the *Nature and Types of Effects*. This is because there would be a greater chance for salable and/or nonenergy mineral activities to occur in these areas.

Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. This is because a recommendation to withdraw lands under the Mining Law of 1872 has no impact. Withdrawals are considered through a separate process pursuant to section 204 of FLPMA.

Impacts from changes in land protected from or open to ROW and renewable energy management would be similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be an additional exception criterion for ROW and wind and solar development in Nevada PHMA and for wind development in Nevada/California GHMA. As compared to Alternative 1, this could increase the potential for impacts on soil productivity and erosion associated with ROW and renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid major impacts on soil productivity and erosion as described under the *Nature and Type of Effects*.

Under Alternative 2, removing the prioritization objective for PHMA and GHMA, which involves determining the order or preference for leasing decisions, would not directly impact soil productivity and erosion because prioritization does not permit or preclude leasing in PHMA.As compared with Alternative 1, the NSO stipulations and conservation measures in place for PHMA would protect soil resources; however, the prioritization objective could potentially result in temporarily deferring a parcel in PHMA from leasing to a later sale, but only in instances of large lease sales where staff capacity would be incapable to analyzing all the nominated parcels. In an area with high levels of disturbance, such a delay could provide time for vegetation conditions and soil productivity to improve before new developments are implemented. As the amount of development increases in former GHMA, the consecutive effects of mitigating disturbances in PHMA could mount and could possibly affect soil productivity and erosion as described in the *Nature and Type of Effects*. Site-specific planning and other management from local resource management plans, and adhering to the land health standards, would reduce impacts on soil productivity and erosion in former GHMA with the use of BMP and other project mitigation design features.

4.14.4 Alternative 3

Livestock Grazing Management

Management of PHMA as unavailable for livestock grazing would eliminate the possibility of the short-term, site-specific impacts from changes in livestock grazing and the associated impacts on soil productivity and erosion as described under the *Nature and Types of Effects*. Compared with Alternative 1, Alternative 3 contains greater restrictions on livestock grazing and would be more protective of soil productivity from impacts related to livestock grazing.

Management of Surface-disturbing Activities

Application of a 3% disturbance cap and calculating disturbance at the project scale and HAF fine scale habitat selection area may prevent some development, and therefore reduce impacts to soil productivity and erosion. Compared with Alternative 1, Alternative 3 would have greater restrictions on new areas of land protected from or open to ROWs, fluid mineral leasing, and other mineral development and thus on development in these areas that would otherwise have the potential to impact soil productivity and erosion. PHMA in all states would be closed to fluid mineral leasing, salable minerals, and nonenergy minerals would reduce potential impacts on soil productivity and erosion, such as areas available to surface-disturbance activities associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced to a greater extent than under Alternative 1. This is because areas closed to leasing could not be developed at any point. Recommendation to withdraw PHMA from location and entry under the United States mining laws does not restrict any activities and therefore would not have any impact on soil productivity and erosion. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

New infrastructure development would be substantially limited as compared with Alternative 1. All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA would decrease the potential for impacts on soil productivity and erosion associated with ROW development and as described under the *Nature and Type of*

Effects. The inability to site ROWs in PHMA could lead to longer ROW routes to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW sitting on soil productivity and erosion outside of PHMA and may result in increased impacts on soil productivity and erosion on adjacent private lands.

Under Alternative 3, PHMA would be ROW exclusion for wind and solar energy development. Prohibiting wind energy development would eliminate impacts on soil productivity and erosion from changes in land protected from or open to this type of surface-disturbing activity in these areas.

4.14.5 Alternative 4

Livestock Grazing Management

Under Alternative 4, same as Alternative 1, livestock grazing would remain available in PHMA, IHMA, and GHMA, with the exception of 13 key RNAs in Oregon that may be fully or partially unavailable for grazing. Site-specific management actions would play a crucial role in determining the impacts on soil productivity and erosion resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. These actions would minimize concentrated compaction and aim to maintain or improve soil productivity and minimize erosion, thereby mitigating effects on soil productivity and erosion as described under the *Nature and Type of Effects*. The BLM Authorized Officer would retain the authority to include or adjust permit terms and conditions within the areas available for livestock grazing. As compared with Alternative 1, the emphasized flexibility under Alternative 4 would ensure that grazing practices comply with existing land health standards under 43 CFR Part 4180 (or subsequent changes to regulations or policy) and contributes to minimizing local and implementation level impacts on soil productivity and erosion resulting from changes in livestock grazing as described in the *Nature and Types of Effects*.

Management of Surface-disturbing Activities

Alternative 4 would include a 3 percent cap within the HAF fine scale habitat selection area in PHMA. Additionally, Alternative 4 would address habitat loss from wildfire and agriculture through existing sagebrush availability and habitat objectives. These measures under Alternative 4 would aim to manage and minimize disturbance, preserve vegetation communities, and mitigate the potential for further degradation while balancing impacts on soil productivity and erosion as described under the *Nature and Types of Effects*.

Under Alternative 4, additional management actions would be included compared with Alternative 1, specifically addressing fluid mineral leasing and development within GRSG PHMA, IHMA, and GHMA. Under Alternative 4, the proposed measures would include evaluating parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Alternative 4 would consider the management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. With that, under Alternative 4 and similar to Alternative 1, the BLM would aim to minimize impacts on soil productivity and erosion by promoting project designs that avoid, minimize, reduce, rectify, and compensate for direct and indirect impacts, while considering site-specific considerations and project specific COAs. However, a blanket NSO restriction on new leases in an area with existing leases complicates the effectiveness of the described efforts. Alternative 4 would also include enhanced collaboration with project proponents and state wildlife agencies to promote effective conservation and connectivity of habitats, while reducing impacts on soil productivity and erosion.

Alternative 4 would maintain the exclusion of PHMA for utility-scale wind and solar projects and would designate IHMA as exclusion within 3.1 miles from active leks, while the remaining IHMA areas are avoidance.

Avoidance areas would also be designated within 0.5 miles of PHMA/IHMA to address indirect impacts. GHMA would be avoidance for utility-scale wind/solar projects. PHMA/IHMA would be avoidance for major ROWs, and areas within 0.5 miles of PHMA/IHMA would also be avoidance. GHMA would be avoidance within breeding/nesting/limited-seasonal habitats or entirely if not mapped, and designated corridors remain open. These modifications in Alternative 4, compared with Alternative 1, would help reduce impacts on soil productivity and erosion, as described under the *Nature and Types of Effects*, while allowing for managed development in specific areas.

4.14.6 Alternatives 5 and 6

Livestock Grazing Management

Under Alternatives 5 and 6, similar to Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA, with the exception of certain RNAs in Oregon that may be partially or entirely unavailable for grazing (pending final determinations). The impacts on soil productivity and erosion resulting from changes in livestock grazing would be determined by variations in site-specific management actions. These actions would strive to minimize concentrated compaction and aim to maintain or improve soil productivity and erosion as described under the *Nature and Type of Effects*.

Under Alternatives 5 and 6, livestock grazing within GRSG PHMA, IHMA, and GHMA would be managed to meet land health standards, informed by the site-scale HAF suitability. The BLM Authorized Officer would have the flexibility to include or adjust permit terms and conditions within the available livestock grazing areas, ensuring compliance with land health standards and GRSG habitat objectives. Under Alternatives 5 and 6, construction of range infrastructure, such as water sources, structures, and fences, would be guided by guidelines that minimize impacts on GRSG and soil productivity and erosion as described under the *Nature and Type of Effects*, similar to the consolidation and simplification efforts of Alternative 1.

While Alternative 1 does not specify the areas where thresholds and responses would be required, Alternatives 5 and 6 would introduce a targeted approach. Under Alternatives 5 and 6, areas with the greatest potential to impact GRSG if suitable habitat conditions were not met would be prioritized for the inclusion of thresholds and responses. Accordingly, by focusing efforts on these priority areas, proactive conservation measures would be implemented, promoting the establishment of suitable habitat and minimizing impacts on soil productivity and erosion as described under the *Nature and Type of Effects*.

Management of Surface-disturbing Activities

Alternatives 5 and 6 include varying caps on disturbance at the project scale within PHMA, depending on the state. These measures under Alternatives 5 and 6 would aim to manage disturbance, protect vegetation communities, and mitigate potential degradation while reducing impacts on soil productivity and erosion, as described under the *Nature and Type of Effects*, across states and specific boundaries.

Alternatives 5 and 6 would include additional management actions compared to Alternative 1, specifically addressing fluid mineral leasing and development within GRSG PHMA, IHMA, and GHMA. The proposed measures under Alternatives 5 and 6 would include evaluating parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Additionally, Alternatives 5 and 6 would consider the management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. Under Alternatives 5 and 6, the BLM would aim to minimize impacts to soil productivity and erosion as described under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and compensate for direct and indirect impacts, while considering site-specific considerations and project specific COAs. Collaboration with project proponents and state wildlife agencies would be encouraged to promote effective conservation and connectivity of habitats while reducing impacts to soil productivity and erosion.

Alternatives 5 and 6 would include notable changes compared to Alternative 1 for wind and solar development and major transmission ROW. Specifically, PHMA would be designated as avoidance for utility-scale wind and solar projects as well as major ROWs, prioritizing the protection of soil productivity. In contrast, GHMA would be open for utility-scale wind and solar development with the implementation of specific minimization measures to mitigate potential impacts on soil productivity and erosion. The designated corridors would remain open to accommodate transmission infrastructure. These modifications in Alternatives 5 and 6 would strike a balance between facilitating renewable energy development, ensuring transmission infrastructure access, and safeguarding the impacts on soil productivity and erosion as described under the *Nature and Type of Effects*.

4.15 WATER RESOURCES

4.15.1 Nature and Type of Effects

Surface water quality is influenced by both natural and human factors. Natural factors include weather-related erosion or sediment delivery into waterways as the result of wildfire removal of vegetation. Human related factors that can temporarily affect surface water quality includes additional transport of eroded soils into streams due to improper recreational activities or improper livestock grazing. Water quality can be affected by introduction of waste matter into streams from domestic livestock (Weltz et al. 2017).

Water quality can also be affected by the introduction of soil from low-water crossing points of roads, routes, and ways used by motorized vehicles. Activities that introduce chemicals into the natural environment also have the potential to degrade surface and water quality through chemical leaks, accidents, or broken well casings. All of these activities have appropriate regulation and mitigation measures in place to reduce and, in most cases, eliminate these risks. The specific regulation and mitigation measures may include strict guidelines for chemical handling, spill response protocols, and well casing integrity requirements. Continuous monitoring of water quality in areas where such activities occur allows for the prompt identification of any deviations from regulatory standards. Additionally, the observed reduction in incidents and the successful implementation of mitigation measures in response to past events contribute to the confidence that risks to water quality can be minimized and, in many cases, eliminated.

Surface-disturbing activities, particularly under specific soil types or weather conditions, can also lead to soil compaction, which decreases infiltration rates and elevates the potential for overland flow. Overland flow can increase erosion and sediment delivery potential to area surface water bodies, leading to surface water quality degradation (Belnap et al. 2001). This degradation occurs through mechanisms such as the introduction of excess sediments, which may carry pollutants, nutrients, and contaminants into the water, adversely impacting its quality.

Surface-disturbing activities within stream channels, floodplains, and riparian habitats are more likely to alter natural morphologic stability and floodplain function. Morphologic destabilization and loss of floodplain function accelerate stream channel and bank erosion, increase sediment supply, dewater near-stream alluvium, cause the loss of riparian and fish habitat, and deteriorate water quality (Rosgen 1996). The deterioration of water quality refers to the introduction of excessive sediments and pollutants into the water, disrupting its chemical composition and overall health. Altering or removing riparian habitats can diminish the hydraulic roughness of the bank, which refers to the resistance that natural features provide to water flow. This reduction in hydraulic roughness, in turn, amplifies flow velocities near the bank. The term hydraulic roughness encompasses the natural irregularities, such as vegetation, rocks, and other features, that impede the smooth flow of water. Thus, when riparian habitats are altered or removed, the resulting decrease in hydraulic roughness allows for swifter flow velocities near the bank. This acceleration in flow can lead to accelerated erosion and potentially contribute to a decline in water quality (National Research Council 2002).

Removing riparian vegetation and the shade it provides contributes to elevated stream temperatures (Rishel et al. 1982; Beschta 1997). Increased solar radiation, resulting from the absence of riparian vegetation, can raise water temperatures. This is significant because elevated water temperatures impact the water's ability to hold dissolved oxygen. The relationship between increased water temperature and lower dissolved oxygen concentrations is crucial for understanding water quality issues affecting aquatic life, particularly in the context of GRSG habitat. Warmer water with lower oxygen levels can pose challenges for aquatic ecosystems, potentially influencing GRSG habitat conditions and overall ecosystem health. Channel widening or lowering overall flow can increase solar loading in stream channels through specific mechanisms. For instance, when a channel widens, it enlarges the surface area exposed to solar radiation, intensifying the heating of the channel. Additionally, a decrease in overall flow results in a reduction in water volume within the stream channel. With less water present, there is a greater concentration of solar energy absorbed per unit volume of water, as the lower flow means that the available solar radiation is distributed over a smaller volume. This contributes to an increase in solar loading and, consequently, elevated water temperatures. The principal source of heat energy delivered to the water column remains solar energy striking the stream surface directly (Brown 1969). The ability of riparian vegetation to shade the stream throughout the day depends on aspect and vegetation height, width, density, and positions relative to the stream, as well as the aspect in which the stream flows (streamside vegetation provides less shade on a north- or south-flowing stream than on an east- or west-flowing stream). In this context, aspect refers to the compass direction of the slope or landform where the vegetation is located, influencing the angle and duration of sunlight exposure.

The land uses most commonly associated with stream degradation in the planning area is improper livestock grazing and excessive use by wild horses and burros because it is most prevalent, compared with other land use disturbances. Livestock, wild horses, and burros often use the same riparian and wetland areas for water and shade and may congregate around water developments. This can result in compacted soil, decreased water quality due to fecal coliform introductions, trampled and consumed nearby vegetation, and reduced riparian community conditions and hydrologic functionality (Weltz et al. 2017). Other land uses linked to degraded streams and water quality issues include road location, which involves placing roads that disrupt drainage, increase sediment runoff, and fragment habitats. Construction and use refer to building structures like bridges or culverts, impacting stream channels and water flow. Trails, if not managed properly, contribute to soil erosion and disrupt stream health. Excessive water withdrawal for agriculture or industry reduces streamflow, affecting aquatic habitats. Mining introduces sediments and pollutants, harming water quality. Reservoir operations impact flow, sediment transport, and aquatic habitat. Altered stream characteristics, like channelization, disrupt ecological processes. Wetlands alteration, such as draining, affects natural filtration and nutrient cycling. These activities collectively contribute to degraded streams and compromised water quality.

Management to protect GRSG generally involves reducing or otherwise restricting land uses and activities that disturb the surface. Therefore, the greater the amount of acreage restricted from a land disturbing use, the greater the protection of impacts from surface disturbing activities afforded to water resources. Lands and realty management decisions affect where surface-disturbing activities can and cannot occur. The use of ROW exclusion and NSO stipulations limit the opportunities for surface disturbances and runoff of soils and chemicals into waterways within those areas and are generally considered to be protective of water quality. ROW exclusion and NSO stipulations also reduce the likelihood of chemical spills onto the ground which may contaminate surface or groundwater. In areas managed as ROW avoidance, water quality would receive some protection since ground disturbance would often be limited. ROW avoidance areas would generally result in lower impacts on water quality, compared with areas not managed as ROW avoidance. Areas where ROWs are authorized are permitted with conditions of approval (COAs) which assure that the holder of the rights comply with the Water Quality Act and other federal and state laws, which would protect water resources from degradation.

The intention of BLM management is to ensure that water quality adheres to the Standards and Guidelines for Livestock Grazing Administration (43 CFR Part 4180.2 (b)). Improper livestock grazing and wild horses and burros above appropriate management levels (AMLs) can lead to loss of vegetation cover, reduced water infiltration rates and nutrient cycling, decreased plant litter and lower water quality, and increased bare ground and soil erosion (Manier et al. 2013). See **Section 4.2**, Greater Sage-Grouse and **Section 4.3**, Vegetation for a more detailed analysis regarding these effects. Livestock grazing can be a compatible use in riparian areas when managed consistent with land health standards and land management objectives.

Activities beneficial to water resources are primarily defined as improving conditions by enhancing or restoring degraded water quality or by reducing ongoing groundwater depletion. Changing grazing patterns and maintaining wild horses and burros at AMLs in riparian areas can mitigate negative impacts and further benefit the water quality by promoting vegetation health, stabilizing streambanks, and enhancing nutrient cycling, along with the geomorphic function of streams.

Water supply structures throughout the landscape that have been established for multi-purpose use may also provide drinking water sources for GRSG. GRSG will use available water although they do not require it because they obtain their water needs from the food they eat. Information on the extent of habitat influenced by developed water and the net effects on GRSG populations is unknown. Natural water bodies and reservoirs can provide mesic areas for succulent forb and insect production, thereby attracting GRSG hens with broods (Connelly et al. 2004). It is unknown whether wildlife guzzlers built to supply available water in normally arid habitats provide a net benefit to GRSG or if potential benefits are countered by potential negative consequences. These negative consequences may include increased competition from other species that benefit from guzzlers, such as domestic and wild ungulates, or predators and the associated increase in predation risk (Braun 1998). In addition, new water sources may become additional habitat for mosquitoes carrying West Nile virus (Naugle et al. 2004).

Diverting the water sources has the secondary effect of changing the habitat at the water source before diversion. This could result in the loss of either riparian or wet meadow habitat that is important to GRSG as sources of forbs or insects. Further study is needed to determine the effects of water management on the sagebrush biome.

Potential impacts from locatable mineral, mineral material disposal, nonenergy leasable, and fluid leasable mineral activity may result from mining accidents. The accidents can include the release of pollutants capable of contaminating surface water or aquifers during groundwater recharge as a result of use, storage, and transportation of hazardous fluids and compounds. Mining activities and developments could alter drainage patterns which would affect stream flow and water supplies, and unintended discharge of mine water could alter water chemistry and impair natural stream morphologic conditions. Effects or impacts from mineral activity is regulated and mitigated through federal and state laws, as well as handbooks, stipulations, and conditions of approval which have effectively reduced the potential of surface or groundwater contamination. However, areas managed as closed to mineral entry would eliminate any potential for impacts on water resources, and therefore be more protective of water resources than areas open to mineral entry.

Effects of wildfire on water resource conditions are determined largely by the severity of the wildfire, suppression tactics used for wildfire management, and post-fire precipitation regimes (Neary et al. 2005). Higher-severity wildfires often result in near complete consumption of vegetation and litter cover and can cause changes to soil chemistry resulting in hydrophobic soil conditions. Wildfire can create hydrophobic soil conditions through a process known as fire-induced soil water repellency. During a wildfire, the intense heat can cause the combustion of organic matter in the soil, releasing hydrophobic substances. These substances then coat soil particles, forming a water-repellent layer. This layer disrupts the natural wettability of the soil, causing water to bead up on the surface rather than penetrating the soil profile. As a result, stream flow responses in severely burned watersheds are typically higher, in some cases orders of magnitude, than in unburned or lower severity burned watersheds. Additionally, increased flooding and debris flow risks can occur up to 5 years after a severe wildfire. (Neary et al. 2005).

Changes in vegetation communities due to wildfire can also affect water resources. Most wildfires in the planning area result in an increase to invasive vegetation communities, particularly cheatgrass. Cheatgrass communities often have shorter wildfire return intervals, altering the 32-70 year return interval (a range representing the typical frequency at which wildfire events naturally occurred in these ecosystems) for sagebrush communities to a 5-year wildfire return interval (Pellant 1996).

4.15.2 Alternative 1

Livestock Grazing Management

Under Alternative 1, PHMA, IHMA, and GHMA would continue to be available for livestock grazing. In Oregon all or portions of 13 key RNAs would be unavailable to livestock grazing. The BLM would continue to prioritize monitoring and renewal of grazing in SFAs and PHMA outside of SFAs. This prioritization includes permit renewals in SFAs and PHMA, with the exception of cases outlined in IM 2018-024. These exceptions may encompass areas that have never undergone assessment or that are in compliance with court orders. Impacts on water resource conditions from changes in livestock grazing would continue to largely be determined by variations in site-specific management actions. Some of the management actions could minimize surface-disturbing actions. In turn, these management actions would continue to help minimize local impacts on water resource conditions from changes in livestock grazing, which would also continue to help minimize rangewide impacts for long-term benefits to water resource conditions as described in the *Nature and Types of Effects*.

Management of Surface-disturbing Activities

Within the rangewide planning area, impacts on water resource conditions are largely a result of variations in management actions. Management actions proposed in this action that minimize, preclude, or stipulate surface disturbance would help maintain or improve water resource conditions. Management of fluid minerals, salable minerals, and nonenergy mineral development in PHMA, GHMA, and IHMA varies by state and includes areas that are open, closed, and withdrawn (see **Chapter 2** alternatives for minerals management). These various restrictions land protected from or open to surface disturbing activities within PHMA and GHMA would continue to help reduce impacts on water resource conditions as described under the *Nature and Types of Effects*.

PHMA and IHMA in all states would continue to be identified as ROW avoidance areas to allow for management flexibility, except for minor ROWs in Wyoming. PHMA would continue to be designated exclusion for wind and solar (utility scale solar only in Idaho, Nevada/California and Oregon) development, with exceptions in Wyoming, Oregon, and Idaho IHMA. Classifying PHMA as exclusion or avoidance areas would continue to decrease the potential for impacts on water resource conditions associated with changes in land open to ROW development, such as the surface-disturbing activities as described in the *Nature and Types of Effects*. This is because development of ROWs would continue to be prohibited in exclusion areas and would be considered on a case by-case basis in avoidance areas.

New ROWs in PHMA would continue to not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in the 2015 approved plan. In IHMA, new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would continue to collocate new ROWs with existing infrastructure when possible. BLM would continue to retain management flexibility to route ROWs to minimize overall impacts on water resource conditions. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50 percent greater than the original footprint. These measures would continue to reduce negative impact to water resource conditions from surface-disturbing impacts described in the *Nature and Types of Effects*. GHMA in all states would continue to be open to minor ROWs with mitigation measures, except Wyoming does not require mitigation. Impacts on water resource conditions associated with changes in land open to ROW development, such as surface disturbance could occur in these areas if developed, but mitigation measures, such as erosion control practices and revegetation, would help to lessen the impacts.

GRSG Management

Watershed health would continue to be affected by reducing water infiltration rates, increase overland flow and sediment loading, which could affect turbidity, temperature, and nutrient loading in water systems.

4.15.3 Alternative 2

Livestock Grazing Management

Under Alternative 2, impacts on water resource conditions from changes in livestock grazing would be similar to those described under Alternative 1. In Oregon, all or portions of the 13 key RNAs would be available to livestock grazing.

Management of Surface-disturbing Activities

Impacts on water resource conditions from changes in land protected from or open to fluid minerals in PHMA and GHMA would be the similar to those described under Alternative 1, except in Colorado PHMA and Colorado GHMA. Removing the closure of Colorado PHMA to fluid mineral development would increase potential for surface-disturbing impacts on water resource conditions. This is because mineral development activities could occur in previously closed areas and cause impacts on water resource conditions as described under the *Nature and Types of Effects*. Compared with Alternative 1, changing GHMA from closed to fluid mineral development to NSO would likely not change impacts on water resource conditions because the NSO stipulation would avoid potential for these surface-disturbing activities.

Impacts on water resource conditions from changes in land protected from or open to salable minerals in PHMA and GHMA would be similar to those described for Alternative 1, except in Idaho IHMA and Nevada PHMA. Impacts from nonenergy mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Nevada PHMA. Under Alternative 2, adding an exception criterion to salable and nonenergy mineral closures for Nevada PHMA, and allowing consideration of new free use permits for salable minerals in Idaho IHMA, would increase the potential for associated impacts on water resource conditions as described in the *Nature and Types of Effects*. This is because there would be a greater chance for more area of salable and/or nonenergy mineral open to activities to occur in these areas.

Under Alternative 2, removing the recommendation for locatable minerals in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment, and Oregon, which retained SFA designation through a plan maintenance action and not an amendment.) would increase the potential for impacts on water resource conditions compared with Alternative 1. This is because locatable mineral activities could occur and cause impacts as described under the *Nature and Types of Effects*.

Impacts on water resource conditions from changes in land protected from or open to renewable energy management would be the similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be additional exception criteria for areas land open to wind/solar development in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on water resource conditions, as described under the *Nature and Type of Effects*, associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on water resource conditions.

Impacts on water resource conditions from changes in land protected from or open to ROW would be the similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be additional exception criteria for areas land open to ROW in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on water resource conditions, as described under the *Nature and Type of Effects*, associated with changes in land protected from or open to ROW development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on water resource conditions.

GRSG Management

Impacts on water resource conditions from changes in potential for wildfire would be the same as those described under Alternative 1 and as described under the *Nature and Type of Effects*.

4.15.4 Alternative 3

Livestock Grazing Management

All areas managed for GRSG would be PHMA. Compared with Alternative 1, Alternative 3 contains greater restrictions on other resources and would most greatly reduce the potential for impacts on water resource conditions as described under the *Nature and Type of Effects*.

Management of PHMA as unavailable for livestock grazing would eliminate the possibility of the short-term, site-specific impacts from changes in land protected from or open to livestock grazing and the associated impacts on water resource conditions as described under the *Nature and Type of Effects*. Alternative 3 would be more protective of water resource conditions from impacts related to changes in land protected from or open to livestock grazing compared with Alternative 1.

Management of Surface-disturbing Activities

Compared with Alternative 1, Alternative 3 would have greater restrictions on new ROWs, fluid mineral leasing, and other mineral development and thus on areas land open to development in these areas that would otherwise have the potential to impact water resource conditions. Under Alternative 3, closing PHMA to fluid mineral leasing, salable minerals, and nonenergy minerals would reduce potential impacts on water resource conditions, such as surface disturbance, associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced to a greater extent than those under Alternative 1. This is because areas closed to leasing could not be developed at any point. Recommendation to withdraw PHMA from location and entry under the United States mining laws would not restrict any activities and therefore would have no impact on water resource conditions. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 3, PHMA would be designated ROW exclusion for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for impacts on water resource conditions from changes in land protected from or open to these surface-disturbing activities in these areas.

Because many water-consuming activities would be restricted, Alternative 3 is also likely to result in increased storage of water in the landscape. Restrictions from Alternative 3 would improve the likelihood of more waters meeting fully supporting beneficial uses and increase or maintain the level of stream miles meeting state and federal water quality standards and designated beneficial uses.

New infrastructure development would be substantially limited compared with Alternative 1. All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA would decrease the potential for impacts on water resource conditions associated with changes in land open to ROW development as described under the *Nature and Type of Effects*. However, the inability to site ROWs in PHMAs could lead to longer ROW routes to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on water resource conditions outside of PHMA and may result in increased impacts on water resource conditions on adjacent private lands.

GRSG Management

Alternative 3 would have more restrictions and result in fewer areas treated when compared with Alternative 1. Under these restrictions, impacts on water resource conditions as described under the *Nature and Type of Effects* would be more prone to impacts from potential wildfires in those areas.

4.15.5 Alternative 4

Livestock Grazing Management

Under Alternative 4, same as Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA, except for all or portions of 13 key RNAs in Oregon that may be fully or partially unavailable for grazing. Under Alternative 4, same as Alternative 1, the BLM would maintain its focus on monitoring and renewing grazing activities in PHMA areas. Under Alternative 4, site-specific management actions would continue to play a crucial role in determining the impacts on water resource conditions resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. These actions would strive to minimize concentrated compaction and aim to maintain or improve water resource conditions, thereby mitigating effects on water resource conditions as described under the *Nature and Type of Effects*. Under Alternative 4, to align with land health standards and GRSG habitat objectives, the BLM Authorized Officer would retain the authority to include or adjust permit terms and conditions within the areas available for livestock grazing. The emphasized flexibility under Alternative 4, compared with Alternative 1, would help ensure that grazing practices remain in compliance with established guidelines and contribute to minimizing local impacts on water resource conditions resulting from changes in livestock grazing as described under the *Nature and Types of Effects*.

Management of Surface-disturbing Activities

Alternative 4, compared with Alternative 1, would introduce additional management actions specifically addressing fluid mineral leasing and development within GRSG Habitat Management Areas (PHMA, GHMA, IHMA). Under Alternative 4, BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Furthermore, Alternative 4 emphasizes the management of already leased areas for fluid minerals, including the application of lease stipulations, minimization measures, and compliance with NEPA. Alternative 4 would minimize impacts on water resource conditions as describes under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and compensate for direct and indirect impacts.

Alternative 4 would direct the exclusion of PHMA for utility-scale wind and solar projects and designate IHMA as exclusion within 3.1 miles from active leks, with the remaining IHMA areas being avoidance. Avoidance areas would also be designated within 0.5 miles of PHMA/IHMA to address indirect impacts. GHMA would be avoidance for utility-scale wind/solar projects.

Under Alternative 4, PHMA/IHMA would be avoidance for major ROWs, and areas within 0.5 miles of PHMA/IHMA would also be avoidance. GHMA would be avoidance within breeding/nesting/limited-seasonal habitats, or entirely if not mapped, while designated corridors remain open. These modifications aim to protect water resource conditions and the GRSG habitat while allowing for managed development in specific areas, considering the impacts described under the *Nature and Types of Effects*.

GRSG Management

Alternative 4 would introduce specific provisions that differ from Alternative 1 regarding potential for wildfire, focusing on the impacts on water resource conditions for GRSG. That is, under Alternative 4, there would be a 3 percent cap within the HAF fine scale habitat selection area in PHMA. These measures under Alternative 4 aim to manage and minimize disturbance, preserve vegetation communities, and mitigate the potential for further degradation, while ensuring the conservation of water resource conditions and considering the impacts described under the *Nature and Types of Effects*.

4.15.6 Alternatives 5 and 6

Livestock Grazing Management

Under Alternatives 5 and 6, same as Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA for GRSG, except for certain RNAs in Oregon that may be partially or entirely unavailable for grazing pending final determinations. This precautionary measure aims to maintain critical GRSG habitat and associated water resource conditions in Oregon so that impacts described under the *Nature and Types of Effects* would be minimized.

In contrast to Alternative 1, Alternatives 5 and 6 introduce a targeted approach for the inclusion of thresholds and responses. Priority areas with the greatest potential to impact GRSG if suitable habitat conditions were not met would be identified for the implementation of thresholds and responses. This proactive conservation approach, compared with Alternative 1, would focus efforts on these priority areas, promoting the establishment of suitable habitat and thus minimizing impacts on water resource conditions as described under the *Nature and Type of Effects*.

Management of Surface-disturbing Activities

Alternatives 5 and 6 introduce additional management actions compared with Alternative 1, specifically focusing on fluid mineral leasing and development within GRSG HMAs. BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Alternatives 5 and 6 would include management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. Alternatives 5 and 6, compared with Alternative 1, would help minimize impacts on water resource conditions as described under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and compensate for direct and indirect impacts, while considering site-specific considerations and project specific COAs. Moreover, Alternative 5 would expand upon the management actions in Alternative 1 to strike a balance between resource development and the conservation of GRSG habitat, connectivity, and impacts on water resource conditions.

Regarding wind and solar development, Alternatives 5 and 6 would introduce notable changes compared with Alternative 1. PHMA would be designated as avoidance for utility-scale wind and solar projects, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on water resource conditions as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for utility-scale wind and solar development, accompanied by specific minimization measures to mitigate potential impacts on water resource conditions as described under the *Nature and Type of Effects*. The designated corridors would be retained to accommodate transmission infrastructure. These modifications in Alternative 5 aim to conserve the GRSG habitat and strike a balance between renewable energy development and the preservation of water resource conditions.

Regarding major transmission ROWs, Alternatives 5 and 6 would introduce notable changes compared with Alternative 1. PHMA would be designated as avoidance for major ROWs, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on water resource conditions as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for major ROW development, accompanied by specific minimization measures to mitigate potential impacts on water resource conditions as described under the *Nature and Type of Effects*. The designated corridors would be retained to accommodate transmission infrastructure. These modifications in Alternative 5 aim to conserve the GRSG habitat and strike a balance between ROW development and the preservation of water resource conditions.

GRSG Management

Alternatives 5 and 6 would introduce provisions that slightly deviate from Alternative 1 concerning the potential for wildfire in relation to impacts on water resource conditions as described under the *Nature and Type of Effects*. That is, Alternatives 5 and 6 would entail different disturbance caps within the project analysis area of PHMA, depending on the state. In Wyoming and Montana, the cap would be set at 5 percent, while in other states, the cap would be 3 percent, limited to infrastructure only. Furthermore, a 3 percent cap on infrastructure would be implemented within the HAF fine scale habitat selection area in PHMA. Moreover, there would be no additional disturbance cap, but there are two scales of analysis. These measures under Alternatives 5 and 6, compared with Alternative 1, would aim to improve disturbance management, preserve vegetation communities, and mitigate potential degradation, while ensuring the conservation of water resource conditions for the GRSG across different states and specific boundaries.

4.16 CULTURAL RESOURCES

4.16.1 Nature and Type of Effects

Effects on cultural resources can be direct, indirect, or cumulative. They can also be adverse or beneficial. Effects from management guidance under each alternative will be largely indirect and cumulative, influencing the effects (or lack of thereof) from future undertakings.

On a project-by-project basis, the spatial distribution (or range) of effects would be largely focused on the specific site or location of a development or action. However, over time and as more actions occur throughout the planning area, the extent of these effects on cultural resources would accumulate throughout the planning area.

The nature and type of effects to be expected from different management actions are explained in more detail below:

GRSG Management

GRSG management in the proposed alternatives includes designation of HMAs for the benefit of GRSG. Restrictions on land use and surface-disturbing activities would occur within the HMAs. These restrictions and corresponding management guidance, including required design features and habitat objectives seeking to stabilize or increase GRSG populations in HMAs, would reduce potential for ground disturbance, changes in setting such as visual or auditory disturbance, and access.

A cap for disturbance in GRSG habitat is present in some form under all alternatives, ranging from three to five percent. This cap varies by alternative and within alternatives by state and situation, limiting disturbance to some degree for the benefit of GRSG. This would offer protection to cultural resources in these habitat areas from impacts due to disturbance under all alternatives, including ground disturbing activities and alterations of setting. This is discussed in detail by alternative. While this will reduce potential for impacts on cultural resources in certain areas, it is likely at least some of the development related impacts will be displaced to locations outside of these protected areas, exposing cultural resources elsewhere to greater potential for impacts.

While intended to benefit the GRSG, reduced potential for ground disturbance, changes in setting, and increase in access would tend to be protective of cultural resources within these areas. Designations of HMA and management guidance by designation varies under each alternative and between states, and the differences will be discussed in more detail below.

Minerals Management

Surface disturbing activities associated with mineral exploration and development would have potential direct and indirect impacts on cultural resources, including damaging, destroying, and/or displacing artifacts and features, and construction of modern features out of character with a historic setting. Many cultural resources that occur on or just below the ground are susceptible to surface disturbance and erosion damage, including modifying spatial relationships of artifacts and destroying features and stratified deposits. The information loss may be relevant to the site function, dates of occupation, subsistence, and past environments; all of these are important to understanding past culture.

Depending on the extent and type of activity, the amount of physical disturbance could be from slight artifact shifts out of context in a small portion of the site to wholesale destruction of the entire site. Should a portion of a site be impacted, it is crucial to recognize that data recovery, while seeking to retrieve valuable information, inherently constitutes an adverse effect. Despite the intention to contribute to the historical or prehistoric record of the region, the process of data recovery itself can have adverse implications. Furthermore, the historical record could be influenced by physical disturbance, encompassing both prehistoric and historic contexts. Adverse impacts that result in an irreversible and irretrievable loss of cultural resource value are of the highest severity. Mineral exploration and development could result in impacts to cultural resources due to surface disturbing or setting altering activities such as road development and use, facility construction and placement, and creation of well pads and pipelines.

Indirect impacts on cultural resources include changing the character of a property's use or physical features within a property's setting that contribute to its historic significance (e.g., isolating the property from its setting) and introducing visual, atmospheric, or sound elements that diminish the integrity of the property's historic features.

Areas closed to mineral leasing and development, or restrictions placed on these activities would reduce the total acreage of potential surface disturbance and associated impacts to cultural resources in those areas. While this would reduce potential for impacts on cultural resources in protected HMA, it is likely at least some of the development related impacts will be displaced to locations outside of HMA, exposing cultural resources in other areas to greater potential for impacts. Additionally, many cultural resources have been discovered because of field surveys associated with anticipated mineral development activities. Reducing mineral development could have the unintended effect of reducing surveys and discoveries.

Renewable Energy Management

The nature and type of effects on cultural resources from renewable energy development and associated infrastructure (including construction and operation of distribution and transmission lines, substations, and access roads) would largely be similar to the type of effects resulting from minerals management, including damaging, destroying, and/or displacing artifacts and features, and construction of modern features out of character with a historic setting.

Similar to minerals management, closing areas to renewable energy development or restricting surface-disturbing activities during development of renewable energy projects would reduce potential impacts to cultural resources in these areas. While this would reduce potential for impacts on cultural resources in protected HMA, it is likely at least some of the development related impacts will be displaced to locations outside of HMA, exposing cultural resources in other areas to greater potential for impacts.

Lands and Realty Management

The nature and type of effects on cultural resources from ROW development would be similar to the type of effects resulting from minerals management and renewable energy management.

Generally speaking, management actions such as establishing ROW exclusion and avoidance areas offer increased protection to cultural resources in these areas from surface disturbing activities or alterations in setting like construction of highly visible features, and from increased access that often accompanies construction in ROWs. While this would reduce potential for impacts on cultural resources in these areas, it is very likely with ROWs that the development related impacts will simply be displaced to other locations, exposing cultural resources in other areas to greater potential for impacts and potential increasing the potential for impacts by resulting in longer ROWs.

Livestock Grazing and Wild Horse and Burro Management

Cultural resources can be adversely impacted by livestock grazing and wild horses and burros through direct trampling of artifacts and features and from such activities as trailing, concentrating around water, under shade, or along natural constraining features, such as rock cliffs. Experimental studies have shown that trampling significantly impacts both the physical artifacts and features of a site. It also distorts the most common analytical approaches to measuring sites, such as artifact abundance, raw material proportions, and average artifact dimensions (Osborn et al. 1987; Douglass and Wandsnider 2012). Trampling also causes the vertical displacement of artifacts, especially in wet ground (Eren et al. 2010). Making land unavailable for livestock grazing and removal of wild horses or burros would be protective of cultural resources.

The loss of vegetation, such as grass, forbs, and shrubs over-consumed by improperly managed livestock, wild horses, or burros can result in increased erosion (**Section 4.14.2**, Soil, Nature and Type of Effects), potentially impacting the integrity of cultural resources. Erosion and the loss of vegetation due to improper grazing could also result in impacts to the setting of cultural resources. However, as described in **Section 2.9.7**, livestock grazing is managed to meet or make progress toward land health standards, thus reducing the likelihood of these effects.

4.16.2 Impacts Common to All Alternatives

Under all alternatives, the BLM would continue to adhere to the existing laws, such as the National Historic Preservation Act, and cultural resource related policy like that found in BLM manuals and handbooks, such as Manual 8100 The Foundations For Managing Cultural Resources (BLM 2004a). This would generally act to protect culturally significant resources from impacts related to ground-disturbing activities, alterations to setting, and vandalism or unauthorized collection. It would also contribute to mitigating unavoidable impacts to cultural resources through various strategies. These might involve the collection of scientific data during cultural resource inventories or excavations, as well as in situ preservation to minimize physical disturbance and avoidance measures to guide activities away from sensitive areas. The BLM would continue to identify and manage cultural resources on a programmatic and project specific level. Additionally, continued consultation and cooperation with State Historic Preservation Offices and Native American Tribes would allow information on cultural properties and cultural landscapes to continue to be compiled and concerns regarding sensitive cultural resources such as TCPs to be addressed. This would enable better future management and protection of the integrity of these resources.

4.16.3 Alternative 1

GRSG Management

Under Alternative 1, habitat management areas (HMAs) and Sagebrush Focal Areas (SFAs) would be designated in GRSG habitat. In all states, a disturbance cap ranging from 3 to 5 percent would be implemented within PHMA. In Wyoming, a 5 percent cap is made at the project area scale and includes disturbance from wildfire and agriculture. In all other states (Colorado, Montana, Idaho, Nevada, California, Oregon, Utah, North Dakota, and South Dakota) a 3 percent cap would not include wildfire or agriculture and the cap would apply not only at the project area scale but also at the biologically significant unit scale within PHMA. In Idaho the cap could be exceeded in utility corridors if it is a benefit to GRSG.

Management related to HMAs and SFAs under Alternative 1, including disturbance caps, would protect cultural resources in these areas from disturbance related impacts to varying degrees depending on the activity and location. While this would continue to reduce potential for impacts on cultural resources in HMAs, it is likely at least some of the development related impacts would be displaced to locations outside of HMA, exposing cultural resources in other areas to greater potential for impacts.

Minerals Management

Under Alternative 1, leasing of fluid minerals would be permitted within PHMAs (and IHMAs in Idaho), with No Surface-Occupancy (NSO) stipulations. The NSO stipulations would reduce potential for ground disturbing activities, changes to site setting, and increases in access due to development activities within PHMAs and IHMAs.

Under Alternative 1, closure of PHMA and IHMA to salable and non-energy mineral development (with some limited exceptions) would reduce potential within PHMAs and IHMAs for ground disturbing activities, changes to site setting, and increases in access due to development activities.

Under Alternative 1, the BLM previously recommended that all SFAs be withdrawn from location and entry under US mining laws. Recommending areas for withdrawal from location and entry under the Mining Law of 1872 does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 1 fluid, salable, and non-energy mineral development in GHMAs would be subject to a mixture of management measures intended to minimize impacts on GRSG including designation as open, controlled surface use, closed, or NSO within varying distance of GRSG leks. These measures would reduce potential for ground disturbing activities, changes to site setting, and increases in access to impact cultural resources within GHMAs, though not to the degree that the management described above for PHMAs and IHMAs would.

While restrictions from minerals management under Alternative 1 would reduce potential for impacts on cultural resources within HMAs and SFAs, it would also likely result in a shift of some of these activities to suitable areas outside of them where possible, increasing potential for impacts on cultural resources outside of HMAs and SFAs. Overall, restrictions from minerals management under Alternative 1 could make development more costly and difficult, or prevent development that could not be relocated to a suitable area. This would continue to be generally protective of cultural resources across the planning area.

Renewable Energy Management

Under Alternative 1, PHMA would be excluded from wind energy development except in some Oregon counties where PHMA would be designated as avoidance and Wyoming, where all PHMA would be designated as avoidance or open if there would be no impact to GRSG. IHMA in Idaho would be designated as avoidance for wind energy development.

Under Alternative 1, PHMA would be excluded from solar energy development, except in Wyoming where solar energy development would not be addressed and in Oregon, where it would be designated as avoidance. IHMA would be designated as avoidance for solar energy development.

Under Alternative 1, GHMAs would be a mix of open, avoidance, and exclusion for wind and solar that would vary by state. Exclusion or avoidance of wind and solar energy development would reduce potential within these areas for ground disturbing activities, changes to site setting, and increases in access due to development.

Impacts on cultural resources from ground disturbance, alteration of setting, and increased access related to renewable energy development would be the same as those described under Nature and Type of effects. While excluding or avoiding renewable energy development within HMAs under Alternative 1 would reduce potential for impacts on cultural resources within these areas, it would likely result in a shift of these activities to suitable areas outside of HMAs, negatively impacting cultural resources outside of them. Overall, the restrictions on renewable energy development under Alternative 1 could make development more costly and difficult or prevent any uses that could not be relocated to a suitable area. This would continue to be generally protective of cultural resources across the planning area.

Lands and Realty Management

Under Alternative 1, all states would designate PHMA/IHMAs as avoidance for major and minor ROWs, except for Wyoming which would be open to minor ROWs with buffers and mitigation. This would reduce potential within designated PHMAs and IHMAs for ground disturbing activities, changes to site setting, and increases in access due to ROW development.

Under Alternative 1, GHMAs would be designated as avoidance for major ROW development in Colorado, California, Nevada, and Oregon. In Idaho and Utah GHMAs would be open to major ROWs with minimization measures, and Wyoming is open to major ROWs. All states would be open to minor ROW development with mitigation, except for Wyoming which would not require mitigation. This would reduce potential within GHMAs for ground disturbing activities, changes to site setting, and increases in access due to ROW development, though to a much lesser degree than ROW related management for PHMAs and IHMAs.

While excluding or avoiding ROW development within HMAs under Alternative 1 would continue to reduce potential for impacts on cultural resources within these areas, it would likely result in a shift of these activities to suitable areas outside of HMAs, negatively impacting cultural resources outside of them.

Livestock Grazing Management

Under Alternative 1, all PHMAs, IHMAs, and GHMAs would be available for livestock grazing except for in Oregon where some or all of Research Natural Areas (RNAs) would be unavailable. Livestock grazing would continue to create potential for impacts on cultural resources within these areas from ground disturbance like trampling and changes to site setting through vegetation changes.

Wild Horse and Burro Management

Under Alternative 1, all states where wild horses and burros overlap with GRSG habitat would continue to manage wild horse and burro populations within established appropriate management levels (AMLs) and incorporate GRSG objectives into wild horse and burro management. Keeping wild horse and burro populations at established AMLs, and prioritized gathers to accommodate GRSG habitat objectives would keep wild horse and burro populations from increasing. Any reduction in AMLs from incorporation of GRSG objectives into wild horse and burro management could decrease wild horse and burro populations. Restrictions on wild horses and burros under Alternative 1 would maintain or decrease the current potential for surface disturbance and changes to site setting from wild horse and burro grazing, extending protection to cultural resources.

4.16.4 Alternative 2

GRSG Management

Under Alternative 2, the impacts on cultural resources from designating SFAs and HMAs within GRSG habitat would be similar to those described under Alternative 1, although SFAs in Utah, Wyoming, Nevada and Idaho would not be designated under Alternative 2. Under Alternative 2, the impacts on cultural resources from instituting a disturbance cap in GRSG habitat would be very similar to those described under Alternative 1, relevant differences being that in Utah the cap can be exceeded if it is a benefit to GRSG, and in Idaho the cap only applies at the BSU-scale, both of which could result in additional impacts from development beyond what would be seen under Alternative 1.

Similar to Alternative 1, management related to HMAs and SFAs under Alternative 2 would protect cultural resources in these areas from disturbance related impacts to varying degrees depending on the activity and location. The differences in GRSG management under Alternative 2 would reduce GRSG related restrictions in these areas that are protective of cultural resources.

Minerals Management

Under Alternative 2, impacts from fluid mineral management in PHMAs and GHMAs would be similar to those described for Alternative 1, except in Colorado PHMAs would not be closed to fluid mineral leasing and GHMAs would have NSO stipulations instead of closure. The increased potential for fluid mineral leasing and associated activities in Colorado GRSG habitat from these changes would increase the potential for related impacts on cultural resources in these areas.

Under Alternative 2, impacts from salable and non-energy mineral management in PHMAs and GHMAs would be similar to those described for Alternative 1, except that in Idaho consideration of new free use permits would be allowed and in Nevada there would be exception criteria added to closure. The increased potential for salable and non-energy mineral development in Idaho and Nevada GRSG habitat would increase the potential for related impacts on cultural resources in these areas.

Under Alternative 2, the recommendation that all SFAs be withdrawn from mineral location and entry under US mining laws (except in Montana, North Dakota, and South Dakota) would be removed. This removal would have no impact because withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA. Only the Secretary may withdraw lands through a Public Land Order.

Under Alternative 2, restrictions from minerals management would reduce potential for impacts on cultural resources within HMAs and SFAs and would also likely result in a shift of some of these activities to suitable areas outside of them where possible. This would increase potential for impacts on cultural resources outside of HMAs and SFAs. Overall, restrictions from minerals management under Alternative 2 could make development more costly and difficult or prevent uses that could not be relocated to a suitable area. This would be generally protective of cultural resources across the planning area.

Renewable Energy Management

Under Alternative 2, the impacts from solar and wind energy management in PHMAs and GHMAs would be the similar to those described for Alternative 1, with some additional exception criteria added to exclusion and avoidance of HMAs in Nevada and California. These exception criteria would increase potential for ground disturbing activities, changes to site setting, and increases in access related to renewable energy development in these areas.

Lands and Realty Management

Under Alternative 2, the impacts from ROW management would be similar to those described for Alternative 1, with the addition of exception criteria for ROWs in PHMAs in Nevada. These exception criteria would increase potential for ground disturbing activities, changes to site setting, and increases in access related to ROW development in these areas.

Livestock Grazing Management

Under Alternative 2, the impacts from livestock grazing management would be similar to those described for Alternative 1. In Utah, Wyoming, and Nevada, the prioritization for review and processing of grazing permits in SFAs and PHMAs was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Under Alternative 2, the impacts from wild horse and burro management would be the same as those described for Alternative 1.

4.16.5 Alternative 3

GRSG Management

Under Alternative 3, all areas managed for GRSG would be designated PHMAs, with some states considering expanding HMA boundaries to include areas of adjacent non-habitat, unoccupied historic GRSG habitat, or areas with potential to become GRSG habitat as PHMAs. Under Alternative 3, The disturbance cap is three percent, applies at the project scale, and in accordance with the HAF (Stiver et al. 2015) Fine Scale boundaries range wide. Of note, under Alternative 3, the disturbance cap would include wildfire and agriculture as well as infrastructure, greatly increasing the amount of potential disturbance included in the disturbance calculation for those states that do not do so under Alternative 1 (all but Montana and Wyoming)

Under Alternative 3, the HMA designation scheme would create the highest acreage of PHMA, and along with the most robust version of the disturbance cap, offers the highest level of protection to cultural resources in HMAs from GRSG related restrictions among the alternatives.

Minerals Management

Under Alternative 3, closure of PHMAs to fluid minerals, salable minerals, and non-energy minerals related development offers the highest level of related protections to cultural resources from GRSG related restrictions among the alternatives.

Under Alternative 3, the recommendation that all PHMAs be withdrawn from mineral location and entry under US mining laws would be made. This recommendation would have no impact on ground disturbing activities, changes to site setting, or access due to related locatable mineral development because withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA. Only the Secretary may withdraw lands through a Public Land Order.

Renewable Energy Management

Under Alternative 3, impacts on cultural resources from ground disturbance, alteration of setting, and increased access related to renewable energy development would be the same as those described under Nature and Type of effects. Only PHMA would be designated under Alternative 3, and all designated PHMA would be excluded from solar and wind energy development without exceptions. These exclusions would decrease potential in designated HMAs for ground disturbing activities, changes to site setting, and increases in access due to solar and wind energy related development the most among alternatives.

Lands and Realty Management

Under Alternative 3, PHMA would be excluded from ROW development outside of designated corridors. These exclusions would decrease potential for ground disturbing activities, changes to site setting, and increases in access due to ROW related development inside PHMAs, and would designate the most acreage of PHMA among alternatives. However, the exclusion of ROW development in PHMAs could lead to creation of longer ROW routes to get around closed areas. Longer ROW routes would increase potential for ground disturbing activities, changes to site setting, and increases in access outside of PHMAs.

Livestock Grazing Management

The management of PHMA as unavailable for livestock grazing would cause the greatest decrease in potential for related impacts on cultural resources among alternatives. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage or destroy cultural resources located at or near the surface.

Wild Horse and Burro Management

The removal of wild horses and burros would decrease the potential for related impacts on cultural resources within PHMAs the most among alternatives.

4.16.6 Alternative 4

GRSG Management

Under Alternative 4, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of current HMA designation, or re-categorization of HMAs. Under Alternative 4, the impacts on cultural resources from designating HMAs within GRSG habitat would likely be similar to those described under Alternative 1, although SFAs would not be designated under Alternative 4.

Under Alternative 4, the disturbance cap in PHMA (and IHMA in Idaho) for all states would be 3 percent for new and pre-existing authorizations at the project scale and also within HAF fine scale habitat selection area, and would apply only to infrastructure (not to wildfire or agriculture). Impacts from the disturbance cap as instituted under Alternative 4 would be similar to those under Alternative 1.

Minerals Management

Similar to Alternative 1, under Alternative 4 fluid mineral leasing management would seek to minimize impacts on GRSG through reduction of habitat fragmentation and loss, which would be generally protective of cultural resources in GRSG habitat. Under Alternative 4 a greater number of waivers, exceptions, and modifications for fluid minerals leasing applied across a larger portion of the planning area could enable a greater degree of development in HMAs than would be seen under Alternative 1.

Renewable Energy Management

Under Alternative 4, PHMA would be managed as exclusion for utility scale wind and solar development while IHMA would be managed as exclusion for utility scale wind and solar development within 3.1 miles of active leks, with the rest of IHMA managed as avoidance. Unique to Alternative 4, all areas within 0.5 miles of PHMA or IHMA would be managed as avoidance for utility scale wind and solar development. Under Alternative 4, the overall impacts on cultural resources from managing HMAs as exclusion and avoidance areas for wind and solar energy development would be similar to those described for Alternative 3.

Lands and Realty Management

Under Alternative 4, PHMA and IHMA as well as a 0.5 mile buffer around them would be designated as avoidance for major transmission ROWs. GHMA would also contain at least some areas designated as ROW avoidance, depending on habitat mapping at the state level. Despite the addition of a 0.5 mile ROW avoidance buffer on PHMA and IHMA, the lack of major ROW exclusions under Alternative 4 could result in shorter

ROWs, reducing the overall acreage where cultural resources would potentially be impacted across the planning area compared to Alternative 1.

Livestock Grazing Management

Impacts from livestock grazing management would be the same as described under Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management would be the same as described under Alternative 1.

4.16.7 Alternative 5

GRSG Management

Under Alternative 5, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of current HMA designation, or re-categorization of HMAs. Under Alternative 5, the impacts on cultural resources from designating HMAs within GRSG habitat would likely be similar to those described under Alternative 1, although SFAs would not be designated under Alternative 5.

Under Alternative 5, the disturbance cap in PHMA (and IHMA in Idaho) for all states would be 3 percent for new and pre-existing authorizations within HAF fine scale habitat selection area, and would apply only to infrastructure (not to wildfire or agriculture). In Wyoming and Montana, a 5 percent cap is made in PHMA at the project scale and includes disturbance from wildfire and agriculture. In all other states (Colorado, Montana, Idaho, Nevada, California, Oregon, Utah, North Dakota, and South Dakota) a 3 percent cap at the project scale would not include wildfire or agriculture related disturbance. Impacts on cultural resources from the disturbance cap as instituted under Alternative 4 would be similar to those under Alternative 1.

Minerals Management

Under Alternative 5, impacts on cultural resources from fluid mineral management would be similar to those described under Alternative 4. The management of fewer acres as NSO under Alternative 5 could make some cultural resources more susceptible to impacts from fluid mineral exploration and development as described in the *Nature and Type of Effects*.

Renewable Energy Management

Under Alternative 5, Impacts on cultural resources from ground disturbance, alteration of setting, and increased access related to renewable energy development would be the same as those described under Nature and Type of Effects. Under Alternative 5, PHMA and IHMA would be managed as avoidance for utility scale wind and solar development while GHMA would be open to it. Impacts on cultural resources within HMAs would be greater than under Alternative 1 due to the lack of HMA designated as solar and wind energy exclusion areas, however overall likelihood of these impacts within the planning area are likely to be the similar to that under Alternative 1, since impacts on cultural resources due to renewable energy development may only be displaced instead of avoided entirely.

Lands and Realty Management

Under Alternative 5, impacts on cultural resources related to ROW avoidance would be the same as those described under Nature and Type of effects. The designation of GHMA as open to major ROWs and lack of major ROW exclusions under Alternative 5 could result in shorter ROWs compared to management under all the other alternatives, since all other alternatives include greater ROW avoidance or exclusion designations. Potentially shorter ROWS would reduce the overall area where cultural resources could potentially be impacted by ROWs across the planning area compared to all other alternatives.

Livestock Grazing Management

Under Alternative 5, the impacts from livestock grazing management would be the same as those described for Alternative 4.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce impacts from wild horses and burros on cultural resources in some areas.

4.16.8 Alternative 6

Impacts on cultural resources under Alternative 6 would be similar to impacts under Alternative 5 except for the designation of ACECs. ACECs designated for the benefit of GRSG under Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, non-energy minerals, saleable minerals and mineral materials as well as development of major ROWs, wind and solar within the ACECs, which would be protective of cultural resources inside these areas. The overall likelihood of impacts on cultural resources from various types of development within the planning area would be similar to that under Alternative 5 since impacts on cultural resources may only be displaced outside of ACECs instead of avoided entirely.

4.17 TRIBAL INTERESTS

4.17.1 Nature and Types of Effects

The nature and type of most effects on tribal interests are general and non-quantifiable in nature. In general, activities that result in ground disturbance to lands currently or historically occupied by GRSG could decrease opportunities for tribes to maintain traditional cultural practices and values if these activities result in decreases in GRSG populations. These include, but are not necessarily limited to, granting ROWs for road and highway construction, wind energy development, vegetation treatments in sagebrush communities, development of leasable, locatable, salable, and fluid minerals, OHV use, and SRPs. Livestock grazing and wild horse and burros may also alter the landscape in ways that decrease tribal opportunities to maintain specific traditional practices and values. In addition, natural processes that are impossible to control likely add to the human-caused impacts on GRSG listed above, including climate change, drought, and lightning-caused wildfires. The general impacts on tribal interests that would result through the implementation of each alternative analyzed in this EIS are described below.

Types of impacts that could occur from management actions or their implementation under all alternatives including the following:

- Direct disturbance of locations or landscapes associated with trust or treaty assets, traditional beliefs, sacred sites, resource gathering areas, hunting and fishing areas, water sources, ancestral sites, human remains, and trails (similar to those described in **Section 4.16,** Cultural Resources)
- Alterations of visual and aural aspects of the cultural landscape's setting that would create changes to the landscape that make it no long useable by tribal members
- Increased access and human presence, which could lead to increased vandalism and unauthorized collection of ancestral sites or trespass on treaty areas
- Decreased tribal member access or interference with the exercise of treaty rights or cultural uses and practices, such as resource gathering or hunting
- The potential for erosion, pollution, habitat loss, and less-tangible changes to natural features and resources that tribal members may consider sacred

Any action that would impact the integrity of an Indian Trust Asset or treaty-based right of a tribe or tribal resource in the planning area would be considered an adverse effect on that resource, asset, or interest. Impacts can be caused by development (e.g., road construction) or conservation (e.g., habitat improvement or landscape reclamation) actions or future implementation actions. The BLM would continue to maintain government-to-government consultation with federally recognized Native American tribes and would consult with tribes during future implementation actions to assess case-by-case or project-by-project impacts.

Depending on the extent and type of activity the amount of physical disturbance could be from slight visual or other intrusions on a landscape to wholesale destruction of an entire location or site. Whether impacts would affect a small portion of an area or affect a larger stretch of landscape would need to be evaluated by tribal representatives before making a determination on said impact's severity. However, it is usual to assume that impacts resulting in an irreversible and irretrievable loss of tribal value are of the highest severity. On a project-by-project basis, the spatial distribution (or range) of the disturbance would be largely focused on a site-specific basis. However, over time and as more actions occur throughout the planning area, the extent would be throughout sagebrush habitat.

4.17.2 Impacts Common to All Alternatives

Under all alternatives the BLM would continue to manage BLM-administered lands in a manner that accommodates Native American religious traditions, practices, and beliefs as guided by directives contained in BLM Manual 1780, BLM Handbook 1780-1, American Indian Religious Freedom Act (42 USC 1996), Native American Graves Protection and Repatriation Act (25 USC 3001), Executive Order 13007 (Indian Sacred Sites), and Executive Order 13084 (Tribal Consultation), Secretarial Order 3317, DOI Policy on Consultation with Indian Tribes (December 1, 2011), and Joint Secretarial Order 3403, on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters (November 21, 2022). All alternatives allow for the appropriate tribal governments to consult on a case-by-case basis on undertakings on BLM-administered that could affect Native American concerns. The BLM would continue to identify, protect, and preserve tribal assets, treaty rights, sacred/religious sites, or special use areas through site- and project-specific modification or mitigation on a case-by-case or project-by-project consultation basis that could affect Native American concerns.

Under all alternatives, actions that provide protections for GRSG or its habitat by limiting access into areas or excluding surface-disturbing activities, such as NSO and restrictions on surface and vehicle use would protect cultural resources from effects due to surface disturbance, erosion, effects on setting and access leading to vandalism, inadvertent damage, and unauthorized collection of cultural resources. These actions could also increase tribal opportunities to maintain specific traditional practices and values such as traditional plant gathering, hunting animals including GRSG, and the role played by GRSG in oral traditions and cultural practices such as observing lekking behavior as described in the Nevada and Northeastern California Greater Sage-Grouse Proposed Land Use Plan Amendment and Final Environmental Impact Statement (BLM 2015) if the current leasing of nonenergy minerals has led to decreases in GRSG populations.

4.17.3 Alternative 1

GRSG Management

Under Alternative 1, GRSG habitat would be separated into SFAs, PHMAs, IHMAs, and GHMAs. Restrictions to land use and surface-disturbing activities would occur within each HMA and SFA, depending on the classification. Corresponding management actions, including lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would provide a hierarchy of potential conditions to minimize effects in HMAs which could stabilize or increase GRSG populations in the future. These management goals and objectives could lead to increased opportunities for tribes to maintain traditional cultural practices and values, such as observing lekking behavior. However, use of Sagebrush Focal Areas (SFAs) and sagebrush-dominated vegetation areas in HMAs to the restrict development has the potential to push development into other vegetation regimes where cultural resources and areas of tribal interest may also exist. For example, in northwest Colorado, there are known concentrations of archaeological resources in pinyon-juniper vegetation areas that could face increased potential for impacts if ground-disturbing activities are directed into those areas when sagebrush-dominated areas are more restrictive. In Nevada and California, tribes have expressed concern for access to traditional pine nutting areas that could be similarly impacted if development is pushed to other vegetative areas in preference for SFA conservation. However, project-specific Section 106 compliance and tribal consultation should mitigate the effects of development on BLM-administered lands outside of sagebrush-dominated areas.

Lands and Realty Management

Under Alternative 1, the BLM would manage and minimize effects of land use actions on PHMA and GHMA; however, it would allow for corridors and ROWs that result in a net conservation gain for GRSG. Tribes would be able to maintain traditional practices by accessing pine nutting areas and observing lekking behavior. Restricting new development and land use authorizations near leks would likely maintain traditional tribal cultural practices and values. Cultural resources important to tribes could be impacted by the development of transmission lines within new and existing utility corridors, specifically surface disturbances from construction of poles, roads, and ancillary features, and visual impacts to the setting.

All states would have a 3% disturbance cap applied to land use activities other than wildfire and agriculture, except MT and WY, which would have a 5% cap that would include wildfire and agriculture. The 3% cap would be calculated at both the BSU-scale and at proposed project analysis area within PHMA, though in ID, the cap could be exceeded in utility corridors. Including caps at both project and BSU scales in the 3% states would reduce disturbance on both the local and landscape scales, therefore, provide protection for resources of tribal interest. A higher disturbance cap in MT and WY calculated at only the project-scale could lead to greater levels of disturbance within a project area, and therefore greater potential direct disturbances to tribally-important resources and the potential for greater cumulative disturbances across multiple projects.

Renewable Energy development is excluded in PHMAs in all states except WY where PHMAs are avoidance or open if there is no impact to GRSG. IHMAs and certain areas in OR would use GRSG avoidance rather than exclusion. GHMAs would be a mix of open, avoidance, and exclusion for wind and solar by state. Allowing renewable energy development within certain GRSG core habitat areas could adversely impact cultural resources and access for tribal cultural practices in those areas.

Minerals Management

Leasing of fluid minerals would be allowed in PHMAs and ID IHMAs, subject to NSO stipulations and/or seasonal restrictions. Allowing fluid mineral leasing would create surface disturbance that could impact cultural resources important to tribes in those areas. However, NSO stipulations on new leases would protect PHMAs from surface-disturbing activities, which could protect cultural resources and increase the opportunities for tribes to participate in traditional cultural practices, if the NSO stipulations were to increase or stabilize GRSG populations.

Closing PHMA to salable and non-energy minerals would protect cultural resources important to tribes and increase the opportunities for tribes to participate in traditional cultural practices if the closures were to increase or stabilize GRSG populations.

Livestock Grazing and Wild Horse and Burro Management

Management of livestock grazing and wild horses and burros in PHMA and GHMA could decrease tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if those current management practices have led to decreases in GRSG populations.

4.17.4 Alternative 2

GRSG Management

Impacts from designating GRSG habitat as SFAs, PHMAs, IHMAs, and GHMAs would be similar as to those described for Alternative 1. However, some SFAs would be removed in UT, WY, NV, and ID. Removing SFAs in UT, WY, NV, and ID would reduce protections to GRSG and habitat, which could lead to decreased opportunities for tribes to maintain traditional cultural practices and values, such as observing lekking behavior.

Lands and Realty Management

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA). The additional exception criteria for ROW and renewable energy in NV/CA could increase the potential for impacts cultural resources and traditional uses from surface-disturbing activities, though the criteria would likely avoid impacts to GRSG. Impacts from disturbance caps at 3%, and 5% in MT and WY, would be similar to Alternative, though the caps could be exceeded in both ID and UT under certain conditions which could pose a higher risk of potential impacts to resources of tribal interest in those states.

Minerals Management

Impacts from fluid mineral management in PHMAs and GHMAs would be the same as described for Alternative 1, except in CO PHMAs would have no closed areas and CO GHMAs would have NSO in place of closed areas. The exposure of areas in CO to fluid mineral leasing could increase the risk of potential impacts to cultural resources and decrease opportunities for tribes to maintain traditional cultural practices and values in areas where fluid mineral leasing occurs.

Impacts from salable and non-energy mineral management in PHMAs and GHMAs would be the same as described for Alternative 1, except in ID IHMAs where new free use permits for salable minerals would be considered and NV PHMAs would include exception criteria to closure for both salable and non-energy minerals. These actions could expose cultural resources to increased risk of potential impacts from surface-disturbing activities and decrease opportunities for tribes to maintain traditional cultural practices and values.

Removing the recommendation for withdrawal of the SFAs from location and entry under the Mining Law of 1872 in all states (except in MT/DK, which did not have a 2019 amendment) would have no impact on how surface-disturbing activities would impact cultural resources and would not impact GRSG disturbance and habitat alterations/degradation, nor would it impact opportunities for tribes to maintain traditional cultural practices and values. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Livestock Grazing Management

Impacts from domestic livestock grazing management would be the same as described for Alternative 1. In UT, WY, and NV, the prioritization for review and processing of grazing permits was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

4.17.5 Alternative 3

GRSG Management

Under Alternative 3, the highest level of conservation for GRSG would be adopted with all areas managed for GRSG as PHMAs and establish management goals and objectives for specific resources in PHMA that could stabilize or increase GRSG populations in the future. If successful, these management goals and objectives could lead to increased opportunities for tribes to maintain traditional cultural practices and values such as observing lekking behavior.

Lands and Realty Management

New development would be substantially limited compared with Alternatives 1 and 2. All PHMAs would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated corridors. The potential for habitat degradation and fragmentation within the PHMAs would be reduced and this would result in increased opportunities for tribes to maintain traditional practices as well as increase protection of cultural resources important to tribes in those areas from surface-disturbing activities by reducing travel and access, which in, turn could reduce vandalism and collection. However, the inability to site ROWs in PHMAs could lead to longer ROW routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting, resulting in more areas that would be exposed to ground disturbance, erosion, and impacts from increased access outside of PHMAs. A 3% disturbance cap would be applied to pre-existing land-use authorization including wildfire and agriculture at multiple scales and with now exceptions, offering a higher level of protection to resources of tribal interest than alternatives 1 and 2.

Under Alternative 3, PHMAs in all states would be ROW exclusion areas for wind and solar energy development. Alternative 3 would offer more protection from renewable energy development than under Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions. Excluding wind energy development in GRSG priority and general habitat areas would reduce surface disturbance and visual impacts to cultural resources important to tribes in those areas as well as preserving opportunities for tribes to maintain traditional cultural practices.

Minerals Management

Closing PHMAs in all states to fluid mineral leasing, salable minerals, and non-energy minerals would reduce potential for impacts to GRSG and habitat to a greater extent than Alternatives 1 and 2. This is because areas closed to leasing could not be developed at any point. Closing PHMAs to mineral leasing and development would protect cultural resources important to tribes from surface-disturbing activities as well as subsurface activities (e.g., directional drilling). GRSG would not be exposed to disruption that is often associated with the noise and human activity that accompanies construction, development, or production activities, preserving opportunities for tribes to maintain traditional cultural practices.

Recommending PHMAs for withdrawal from location and entry under the United States mining laws would have no impact on tribal opportunities to practice traditional cultural behavior and values such as observing lekking behavior if this management strategy stabilizes or increases GRSG populations. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Livestock Grazing Management

Under Alternative 3, all PHMA would be unavailable for domestic livestock grazing that would increase opportunities for tribes to maintain traditional practices, such as observing lekking behavior, if this grazing strategy stabilizes or increases future GRSG populations. Prohibiting livestock grazing within GRSG priority habitat could also protect cultural resources important to tribes in these areas from damage by livestock trampling. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage or destroy tribal interests. Additionally, this alternative may decrease economic revenue to tribes holding grazing permits if their current AUMs are reduced.

Wild Horse and Burro Management

Removing wild horses and burros in those PHMAs with existing herd management areas in all states would increase habitat quality for wildlife, including GRSG, as described in **Section 4.2**. This increase in GRSG habitat quality would increase opportunities for tribes to maintain traditional practices.

4.17.6 Alternative 4

GRSG Management

Under Alternative 4, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of areas currently in HMA, or re-categorization of HMA prioritization. Impacts to resources of tribal interest from HMA designations under Alternative 4 are expected to be similar to alternatives 1 and 2.

Lands and Realty Management

Under Alternative 4, impacts from managing PHMAs in all states and ID IHMAs as ROW avoidance areas would be similar to those described for Alternative 1.

Impacts from applying a 3% disturbance cap under Alternative 4 would be similar as to those described for Alternative 3, however, the cap would apply to both existing and proposed infrastructure authorizations and wildfire and agriculture would not be included in the disturbance calculation. As a result, the level of possible disturbance to resources of tribal interest from other sources (energy development, roads, RPWs, etc.) would be relatively higher than if wildfire and agriculture were included in the disturbance calculation.

Impacts from managing PHMAs in all states as ROW exclusion areas for utility-scale wind and solar energy development would be similar to those described for Alternative 3. Unique to Alternative 4, all areas within 0.5 miles of PHMA or IHMA would be managed as avoidance for utility scale wind and solar development. However, since PHMAs would apply to a smaller area under this alternative, the extent of protection from disturbance associated with from renewable energy development would be less.

Minerals Management

Under Alternative 4, fluid mineral leasing management would seek to minimize impacts on GRSG through reduction of habitat fragmentation and loss, which would be generally protective of cultural resources and other tribal interests in GRSG habitat. Under Alternative 4 a greater number of waivers, exceptions, and modifications for fluid minerals leasing applied across a larger portion of the planning area could enable a greater degree of development in HMAs than would be seen under Alternative 1.

Livestock Grazing Management
Impacts under Alternative 4 would be the same as those described under Alternative 1.

Wild Horse and Burro Management
Impacts under Alternative 4 would be the same as those described under Alternative 1.

4.17.7 Alternative 5
GRSG Management
Under Alternative 5, impacts to tribal interests would be similar to Alternative 4 with the additional consideration of adjustments to HMAs to balance multi-use opportunities, which has the potential produce impacts on tribal interests since HMAs would cover a smaller area under Alternative 5.

Lands and Realty Management
Under Alternative 5, impacts from managing PHMAs in all states and ID IHMAs as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4. GHMA would be open to major ROW development with minimization measures of managing the severity of a project impact at a specific location. Potential impacts on areas of tribal interest would be similar to those as described under Alternative 4, but greater in magnitude due to GHMA being managed as open to major ROW development.

Impacts from applying a 3% disturbance cap under Alternative 5 would be the same as described for Alternative 4, except in WY and MT that would have a 5% disturbance cap at the project scale. Impacts from exceeding the 3% disturbance cap under certain conditions would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development and potential disturbance to resources of tribal interest.

Minerals Management
Under Alternative 5, impacts on areas of tribal interest from fluid mineral management would be identical to those described under Alternative 4.

Livestock Grazing Management
Impacts under Alternative 5 would be the same as those described under Alternative 1.

Wild Horse and Burro Management
Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could increase in GRSG habitat quality, which could increase opportunities for tribes to maintain traditional practices in some areas.

4.17.8 Alternative 6
Impacts on areas of tribal interest under Alternative 6 would be similar to impacts under Alternative 5 except for the designation of ACECs. ACECs designated for the benefit of GRSG under Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, non-energy minerals, saleable minerals and mineral materials as well as development of major ROWs, wind and solar within the ACECs, which would lessen the potential for impacts to areas of cultural interests in these areas.

4.18 Lands with Wilderness Characteristics

4.18.1 Nature and Type of Effects

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area or by activities that increase the sights and sounds of other visitors. Linear developments also impact the sizes of lands with wilderness characteristics units, which can also impact a unit's eligible acreage. These actions and activities could change the wilderness qualities listed in BLM Manual 6310 that make up the criteria for lands with wilderness characteristics. Generally, actions that create surface disturbance degrade the naturalness of wilderness characteristics, as well as the setting for experiences of solitude and primitive recreation.

Allowing any type of energy or mineral development, such as fluid, nonenergy leasable, and salable minerals, as well as renewable energy (e.g., wind and solar), would result in surface disturbance that would diminish the area's natural characteristics. Any new roads authorized for access to the development area could eliminate wilderness characteristics of the entire unit. This would be the case if the road were to bisect the unit so that it would no longer be considered a roadless area of adequate size. In addition, allowing developers regular access to the lease area or mine site would reduce opportunities for solitude.

ROW exclusion areas provide direct and indirect protection of wilderness characteristics by preserving naturalness and opportunities for solitude and primitive recreation by prohibiting disturbance and fragmentation from transmission lines, roads, and other utility developments. ROW avoidance areas also provide protection of wilderness characteristics by encouraging ROW development outside of the avoidance area when feasible.

Impacts on wilderness characteristics are possible from changes in livestock grazing and wild horses and burro management, particularly from new developments (e.g., water developments and range facilities) in lands with wilderness characteristics. This could lessen the naturalness of appearance or could limit unconfined recreation. Existing range facilities used for livestock grazing and wild horses and burro management, such as stock trails and spring developments, would result in no changes to current wilderness characteristics. Installing and maintaining range improvements could result in short-term impacts on solitude and naturalness due to human presence, noise, and disturbance. In addition, range improvements reduce the overall appearance of naturalness over the long term could result in short-term impacts on solitude and naturalness due to human presence, noise, and disturbance during installation. Where areas are unavailable for livestock grazing, lands with wilderness characteristics that overlap with these areas would experience a reduction of these impacts. Gathering operations to manage wild horse and burro populations would temporarily reduce opportunities for solitude due to the increase in human presence and noise during these efforts.

4.18.2 Alternative 1

Under Alternative 1, fluid minerals would be managed within PHMA and IHMA as open with an NSO stipulation in most states with the exception that PHMA in Colorado would be closed to fluid mineral leasing within 1 mile of leks. Fluid mineral leasing in PHMA within Wyoming and Montana would also be subject to density and disturbance limits. Fluid mineral leasing within GHMA would be managed as closed within one mile of leks in Colorado and Oregon. Fluid minerals would be managed with an NSO stipulation in GHMA with varying distances from leks depending on the state. Fluid minerals would also be managed within GHMA as controlled surface use in California, Idaho, Nevada, Oregon, and Wyoming. Areas open to fluid minerals leasing and development would not provide protection to wilderness characteristics because development and infrastructure related to those actions would impact wilderness characteristics as discussed above under *Nature and Type of Effects*.

PHMA and IHMA would be managed as closed to salable minerals in most states and closed to new development of non-energy leasable minerals. These closures would protect the naturalness of the lands with wilderness characteristics. Lands in GHMA would have minimization measures for salable mineral and non-energy leasable mineral development, which would minimize impacts, but would not prevent impacts from salable mineral development on lands with wilderness characteristics.

SFAs were recommended for withdrawal from mineral location and entry within PHMA. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. Where lands with wilderness characteristics intersect with the areas open for mineral development, there is no certainty for protection of these wilderness characteristics.

PHMA and IHMA would be managed as ROW avoidance areas for major and minor ROWs. However, Wyoming would be open to ROWs with buffers and mitigation. Major ROW development within GHMA would vary by state. For minor ROWs, GHMA would remain open to ROW development with mitigation for all states, except for Wyoming, which does not require mitigation. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described above under *Nature and Type of Effects*. Due to screening criteria, conditions for development, and required mitigation, applicants may find it easier to cite their development outside of GRSG habitat, thereby leading to some additional protection of lands with wilderness characteristics within GRSG habitat.

Livestock grazing would be available in GRSG HMAs, except in Oregon where all or portions of 13 key RNAs would be unavailable. Impacts to wilderness characteristics would be the same as those described under *Nature and Type of Effects*.

4.18.3 Alternative 2

Under Alternative 2, impacts from management of fluid minerals on lands with wilderness characteristics would be similar as those described under Alternative 1. However, under Alternative 2, PHMA and GHMA within Colorado would not be managed as closed to fluid minerals, rather these areas would be managed as NSO within 1 mile of leks which would effectively provide the same protection to wilderness characteristics due to the lack of surface disturbance with this type of development.

Impacts from salable minerals on lands with wilderness characteristics within PHMA and IHMA would be similar as those described under Alternative 1. However, under Alternative 2, Idaho would allow for consideration of new free use permits and Nevada would have exception criteria to the closed areas. Compared with Alternative 1, the free use permits, and exception criteria would allow for more impacts on lands with wilderness characteristics within PHMA and IHMA due to more areas allowing this surface disturbing activity. Impacts from salable minerals and non-energy minerals on lands with wilderness characteristics within GHMA would be the same as those described under Alternative 1.

The BLM would not recommend lands for withdrawal from locatable mineral entry within GHMA or PHMA. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. Where lands with wilderness characteristics intersect with the areas open for mineral development, impacts in these areas would be greater under this alternative compared with Alternative 1 due to no certainty for protection of wilderness characteristics.

PHMA would be managed similar to Alternative 1 for ROWs, except Nevada would have added exception criteria added which could allow for more impacts to wilderness characteristics under this alternative as described under *Nature and Type of Effects*. Impacts from ROWs on lands with wilderness characteristics would be the same as those described under Alternative 1 for GHMA.

Impacts from livestock grazing on lands with wilderness characteristics would be the same as those described under Alternative 1. In Oregon, livestock grazing would be available in all or portions of 13 key RNAs.

4.18.4 Alternative 3

Under Alternative 3, PHMA would be closed to fluid mineral leasing, salable minerals, non-energy leasable minerals, and recommended for withdrawal from locatable mineral entry providing the most protection from impacts described under *Nature and Type of Effects* to lands with wilderness characteristics than under any other alternative. However, a recommendation for withdrawal provides no protection to habitat. Withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA.

PHMA would be managed as ROW exclusion areas which would result in the most protection of lands with wilderness characteristics compared to all other alternatives. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described under *Nature and Type of Effects*. Precluding these types of activities would help protect wilderness characteristics.

Livestock grazing would be unavailable in PHMA which would result in the most indirect protection of lands with wilderness characteristics of all the other alternatives because lands with wilderness characteristics would not be subject to the types of impacts from livestock grazing that could reduce naturalness. In Oregon, key RNAs within PHMA would be unavailable for grazing with the same direct and indirect impacts as described under *Nature and Type of Effects*. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage wilderness characteristics.

Management actions under Alternative 3 would have the overall greatest potential to maintain wilderness characteristics on lands with wilderness characteristics within PHMA when compared to all other alternatives.

4.18.5 Alternative 4

Under Alternative 4, no changes to mineral resource use allocations would be made, but fluid mineral leasing would be managed to minimize potential for conflict and associated impacts from subsequent development in important habitats or connectivity areas. The evaluation of parcels and the consideration of development proximity, habitat significance, and potential would contribute to the preservation of naturalness in lands with wilderness characteristics as described under *Nature and Types of Effects*.

PHMA and IHMA would be managed as avoidance areas for major ROWs under this alternative. All areas within 0.5 miles of PHMA and IHMA would be managed as avoidance areas for ROWs to address indirect impacts to adjacent PHMA and IHMA. GHMA would be managed as avoidance areas within breeding, nesting, and limited-seasonal habitats where mapped. Impacts on lands with wilderness characteristics would be similar to those as described under Alternative 1, but lesser in magnitude due to the additional areas adjacent to HMAs being managed as avoidance areas for ROWs.

All GRSG HMAs would be available for livestock grazing, except in Oregon, where all or portions of 13 key RNAs would be unavailable. Livestock grazing would be managed toward meeting land health standards to meet or make progress toward meeting the GRSG habitat objectives in HMAs. This alternative would provide additional protections to lands with wilderness characteristics because the BLM would design new range improvement projects to enhance livestock distribution and new structural range improvements would be placed along existing disturbance corridors where possible to not increase impacts on GRSG and their habitat. This would limit the impacts on lands with wilderness characteristics from new range improvement projects as described under *Nature and Type of Effects*.

4.18.6 Alternative 5

Under Alternative 5, impacts from mineral resource use allocations on lands with wilderness characteristics would be the same as those described under Alternative 4.

PHMA and IHMA would be managed as avoidance areas for major ROWs under this alternative, but GHMA would be open to major ROW development with minimization measures of managing the severity of a project impact at a specific location. Impacts on lands with wilderness characteristics would be similar to those as described under Alternative 4, but greater in magnitude due to GHMA being managed as open to major ROW development.

Impacts from livestock grazing on lands with wilderness characteristics would be the same as those described under Alternative 4.

4.18.7 Alternative 6

Where lands maintained for wilderness characteristics overlap ACECs, management of these other areas could also indirectly protect wilderness characteristics due to the protective measures proposed for the other areas. These protective measures would include complementary management objectives, where lands with wilderness characteristics would be managed to protect them. This could offer some indirect protection of wilderness characteristics for units managed primarily for other resource considerations.

Under Alternative 6, ACECs would be open to fluid mineral leasing subject to NSO stipulations. Where ACECs overlap inventoried areas found to possess wilderness characteristics, impacts to the indicators of lands with wilderness characteristics would occur due to the surface disturbance and facility development associated with locatable and fluid mineral development. Closure of ACECs to new non-energy minerals and saleable minerals operations would protect overlapping lands with wilderness characteristics from this type of surface disturbing development.

Management of ACECs as ROW exclusion areas would result in the protection of overlapping lands with wilderness characteristics. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described under *Nature and Type of Effects*. Precluding these types of activities would help protect wilderness characteristics.

4.19 RECREATION AND VISITOR SERVICES

4.19.1 Nature and Type of Effects

Impacts on recreation can be direct and indirect. Management actions that alter or prohibit users' opportunities to access recreation areas or participate in recreation activities would result in a direct impact. Management actions that change the physical, social, or administrative setting within which recreation activities take place would result in indirect impacts. Impacts on recreation settings can be the achievement of or movement toward a desired setting or an unwanted shift in setting, such as to either a more or less developed environment. Management actions which change when or where SRPs are issued would affect recreation users by changing the types of organized recreation activities permitted via SRPs in the planning area over the long term. This would potentially add costs to recreational users of BLM-administered lands having to circumvent some areas or adopting less preferred options in certain activities. Dispersed recreational activity does not require a permit and would not be affected. There may also be areas closed for restoration, changing the experiences of or opportunities for users. Physical, social, and administrative settings are not specifically managed for in areas not designated as Recreation Management Areas, although these areas do still provide intrinsic recreation values and opportunities.

4.19.2 Impacts Common to All Alternatives

Under all alternatives, the BLM would continue to review and approve SRPs on a case-by-case basis within the planning area and there would be no direct impacts on recreation through changes to the number and types of SRPs issued on an annual basis within the decision area. Any indirect impacts on SRPs would be related to the impacts on the change in the types of recreation activities, experiences, and benefits in the decision area.

Under all alternatives, disturbance caps which restrict the construction of recreation infrastructure would decrease access for recreation experiences that depend on road and trail development and could inhibit management objectives where developments are part of the desired conditions. If future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would prohibit construction of new recreation facilities such as campground, day-use areas, and trailheads in PHMA and GHMA. However, these disturbance caps would also limit development in some areas, thereby increasing remoteness and naturalness in areas managed for those objectives and enhancing the recreational user experience of primitive backcountry recreation activities and experiences over the long-term (BLM 2014).

4.19.3 Alternative 1

Under Alternative 1, existing restrictions on other resource uses, such as seasonal restrictions on fluid mineral development and disturbance caps, would indirectly affect recreation by reducing resource conflicts in PHMA, IHMA, or GHMA (**Table 2-3**) as described in **Chapter 2**. Reducing resource conflicts with recreation enhances and preserves the recreational experiences in those areas. These restrictions would reduce the impacts on recreation from the general trend of resource conflict with increasing energy development on BLM-administered lands in those management areas over the long-term.

Management of major ROW avoidance areas including those for power lines, pipelines, access roads, and communication sites in PHMA and IHMA and in GHMA in some states (CO, NV/CA, OR), would continue to improve recreation experiences over the long-term as these diminish the naturalness of the physical setting and the opportunities for recreation activities, experiences, and outcomes that require more remote and natural settings. These avoidance areas would not apply to existing roads and facilities.

4.19.4 Alternative 2

Under Alternative 2, there would be more exceptions to restrictions on other resource uses than Alternative 1 such as no closed areas for fluid mineral development in Colorado, and additional exceptions to the disturbance cap compared to Alternative 1. These exceptions would indirectly increase recreation conflicts with other resources in PHMA, IHMA, and GHMA more than Alternative 1. Increasing resource conflicts with recreation diminishes the recreational experiences in those areas. These exceptions would potentially add to the impacts on recreation associated with the trend of increasing energy development on BLM-administered lands over the long-term.

Management of ROW avoidance areas under Alternative 2 would be similar to Alternative 1, except in Nevada where additional exception criteria would allow for more ROWs to be constructed. This would diminish the naturalness of the physical setting and opportunities for recreation experiences in those areas over time for recreation activities that require more remote and natural settings; however, this exception criteria would only occur in Nevada. Some ROWs, such as for road maintenance and trail development, would enhance other recreational activities by providing better access to recreational activities.

Under Alternative 2, there would be fewer acres of PHMA and GHMA when compared to Alternative 1 (**Table 2-3**). This would restrict fewer acres of land subject to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would have the potential to restrict fewer acres than Alternative 1.

4.19.5 Alternative 3

Alternative 3 would impose the greatest restrictions on other resources, including closing fluid mineral leasing in PHMA, and would most greatly reduce the potential for resource conflict with recreation. Reducing resource conflicts with recreation would enhance and preserve recreation which requires specific physical setting characteristics, such as remoteness. This would counter the trend of increased energy development on BLM-administered lands and its impact on recreation resources in PHMA to a greater extent than Alternative 1. These restrictions would also reduce the degradation of physical setting characteristics within the planning area, which would enhance the recreational user experience more than Alternative 1.

By managing more acres of ROW exclusion compared to Alternative 1, Alternative 3 would prohibit such developments over a greater area and would thus maintain the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Alternative 3 has the greatest acreage of PHMA, which would be subject the greatest acreage to disturbance caps. Therefore, if future recreation would have the potential exceed the disturbance cap in a particular area, the disturbance cap would have the potential to prohibit the construction of new recreation facilities over the largest area when compared with the other alternatives. There would be over double the acres of PHMA when compared to Alternative 1 (**Table 2-3**).

4.19.6 Alternative 4

Similar to Alternative 1, under Alternative 4, existing restrictions on other resource uses such as fluid mineral leasing, would have an indirect effect on recreation by reducing resource conflicts in PHMA, IHMA, or GHMA. Reducing resource conflicts with recreation enhances and preserves the recreational experiences in those areas.

Under Alternative 4, ROWs would have additional criteria for avoidance of GRSG when compared to Alternative 1, which would limit such developments over a greater area and would thus indirectly affect recreation by maintaining the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Under Alternative 4, there would be more acres of PHMA and fewer acres of GHMA when compared to Alternative 1 (**Table 2-3**), which would subject fewer acres of land to disturbance caps. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would have the potential to restrict fewer acres of land against the construction of new recreation facilities when compared to Alternative 1.

4.19.7 Alternative 5

Similar to Alternative 1, existing restrictions on other resource uses such as fluid mineral leasing, would have an indirect effect on recreation by reducing resource conflicts in PHMA, IHMA, or GHMA. Under Alternative 5, all states would be avoidance for utility scale wind and solar energy development. This would be less restrictive on energy development than Alternative 1, which could indirectly affect recreation by leading to the potential for great resource conflicts with energy development. Increasing resource conflicts with recreation diminishes the recreational experiences in those areas.

Under Alternative 5, ROWs would have less restrictive criteria for avoidance of GRSG when compared to Alternative 1. This would indirectly affect recreation when compared to Alternative 1 by decreasing the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Under Alternative 5, there would be more acres of PHMA when compared to Alternative 1 (**Table 2-3**). This would restrict more acres of land to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, this would have the potential to restrict more acres against the construction of new recreation facilities when compared to Alternative 1.

4.19.8 Alternative 6

Impacts to recreation under Alternative 6 would be similar to impacts under Alternative 5 except in ACECs. Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, non-energy minerals, and mineral materials as well as major ROWs, wind and solar. These would indirectly decrease the resource conflicts that also affect recreation resources when compared to Alternative 1.

4.20 Transportation and Travel Management

The BLM has designated lands within the planning area in one of three OHV designation categories, open, limited or closed. Per Alternative 1, PHMA and GHMA that do not have designated routes in a Travel Management Plan will be managed as limited to existing routes until a Travel Management Plan designates routes (unless they are already designated as limited to designated routes or closed to OHV use). This decision will not change by alternative, but since HMAs change by alternative, areas where this management action would be applied would also change by alternative (**Table 4-7**). Alternative 3 would manage the greatest acreage of PHMA and thus the greatest acreage would be limited to existing routes of all alternatives. The second greatest acreage of PHMA would be managed under Alternative 4, followed by Alternatives 5 and 6, 1, and 2, with decreasing acreage that would be limited to existing routes across these alternatives.

4.21 Cumulative Effects

The following two cumulative effects would apply for all resources and resource uses discussed below. First, GRSG state plans can cumulatively affect most resources and resource uses. While 10 of the 11 States in the GRSG range have updated their State plans to conserve the species by incorporating new information, not all of these plans have been implemented or are regulatory in scope. Specifically, the regulatory conservation actions mandated by the State plans in WY, MT, and OR, and through mitigation required by the NV plan provide the greatest degree of regulatory certainty in addressing potential threats to GRSG. Required mitigation in NV is through the Conservation Credit System (CCS) managed by the State of Nevada Sagebrush Ecosystem Program. The goal of the CCS is to generate a net benefit of greater sage-grouse habitat on public lands, but it may be adapted to support the ongoing preservation, enhancement, and restoration of NV sagebrush ecosystem. The regulatory plans may reduce or increase restrictions on resource uses in planning areas that would protect or limit impacts on natural and cultural resources and Tribal interests. For instance, regulatory plans could add to the potential complications and costs of large projects that span multiple states, such as transmission lines, pipelines, and fiber optics or in areas where the federal plan is inconsistent with the state plan.

The remaining State plans are voluntary in nature and do not meet a level of certainty for implementation and effectiveness; they may result in more compensatory mitigation relative to if no State plan existed, which could still provide long-term benefits to natural and cultural resources and tribal interests. However, these voluntary state plans do have measurable goals and objectives for habitat and population management across the state.

Secondly, as described further in **Section 4.21.8** and **Appendix 12**, the BLM's ongoing Solar PEIS revision may change the availability of lands for solar energy development outside of GRSG habitat. Within the cumulative impacts study area but outside of GRSG habitat, natural and cultural resources, Tribal interests, and resource uses could be impacted by solar development, though the extent of such impacts could be limited by other exclusion criteria or design features imposed by the Solar PEIS.

4.21.1 Greater Sage-Grouse

This cumulative impacts analysis discloses the short- and long-term effects on GRSG and its habitat from implementing each RMPA/EIS alternative, in conjunction with other past, present, and reasonably foreseeable future actions. The cumulative effects analysis area for GRSG is the same as the planning area, which encompasses the entirety of the GRSG current range. The temporal scale of the analysis is the anticipated lifetime of RMPA/EIS, i.e., 20 years.

The past, present, and reasonably foreseeable future actions that contribute to cumulative impacts on GRSG are summarized in **Appendix 14, Table 14-1**. These include the ongoing and reasonably foreseeable actions across the entire range for GRSG, which are separated by state. However, the cumulative impacts analysis considers multiple geographic scales, including the appropriate HAF groupings, which have biological significance to GRSG—fine scale HAFs represent an individual's home range and are determined in part by the quality and juxtaposition of resources within and between seasonal habitats (Stiver et al. 2015).

Where these actions occur within GRSG habitat, they would cumulatively add to the impacts of BLM-authorized activities set forth in the EIS alternatives. The actions in **Appendix 14, Table 14-1** can broadly be characterized as regional and state land use and conservation plans; resource uses and projects such as energy development and grazing; wildfire, fuels, and vegetation/habitat management. The types of cumulative impacts that can occur from these activities are discussed in the sections below.

Regional and State Land Use and Conservation Plans

Regional efforts to manage threats to GRSG include land use/resource management plans and amendments conducted by the BLM, Forest Service, and by other federal and/or in cooperation with non-federal agencies, organizations, landowners, or other groups. The National Resources Conservation Service partners with private agricultural lands for the Working Lands for Wildlife to conserve habitat while keeping working lands. The Sage-Grouse Initiative is a part of the and targets conservation efforts where the returns are highest by targeting threats to the bird. At the state level, each state considered in the GRSG range has developed a GRSG conservation plan with a suite of management actions that aim to conserve GRSG habitat and populations across all land ownerships. In their 2015 determination not to list the GRSG as threatened under the ESA, the USFWS cited regulatory mechanisms provided by federal and the three existing state plans at that time, as having substantially reduced threats to the species in approximately 90 percent of the breeding habitat through avoidance and minimization measures (USFWS 2015).

Plans developed by States for GRSG vary widely in the nature of the protective measures, but generally establish goals and objectives to maintain and increase GRSG populations statewide, and maintain, protect and increase GRSG seasonal habitats. They also generally include stipulations and guidelines, for leases, permits, and easements on state lands and conservation measures for activities such as oil and gas development, mining, and wildfire prevention or suppression.

Mineral Development

Mining and mineral leasing, exploration, and development continue to occur throughout the planning area. These include activities associated with fluid minerals (oil, gas and geothermal), locatable minerals, leasable minerals, and mineral materials. The types of impacts on GRSG that could occur from mineral development are described in **Section 4.2**, and generally relate to surface and subsurface disturbance from exploration and development actions and infrastructure. These activities may contribute to fragmentation, removal or alteration of habitat, changes in GRSG use patterns, changes in GRSG demographics (e.g., nest survival, recruitment, and population growth), and an increase in invasive plant introduction and spread. Past, present, and reasonably foreseeable development related to fluid minerals in the planning area are included in the RFDs for those resources (see **Appendix 12**). In addition, the process to consider the proposed withdrawal of SFAs is underway; if approved by the Secretary, the effects described under Alternative 1 for locatable minerals would be realized. The acres of HMAs subject to energy and mineral decisions within each HAF group are presented in **Appendix 14**.

Lands and Realty, including Renewable Energy Development

Effects on GRSG and its habitat from roads and ROWs (including pipelines, electrical transmission lines, infrastructure ROWs, and large renewable energy projects, such as solar and wind development projects) have occurred throughout the planning area and are expected to continue to occur (**Table 14-1**). The likelihood for development would increase following the development of large-scale utility corridors. The types of impacts on GRSG that could occur from lands and realty and solar and other renewable energy development are described in **Chapter 4**. Increasing development and population growth have increased demand and construction of transmission lines and roads within the planning area which fragments habitat and increases the risk of collision, predation, and mortality of GRSG. Road use is also a source of spread for invasive annual grasses which degrade GRSG habitats and increase wildfire frequency. This trend is expected to continue. The acres of HMAs subject to lands and realty decisions within each HAF group are presented in **Appendix 14**.

Livestock Grazing

The BLM and other land management agencies authorize livestock grazing in accordance with their regulations (43 CFR Part 4100 for the BLM) and agency policies and guidance. Where lands are available for livestock grazing, BLM field offices will continue to administer grazing authorizations (permits and leases) in conformance with the NEPA and other applicable laws. Land management agencies will authorize structural and nonstructural range improvements, and agencies like the NRCS and state agricultural departments will continue to work with private landowners to conduct projects on private rangelands. As a result, several GRSG Candidate Conservation Agreements with Assurances (CCAA) have been initiated. These are voluntary agreements between the USFWS and landowners whereby landowners agree to manage their lands to remove or reduce threats to GRSG will help contribute to the long-term persistence of GRSG by helping to maintain intact habitats and implement conservation measures to reduce threats. Impacts to GRSG from grazing on public and private lands would continue to occur as described in **Chapter 4**. The acres of HMAs available and unavailable for livestock grazing within each HAF group are presented in **Appendix 14**.

Wild Horses and Burros

Wild horse and burro grazing has similar types of effects as livestock grazing in their effect on soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems (Connelly et al. 2004). These effects impact GRSG by causing habitat alteration, such as loss of cover and forage (Coates et al. 2021). There are approximately 168 wild horse and burro herd management areas across the planning area (15 million acres), and populations are continuing to grow, often exceeding AMLs. As such, impacts to GRSG, such as habitat degradation, will likely increase. Removal, adoption, and fertility control of animals from the range each year will help control herd sizes and lessen impacts to GRSG.

Wildfire, Fuels, and Vegetation/Habitat Management

Wildfires result in the greatest direct loss of GRSG habitat and have been widely distributed in terms of frequency and severity. The spread and prevalence of invasive plant species contributes to increasing wildfire frequency and size. Increasing recurrence and severity of drought conditions have been predicted for much of the planning area as a result of climate change. These trends can contribute to increasing the occurrence, size, and severity of wildfires throughout the planning area.

Fuels management and fuel reduction projects have been and continue to be implemented throughout the planning area by the BLM, other federal agencies such as the Forest Service, states, local or regional partnerships, and other groups to assist in wildfire management. These cooperative treatments seek to support and, where possible, improve natural resilience and resistance of sagebrush habitats to invasive plant species and wildfire. Treatments also seek to improve the ability of cooperative firefighting agencies to better suppress wildfires, minimizing the potential size of wildfires and the related acres of habitat burned. Where fuels projects reduce the potential for catastrophic wildfire, they would also reduce potential for GRSG habitat loss and fragmentation. They would also contribute to short-term impacts such a disturbance from use of equipment and habitat alterations.

Likewise, vegetation and habitat management projects for GRSG have occurred throughout the planning area and projects such as hazardous fuels reduction, pinyon-juniper removal, emergency stabilization and rehabilitation, and invasive species control have impacted vegetative cover and structure, which in turn influence wildfire risk and GRSG habitat conditions and availability. These projects have been and continue to be implemented by the BLM and other federal and state land management agencies and private landowners. Vegetation projects will continue throughout the planning area and new projects will be proposed, regardless of decisions made in this RMPA. Where vegetation and habitat management projects for GRSG occur, they would improve habitat for GRSG by improving native plant composition and structure and decrease the risk of habitat avoidance resulting from conifer invasion because trees displace species that are important to GRSG habitat (Manier et al. 2013). They would also reduce the potential for/mitigate the risks of catastrophic wildfire that creates stand replacing impacts or major changes to vegetation seral stages affecting habitat availability and suitability on a long-term basis. Vegetation treatments would contribute to short-term impacts such a disturbance from use of equipment and temporary habitat alterations until desired conditions are achieved.

Travel Management and Recreation

Travel management planning on BLM-administered lands continues throughout the planning area. Travel management planning has been completed or is underway on certain BLM-administered lands to develop travel networks and manage access for all types of resources and resource uses (e.g., mineral extraction, range access, realty, recreation). As demand for each resource use continues to grow, the use of existing routes, demand for new routes, and upgrading of existing routes would be considered in travel management planning. In general, use of existing roads and development of new roads in GRSG habitat contributes to GRSG habitat loss, alteration, and fragmentation. Travel management plans typically include seasonal and permanent closures of roads and other mitigation measures reduce impacts to other resources, such as vegetation and wildlife, including GRSG.

Dispersed, organized, and concentrated recreation would continue throughout the planning area with specific management for certain activities per the recreation management allocations and management actions in individual BLM resource management plans. Overall visitation to the BLM-administered lands in the planning area is expected to continue to increase; however, the number of visitors would vary by season, year, location, and type of activity. Where roads, trails, and recreation occur in GRSG habitat it would contribute to disturbance, habitat alterations and fragmentation, and potential for injury or mortality from vehicle collisions.

Contribution of Alternatives

Consistent with multiple use management, each alternative would allow for some land use activities, including energy and mining, lands and realty, renewable energy development, grazing, recreation activities, and travel and trails. These land uses will have varying cumulative impacts of habitat loss and degradation and behavioral disturbance of individuals. The cumulative contribution of each alternative would vary due to differences in habitat designations, stipulations, management actions, and protections that would influence the type, extent, and magnitude of allowable activities within GRSG habitats.

Under Alternative 1, GRSG habitat would be separated into SFAs, PHMA, IHMAs, and GHMA (**Table 2-3**). Restrictions to land use and surface-disturbing activities would occur within each HMA and SFA, depending on the classification. Restrictions on development, such as stipulations and avoidance/exclusion areas would be applied within HMAs and would limit impacts to GRSG. Under Alternative 1, the BLM would manage lands to conserve, enhance and restore GRSG habitat and the sagebrush ecosystem upon which GRSG populations depend. The BLM would incorporate adaptive management, mitigation, disturbance caps, buffers, habitat objectives, and monitoring. Including 3 percent disturbance caps at both project and BSU scales for most states would reduce disturbance on both the local and landscape scales, therefore, provide protection for both the larger population and individual leks and their surrounding habitat. In MT and WY, a 5 percent disturbance cap would apply to land use activities; this would increase potential for habitat loss and alterations as well as direct disturbance to GRSG above those of 3%. Because the 5% cap would include wildfire and agricultural conversion in the calculation, there would be potential for added protection from impacts to habitats other than anthropogenic development (in contrast to considering only anthropogenic disturbance in the calculation).

Under Alternative 2, the contribution to cumulative impacts from designating HMAs and incorporating adaptive management, mitigation, disturbance caps, buffers, habitat objectives, and monitoring would be similar to Alternative 1 (**Table 2-3**). Alternative 2 would remove SFAs in some states, which would reduce protections to GRSG and habitat. It would also include more areas open to mineral development and exploration. Fewer restrictions may result in greater impacts to GRSG habitats. Alternative 2 would remove the recommendation for locatable mineral withdrawals in SFAs, which has no impact. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 3, the BLM would manage the largest acreage of HMAs, all as PHMA (**Table 2-3**). Management actions for PHMA, such as lek buffers and required design features would be more restrictive and designed to promote GRSG conservation to a greater extent than in previously designated GHMA. Therefore, managing previously designated GHMA as PHMA would minimize potential impacts to GRSG to a greater extent than if they remained managed as GHMA. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would also decrease potential for disturbance to birds and habitat alterations because management restrictions associated with PHMA would occur over a larger area. Applying a 3 percent disturbance cap at the project scale and within HAF fine scale habitat selection area would include protection for both the larger population and individual leks and their surrounding habitat. Including no disturbance cap exceptions and wildfire and agriculture as part of the overall disturbance cap would also result in a lower level of disturbance overall, particularly since wildfire was the cause of the majority of habitat loss between 2012 and 2018 (Herren et al. 2021). Closing PHMA in all states to fluid mineral leasing, salable minerals, and non-energy minerals would protect GRSG habitat from surface-disturbing activities as well as subsurface activities (e.g., directional drilling), maintain connectivity between leks, and not contribute to fragmentation. These restrictions would decrease the acres available for development and the potential for impacts to GRSG associated with surface disturbing activities (including mineral development, renewable energy development, ROW development, and travel and recreation development) in PHMA to a greater extent than under Alternatives 1 and 2. Additionally, this alternative would require all states that have PHMA to restrict livestock grazing and place developments outside of the PHMA boundaries. This would increase the potential for GRSG habitat alterations from fencing and collision rates from fencing that would be needed to separate public from private lands. As described above, fencing is a potential cause of direct mortality to GRSG by acting as potential movement barriers, predator perches, or travel corridors (Manier et al. 2013). GRSG collision rates with fencing generally increases with low visibility fencing and decreases in areas of greater topographic relief (Manier et al. 2013). However, exclusion of grazing on BLM-administered lands may intensify grazing use on private lands, which could degrade GRSG habitat in those areas. Alternately, managing PHMA as unavailable for grazing could promote rural subdivisions and thus habitat loss in areas where livestock operators are not able to continue their operations solely on private lands.

Under Alternative 4, leasing would be permitted in HMAs, which would increase the HMA acres affected and potential for cumulative impacts to GRSG, including disturbance and habitat loss and alterations. Applying a 3% disturbance cap at the project scale and within HAF fine scale habitat selection area would limit potential for overall disturbance and habitat alterations, including fragmentation, and would provide protection for both the larger population and individual leks and their surrounding habitat. Including exceptions to the cap and excluding wildfire and agriculture from the calculation would result in an overall greater contribution to cumulative impacts to GRSG compared with Alternative 3. The potential for developments in PHMA and GHMA is underdetermined at the time of this analysis and would likely vary by state. Therefore, cumulative impacts on GRSG from mineral development, renewable energy development, ROW development, and travel development is unknown in this analysis, but the 3% would limit the overall disturbance level as described above. Both Alternatives 4 and 5 would include compensatory mitigation that would meet the requirements set by the state wildlife agency or appropriate authority. This would reduce impacts on GRSG but to a lesser degree than Alternative 3. Impacts associated with certain uses, such as livestock grazing or wild horses and burros, would not be subject to compensatory mitigation requirements but would be addressed through other processes. Further, adaptive management under Alternatives 4 and 5 may result in more favorable outcomes for GRSG because the approach would be coordinated at ecological rather than geopolitical boundaries.

Under Alternative 5, cumulative impacts from permitting leasing in HMAs and applying a 3 percent disturbance cap (including exceptions to the cap and excluding wildfire and agriculture from the calculation) at the project scale and within HAF fine scale habitat selection area in most states would be similar as to those described for Alternative 4 but would occur over a smaller area given the lower acreage of PHMA under Alternative 5. Cumulative impacts from applying a 5 percent disturbance cap at the project scale in WY and MT would be similar to those described for Alternative 1. Impacts from development in PHMA and GHMA as well as from compensatory mitigation would be the same as described for Alternative 4.

4.21.2 Vegetation

Land management by BLM, Forest Service, and other federal agencies with adjacent state, tribal, county, and privately owned lands within the planning area are considered to be the cumulative effects analysis area for vegetation. Ongoing and planned actions in and near GRSG habitat that are considered PHMA or GHMA (including IHMA in ID) would influence vegetation conditions and management effectiveness across the different state plans over a 20-year period. The cumulative effects assessment for this project would consider previous efforts in combination with the current planning efforts to establish best management decisions for current conditions within the project's boundaries.

Vegetation management, including fire and fuels management, is becoming more broadly consistent across federal landownerships, due to updated adherence with current federal law, regulation, and policy. The cumulative effects of historical activities have directly or indirectly contributed to increased shift of native plant community size, distribution, and risk of invasion or expansion of invasive species. BLM has completed a programmatic environmental impact statement (PEIS) that evaluates creating and maintaining a system of fuel breaks, fuels reduction and rangeland restoration in the Great Basin region. This landscape scale PEIS analyzes potential effects of reducing fuel loading and restoring rangeland productivity within the Great Basin Region (Idaho, Oregon, Nevada, northern California, Utah, and eastern Washington) to protect and conserve the sagebrush-steppe ecosystem from loss or fragmentation as a result of wildfires.

Reasonably foreseeable future actions in the planning area have the potential to impact vegetation. Generally, these are projects that would substantially alter vegetation conditions, including projects which disturb the land's surface, increase the potential for invasive weed spread, or increase the risk of human-caused wildfire. Anticipated projects that could impact vegetation include energy (with the exclusion of Solar in PHMA) and mineral exploration and development, lands and realty decisions, livestock grazing, wild horses and burros, timber removal, and travel and transportation decisions that create new routes or roads.

The cumulative impacts of past and present action on vegetation in the planning area have had differing effects, as described under *Nature and Types of Effects*, based on type of disturbances. Impacting factors include wild horses and burros, big game wildlife herds, mineral development, wind and solar implementations, and ROW development in addition to historical and ongoing livestock grazing and wildfire suppression in land management plans. These impacts vary in degree of disturbance based on state and local regulations throughout the multi-state HMA boundaries, which have contributed to the introduction of invasive annual grasses, wild horses, and ranching and the change in the wildfire regime that are departed from historical conditions in current conditions. These disturbances have resulted in a landscape with increased pinyon-juniper densities and invasive annual grasses and a greater potential for uncharacteristically large, severe wildfires compared with historical conditions. Ongoing climate trends, including more frequent extreme fire weather, combine with and exacerbate these conditions.

The importance of vegetation management including fuels treatments, wildland fire management, and managing wildlife habitat is widely recognized by state and Federal agencies and private landowners. Vegetation and habitat management projects for GRSG have occurred throughout the planning area and projects such as hazardous fuels reduction, pinyon-juniper removal, emergency stabilization and rehabilitation (ESR), and invasive species control have impacted vegetative cover and structure, which in turn influence wildfire risk. These projects have been and continue to be implemented not only by the BLM but also by other federal and state land management agencies and private landowners. Coordination of these activities during implementation across ownership/jurisdictions boundaries improves their effectiveness for providing habitat benefits. Vegetation management will continue throughout the planning area and new projects will be proposed, regardless of decisions made in this RMPA. Implementation of these projects will include completion of the appropriate level of NEPA.

Contribution of Alternatives

Under all alternatives, best management practices would be followed and would provide guidance on which treatments and chemicals can be used. Avoiding or limiting surface disturbance on steeper slopes or highly erodible soils would maintain native vegetation stability and resiliency to invasive species spread or invasion. There would be no impacts common to all alternatives from mineral resource management, renewable energy development, infrastructure development, livestock grazing management, or ACEC management.

Alternative 1 management actions is the 2015 plan amendments. This includes restrictions on development, such as land use and surface-disturbing activities, that would occur within HMAs and would limit impacts to vegetation. All states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. In summary, there would not be any significant changes to management that would cause an impact on vegetation beyond current conditions and management practices.

By contrast, under Alternative 2, there would be more areas open to oil and gas development and exploration. The consequence of fewer restrictions would likely result in greater impacts to vegetation habitats. Alternative 2 would remove the GHMAs in Utah for wild horse and burro management that would increase the potential for vegetation loss.

Alternative 3 would include the fewest acres open and the most stringent restrictions for fluid mineral leasing. More restrictions on PHMA would result in fewer open acres that can be used for development. These restrictions would decrease the potential for impacts to vegetation associated with surface disturbing activities (including mineral development, renewable energy development, ROW development, and travel development) in PHMA to a greater extent than under Alternatives 1 and 2. Additionally, this alternative would require all states that have PHMA unavailable to livestock grazing and place developments outside of the HMA boundaries that would result in less disturbances occurring within the planning area. Mitigation approaches for direct and indirect impacts would utilize avoid, minimize, and compensate, with emphasis on avoidance, precluding new developments when possible. In summary, Alternative 3 would have the most protections for vegetation and habitat within GRSG management areas.

Alternatives 4 would be similar to Alternatives 1 but would emphasis more avoidance. Mineral development would be allowed in HMA boundaries, which would increase potential impacts to vegetation in these areas as described in the *Nature and Types of Effects*. The potential for developments in PHMA and GHMA is still under review and will likely vary by state. Therefore, impacts on vegetation communities from mineral development, renewable energy development, ROW development, and travel development will vary by magnitude using the best available science. Like Alternative 3, Alternatives 4 would add to the discussion for compensatory mitigation that would meet the requirements set by the state wildlife agency or appropriate authority. This would reduce impacts on vegetation but to a lesser degree than Alternative 3.

Alternative 5 would be similar to Alternative 4 but would allow more development to occur. This alternative would emphasis more compensatory mitigation when development is allowed in HMA boundaries and would potentially impact vegetation communities.

4.21.3 Wildland Fire Ecology and Management

The cumulative impact area for wildland fire ecology and management includes lands managed by the BLM, Forest Service, and other federal agencies with adjacent state, tribal, county, and privately owned lands in the planning area. The time frame for cumulative environmental consequences for future actions is 20 years.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect fuels and wildfires include vegetation treatments, livestock grazing, increases in population and recreation, and development in the wildland-urban interface. Alternatives 1, 2, 4, 5, and 6 would have similar contributions to cumulative effects on wildland fires since they would carry forward the vegetation and wildland fire ecology and management decisions from the 2015 GRSG plans. By making all PHMA unavailable for grazing, Alternative 3 would have the greatest contribution to cumulative effects through a potential increase in fine fuels that could influence a large-scale wildfire.

4.21.4 Fish and Wildlife and Special Status Species

The cumulative impact analysis area includes all BLM-administered lands within the range of GRSG as well as other federally managed lands, and adjacent state, tribal, county, and privately owned lands. The larger analysis area is necessary because some wildlife and special status species, including migratory birds, and big game move across this larger landscape and animals and plants depend on ecosystems that extend over larger areas. Ongoing and planned actions in and near the cumulative impact analysis area would influence conditions and habitat requirements for fish, wildlife, and special status species, and management effectiveness across the planning area. The time frame for cumulative environmental consequences for future actions is 20 years.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect fish, wildlife, and special status species, include mining and mineral exploration and development such as fluid minerals (oil, gas and geothermal), locatable minerals, leasable minerals, and mineral materials. Other development like residential and industrial development, associated roads and ROWs (including pipelines, electrical transmission lines, infrastructure ROWs, and large renewable energy projects, such as solar and wind development projects), vegetation treatments, fire and fuels management, livestock grazing, wild horse and burro management (which includes gathers, fertility treatments, and removal of excess wild horses and burros from designated herd management areas), recreation, travel management, and GRSG goals, objectives, and planning efforts that are also likely to continue to affect fish, wildlife, and special status species.

Many of the actions described above have and will likely continue to alter habitat conditions, which then cause or favor other habitat changes. For example, wildland fire removes wildlife and special status species habitat features, and affected areas are more susceptible to weed invasion, soil erosion, and sedimentation of waterways, all of which further degrade habitats. In general, resource use activities, such as energy, mineral, and other developments have cumulatively impacted fish, wildlife, and special status species by causing habitat removal, fragmentation, weed spread, and disturbance from noise and increased human presence. Dispersed, organized, and concentrated recreation also promotes the spread of invasives and pollutants into the environment, habitat degradation from OHV use, and associated noise from an increase in visitors to BLM-administered lands. Land planning efforts and vegetation, habitat, and fuels treatments have offset some of these impacts by improving habitat connectivity, resistance, and resilience. Planning efforts for GRSG would also constrain certain uses such as mineral development, ROW authorizations, and grazing, and contribute to restoration of shrubland habitats. Additionally, planning efforts to protect aquatic species exist that constrain certain uses within 100 meters of riparian areas, fens, wetlands, and water impoundments. As such, these planning efforts would reduce cumulative impacts on wildlife species associated with these habitat types.

Federal Plans typically exclude new utility-scale solar and wind developments from PHMAs, with limited exceptions based on the rationale that biological impacts on GRSG will be avoided. This includes ROWs for wind testing, development structures, and solar energy projects on public lands. The Renewable Energy RFD includes the planning area's past, present, and reasonably foreseeable renewable energy activities associated with the proper level of NEPA.

Climate change could cause an increase or decrease in temperatures and precipitation, as described further in **Section 3.2.12**, which would affect soil conditions, vegetative health, and water flows and temperature. Such changes would alter habitat conditions, potentially creating conditions that could favor certain species or communities, weeds, or pests. Future climate conditions will likely impact GRSG planning efforts to restore habitat by reducing sagebrush ecosystem resistance and resiliency in some areas of PHMA.

Under all the alternatives, there is at least one goal or objective in place that includes language to improve GRSG habitat and populations, this would reduce the incremental contribution to cumulative impacts on fish, wildlife, and special status species by helping to offset effects from activities which degrade habitat.

Contribution of Alternatives

Management under Alternative 1 includes restrictions on development, such as NSO and CSU stipulations on fluid minerals, mining, and other surface disturbing activities would be focused outside of PHMA, exclusion areas for some renewable energy development, and mitigation to reduce the total net impact on fish, wildlife, and special status species (3 or 5 percent disturbance cap, depending on the state). In summary, there would not be any significant changes to management that would cause an impact on fish and wildlife beyond current conditions and management practices. Therefore, this alternative would have some incremental contribution to cumulative impacts on wildlife species. This is because impacts, such as habitat alterations and disturbance, would not necessarily be dispersed, and concentrated areas of development could reduce habitat connectivity and functionality.

Conversely, under Alternative 2, there would be more areas open to mineral development and explorations, thus posing greater impacts on fish, wildlife, and special status species. This is because Alternative 2 allows for more flexibility in the management of activities that can impact wildlife and their habitat.

Alternative 3 would include the fewest acres open and the most stringent restrictions for fluid mineral leasing. Alternative 3 would also provide the most protection for wildlife and special status species habitats within GRSG management areas because of increased restrictions, and in some cases the prohibition of surface disturbing activities (including mineral development, renewable energy development, ROW development, and travel development). In summary, Alternative 3 would provide the most protection and reduce the contribution of surface disturbances, but the lack of active vegetation management would have long-term detrimental to cumulative impacts to wildlife and special status species to the greatest extent of all the alternatives. These protections would result in increased wildlife habitat connectivity and functionality.

Under Alternatives 4 and 5, mineral development would be allowed in HMA boundaries, which would increase potential impacts to fish, wildlife, and special status species in these areas as described in the *Nature and Types of Effects*. Like Alternative 3, both Alternatives 4, and 5 would require compensatory mitigation that would meet the requirements set by BLM but may also be affected by state wildlife agencies or appropriate authority mitigation programs. This would offset impacts on fish, wildlife, and special status species but to a lesser degree than Alternative 3.

Vegetation treatments would improve habitat conditions for some wildlife and special status species such as small mammals, big game, birds, and invertebrates, such as insects and pollinators. These projects include hazardous fuels reduction, pinyon-juniper removal, emergency stabilization and rehabilitation, and invasive species control. Removing encroaching conifers would help maintain the extent of sagebrush habitat by reducing the potential for conversion to pinyon-juniper woodlands. These activities would improve the habitats' resistance to potential future disturbances, assisting in long-term habitat maintenance. Vegetation treatments would cause short-term impacts, such as noise disturbance, displacement of individuals, surface disturbance, erosion, and sedimentation. Mitigation measures such as the timing of treatments would be implemented to minimize the impacts on migratory birds. For other wildlife and special status species, short-term displacement could occur during vegetation treatments; however, these effects would be temporary and minor. Long-term impacts would potentially be enhanced habitat conditions and a reduced risk of catastrophic wildfire. Restoration activities would improve habitat conditions for sagebrush-dependent wildlife by increasing the availability of features used for nesting and shelter. Pinyon and juniper removal could reduce nesting and roosting opportunities for raptors, migratory birds, and other arboreal species, however, the removal could have beneficial components for small mammal and bird species that occupy sagebrush habitats Removing predator perches and nesting sites would benefit species that are vulnerable to avian predation (for example, raptors). Opening the understory would allow sagebrush and perennial grasses to grow.

4.21.5 Wild Horses and Burros

The cumulative impacts analysis area for wild horses and burros and herd management areas includes lands administered by BLM, Forest Service, and other federal agencies, as well as adjacent state, tribal, county, and privately owned lands surrounding the planning area. This includes all herd management areas that overlap with the planning area. The temporal limit of this analysis would be the life of this plan, or approximately 20 years.

Impacts to wild horses and burros managed for AML inside herd management areas are typically caused by the same activities which impact vegetation and water resources. Current and reasonably foreseeable future actions in and near GRSG habitat that are considered PHMA (and IHMA in ID) or GHMA would influence the availability of resources for wild horses and burros across the different states analyzed in this EIS. Past, present, and reasonably foreseeable future actions which limit the creation or maintenance of range improvements or remove or modify forage would combine cumulatively with the actions outlined in this plan to impact wild horses and burros over the short and long term. Generally, cumulative impacts on wild horses and burros from current and reasonably foreseeable future actions are similar to those described under **Section 4.6.1**, Wild Horses and Burros.

Past, present, and reasonably foreseeable future actions within the cumulative impact analysis area that have affected and will continue to affect wild horses and burros include mining and mineral exploration and development of fluid minerals, locatable minerals, leasable minerals, and mineral materials. Additionally, ground disturbing development like residential and industrial construction (including renewable energy development), associated roads and ROWs, vegetation treatments, fire and fuels management, recreation, travel management, and GRSG goals, objectives, and planning efforts are also likely to continue to affect wild horses and burros.

Contribution of Alternatives

Management under Alternative 1 would rely heavily on the management actions from the 2015 Plan amendments. Restrictions on development, including fluid minerals development, mining, and other surface disturbing activities would be focused outside of PHMA and other exclusion areas. Under Alternative 1, there would not be any significant changes that would lead to additional impacts on wild horses and burros and herd management areas beyond current conditions and management practices. This alternative would have some incremental contribution to cumulative impacts on wild horses and burros where herd management area do not overlap with PHMA.

Under Alternative 2, there would be more areas open to mineral development and other ground disturbing activities, leading to a greater contribution to the cumulative impacts described above when compared with Alternative 1.

Alternative 3 would make the fewest acres available for fluid mineral leasing and other ground disturbing activities, therefore protecting vegetation where those restrictions are implemented. However, Alternative 3 would also make the greatest number of acres of livestock grazing unavailable, in some cases, this may contribute to the cumulative impacts on wild horses and burros when combined with other actions, as limitations on livestock grazing could limit the availability of watering sources used by wild horse and burros.

Under Alternatives 4 and 5, mineral development would be allowed in HMA boundaries, which would increase potential impacts to forage and other resources used by wild horses and burros as described in **Section 4.7.1**, Wild Horses and Burros. The potential for development in PHMA and GHMA are still under review, and will likely vary by state. Therefore, impacts on forage and habitat conditions inside of herd management areas from mineral development, renewable energy development, ROW development, and travel development will vary by magnitude using the best available science.

4.21.6 Livestock Grazing

The cumulative impacts analysis area for livestock grazing includes the BLM, Forest Service, and other federal agencies as well as adjacent state, tribal, county, and privately owned lands surrounding the planning area. Impacts to permittee's base property and changes to surface owned by other agencies but administered by BLM could impact livestock grazing across a larger landscape than the planning area. Ongoing and future activities in and near the cumulative impacts analysis area could influence livestock grazing and forage conditions within the planning area.

Current and reasonably foreseeable future actions in and near GRSG habitat that are considered PHMA (and IHMA in ID) or GHMA would influence grazing operations and livestock grazing permitting across the different states analyzed in this EIS. The temporal limit of this analysis would be the life of this plan, and the life of grazing decisions made as a result of the actions made through the record of decision.

Past, present, and reasonably foreseeable future actions which modify or prohibit livestock use, limit the creation or maintenance of range improvements, or remove or modify forage would combine cumulatively with the actions outlined in this plan to impact livestock over the short and long term. Generally, cumulative impacts on livestock grazing from current and reasonably foreseeable future actions are similar to those described under **Section 4.7.1**, Livestock Grazing.

Past, present, and reasonably foreseeable future actions within the cumulative impact analysis area that have affected and will continue to affect livestock grazing operations and livestock forage include mining and mineral exploration and development of fluid minerals, locatable minerals, leasable minerals, and mineral materials. Additionally, ground disturbing development like residential and industrial construction (including renewable energy development), associated roads and ROWS, vegetation treatments, fire and fuels management, wild horse and burro management, recreation, travel management, and GRSG goals, objectives, and planning efforts are also likely to continue to affect livestock grazing.

Vegetation management, including fire and fuels management, is becoming more broadly consistent across federal landownerships. The cumulative effects of historical activities have directly or indirectly contributed impacts on livestock forage, such as increased shift of native plant community size, distribution, and risk of invasion or expansion of invasive species. As a response to these shifts in vegetation communities, BLM has completed a PEIS that evaluates creating and maintaining a system of fuel breaks, as well as conducting fuels reduction and rangeland restoration activities in the Great Basin region. This landscape scale PEIS analyzes potential effects of reducing fuel loading and restoring rangeland productivity within Idaho, Oregon, Nevada, northern California, and Utah In order to protect and conserve the sagebrush-steppe ecosystem from loss or fragmentation as a result of wildfires. Similar vegetation management projects may be implemented by other federal and state land management agencies, as well as private landowners, including hazardous fuels reduction, pinyon-juniper removal, emergency stabilization and rehabilitation (ESR), and invasive species control, all of which could impact the availability of forage for livestock.

Contribution of Alternatives

Alternative 1 management actions would be based on the 2015 plan amendments. This includes restrictions on development, such as land use and surface-disturbing activities, that would occur within HMAs and would limit impacts to livestock grazing and forage. All states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. In summary, there would not be any significant changes to management that would cause an impact on livestock grazing operations beyond current conditions and management practices.

Under Alternative 2, there would be more areas open to oil and gas development and exploration and thus more potential for surface disturbance and removal of forage for livestock. Alternative 2 would remove GHMAs in Utah for wild horse and burro management, which would increase the potential for reductions in forage quality and quantity. Additionally, development could lead to exclusion of livestock from the development footprint, reducing the available area for livestock grazing.

Alternative 3 would make all PHMA unavailable to livestock grazing. The BLM would have to construct and maintain a large amount of fencing, particularly in areas with mixed surface ownership, to effectively make grazing unavailable. Exclusion of grazing on BLM-administered lands may intensity grazing use on private lands or cause operators to reduce the scale of their operations on private lands. This alternative would have the greatest cumulative adverse effects on livestock grazing than any of the other action alternatives.

Under Alternatives 4 and 5, mineral development would be allowed in HMA boundaries, which would increase potential impacts to forage in these areas as described in **Section 4.8.1**, Livestock Grazing. The potential for developments in PHMA and GHMA are still under review and will likely vary by state. Therefore, impacts on forage conditions and livestock grazing operations from mineral development, renewable energy development, ROW development, and travel development will vary by magnitude using the best available science.

4.21.7 Lands and Realty (Including Wind and Solar)

Cumulative impacts on lands and realty would be the result of past, present, and reasonably foreseeable future actions that restrict ROW authorizations within the planning area. The spatial scale of the project for lands and realty is the planning area and the temporal scale is 20 years. Many of the states in the planning area are heavily dependent on extractive industries that require ROWs to operate and provide end users with products. These industries include oil and gas development, renewable energy generation, power transmission, and fiber optics. Any criteria that cause a change in ROW management action may have a direct effect on proposed projects in the planning area.

As populations continue to grow and shift geographically, there will be an increased demand for ROW authorizations that would occur under all of the alternatives. Each of the Alternatives contains restrictions, stipulations, and limitations; when coupled with present and reasonably foreseeable future actions longer planning and approval processes could result. This could lead to delays for future projects including transmission lines, mining operations, and telecommunication sites that occupy HMAs across the planning area.

Under Alternatives 1 and 2, project planning would be the most complex as a variety of land management actions, stipulations, and restrictions for ROWs are present. This could lead to increased project costs, longer timelines, or abandonment of proposed projects. Abandonment and delays of existing and planned projects could lead to increased costs and lower levels of service for consumers due to supply constraints and increased project costs. Alternative 3 would make all PHMA ROW exclusion, which may prevent development of adjacent private lands where a ROW would need to cross public lands. Alternatives 4 and 5 apply to entire planning area which could provide for a consistent project planning approach that is not dependent on individual state plan restrictions found in Alternatives 1, 2, and 3. This could streamline the planning process for projects, including those that span large areas and differing land ownership types by reducing state-by-state restrictions on ROWs. This may allow for a less time-consuming planning, permitting, and approval process. This alternative would have the greatest cumulative adverse effects on lands and realty authorizations than any of the other action alternatives.

A planning process to update the Solar Energy Development Programmatic EIS (BLM 2012) is currently underway to identify areas of BLM-administered lands available for, or excluded from, solar energy development. That planning process would defer to the allocation decision for solar energy decisions regarding GRSG to those in this GRSG RMPA/EIS. The ongoing Solar PEIS revision may change the availability of lands for solar energy development outside of GRSG habitat. However, given the ample lands available for solar energy development in each state, none of the management actions in the GRSG EIS alternatives would constrain the availability of lands estimated to be needed to meet the demand for solar energy development on public lands through 2045 (see **Appendix 12** for further discussion).

Additionally, each state in the planning area has developed conservation plans for state and private lands not under the jurisdiction of Federal plans. Of these plans, only the Wyoming, Montana, and Oregon plans are regulatory in nature, with the state of Nevada also requiring mitigation.

4.21.8 Mineral Resources

The cumulative impact analysis area used to analyze cumulative impacts on mineral resources is the planning area, regardless of mineral ownership. The cumulative impact analysis area includes all lands and mineral estate within the range of GRSG including other federally managed lands, and adjacent state, Tribal, county, and privately owned lands. The time frame for cumulative environmental consequences for future actions is 20 years. Ongoing, planned and expected future actions in and near the cumulative impact analysis area would influence conditions surrounding mineral development and the development of supporting infrastructure in the cumulative impacts analysis area. The closures, restrictions, and stipulations considered in the alternatives and discussed in the context of the decision area for analyzing direct and indirect impacts, are analyzed here in the context of the entire planning area to assess their contribution to cumulative impacts on mineral resources.

Mining and mineral leasing, exploration, and development are occurring and will continue to occur throughout the planning area. These include activities associated with fluid minerals (oil, gas and geothermal), locatable minerals, leasable minerals, and mineral materials. Impacts associated with mining and mineral exploration and development in GRSG habitat relate to surface and subsurface disturbance from exploration and development actions and infrastructure constructed to support these activities. The surface and subsurface disturbance from these activities contribute to habitat removal, alteration, and fragmentation, changes in GRSG use patterns, and the potential for invasive plant introduction.

Past, present, and reasonably foreseeable development trends for fluid minerals and locatable minerals in the planning area are included in the RFD updates for those resources, **Table 14-1** lists many projects, plans and actions that could or are likely to impact mineral exploration, leasing, and development. Past, present, and reasonably foreseeable future actions and conditions in the cumulative impact analysis area that have affected and will likely continue to affect fluid mineral leasing and development include, past, present, and continued mineral exploration, development, leasing, and management decisions on BLM-administered lands as well as on other federal and Tribal lands.

State laws, regulations, and permitting for mineral development activities intended to prevent or reduce environmental or public health impacts would likely confer incidental protection to GRSG and could reduce levels of mineral development. Similarly, policy and land use plan decisions by BLM, other federal agencies, and state agencies, that would apply closures, restrictions, or stipulations on mineral leasing and development intended to protect other resources, could result in reductions in the availability of minerals for development.

Fluid Minerals (Including Geothermal)

The level of development of oil and gas resources is in large part dependent on global resource prices which can be impacted by a variety of factors such as the cost of development, changes in demand, geopolitical instability, new technology, and the availability of alternative energy sources including geothermal development. The cumulative impact analysis area for fluid minerals includes all lands within the range of GRSG including other federally managed lands, and adjacent state, tribal, county, and privately owned lands, however due to the global nature of the oil and gas markets certain actions, projects or trends that are further removed can also contribute to cumulative impacts on oil and gas. Areas with a high potential rating, and areas with existing and historical developments are more likely to be the focus of future development interest. Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect fluid minerals are existing and planned fluid mineral development projects outside the decision area, changes to BLM policy or requirements; changes to land use plan allocations; GRSG plans developed by individual states, especially state plans that have regulatory authority (Wyoming, Montana, Nevada, and Oregon); other multi-state plans and actions conducted by the BLM or other federal agencies, such as the west-wide energy corridors plan, and the designations of special management areas such as wilderness areas or national monuments. Reductions in fluid mineral development in the planning area may occur because of restrictions applied by any of these plans or actions, or by plans and actions not known at this time. These reductions would not vary by alternative and would have cumulative impacts on fluid minerals similar to those of the management actions being considered in this RMPA/EIS.

Under all alternatives, the current trends for oil and gas development activities in the planning area are expected to continue, however the locations and intensity of development would likely experience changes in some areas due to the impacts of the alternatives. The management actions proposed under this RMPA/EIS would cumulatively impact fluid mineral development through surface use restrictions (e.g., closures, and NSO, CSU, and TL stipulations) that ultimately would decrease the amount of oil and gas development in the planning area during the planning period. Closures and surface use restrictions, such as NSO stipulations, could also cause an operator to move to nearby private or state land if similar resources are available and recoverable with no such restrictions. However, many state plans or state fluid mineral regulations require actions to avoid, minimize, or mitigate impacts from land uses on GRSG, which would likely result in some restrictions on fluid mineral development within GRSG habitat. Surface use restrictions could also prevent or restrict the development of some infrastructure necessary for fluid mineral development. The application of disturbance caps or limitations proposed under this RMPA/EIS could cumulatively impact fluid mineral development through limitations on additional development in some areas.

Alternative 1 reflects the HMA boundaries from the 2015 amendments. Most states are NSO (in PHMA and IHMA) and/or have seasonal restrictions. PHMA is also subject to density and disturbance limits. Colorado closes PHMA within 1 mile of leks to fluid mineral leasing.

In Alternative 2, PHMA management would be the same as Alternative 1, except Colorado changed the area within 1 mile of an active lek from closed to NSO for both PHMA and GHMA. In GHMA, management would be the same as Alternative 1, except Colorado changed the closure areas to NSO.

Under Alternative 3, management would focus on maximum protection of GRSG. Alternative 3 would conserve and manage GRSG habitats to support persistent, healthy populations, consistent with BLM's sensitive species policy and in coordination with state wildlife agencies. In areas with large, contiguous areas of BLM-administered lands, conservation and management should maintain existing connectivity between GRSG populations. This effect would be limited in areas with BLM-adminsitered lands interspersed with lands managed by other agencies or individuals. With all of PHMA closed to new fluid mineral leasing, this alternative would be the most restrictive and limit development of fluid mineral resources more than other alternatives.

Cumulative impacts would be greater under Alternative 4 compared with Alternatives 1 and 2 but less than Alternative 3 due to the acreage that would be managed as PHMA. For those HMAs open to leasing under Alternative 4, BLM would evaluate parcels identified in EOIs and determine which to analyze for potential inclusion in a lease sale. This evaluation process will follow BLM's policies for lease sales. The amount of fluid mineral acreage available for leasing under this alternative is similar to Alternative 1. However, areas that would be leased under Alternative 4 would depend on received EOIs and evaluated based on fluid mineral and GRSG habitat criteria. Areas in proximity to existing production and areas where mitigation efforts could minimize impacts will have higher priority review and therefore will be more likely to be leased.

Alternative 5 would have similar cumulative impacts as Alternative 4, though impacts would be less due to less acreage being managed as PHMA under Alternative 5. Under Alternative 6, ACECs would be added to the proposed managment. ACECs would be managed as open to leasing subject to NSO stipulations with an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if it can be demonstrated that no direct or indirect impacts on GRSG will occur. Compared to Alternative 5, Alternative 6 would apply NSO on additional acres, resulting in a decrease in fluid mineral leasing and development.

Nonenergy Leasable Minerals

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect nonenergy leasables are existing and planned nonenergy leasable development projects outside the decision area. Cumulative impacts on nonenergy leasable mineral development focuses on the impacts of conservation measures to protect GRSG. Management actions in the form of surface use restrictions such as closing areas to new nonenergy leasable mineral, prohibitions on surface mining, or creating ROW exclusion or avoidance areas, would impact nonenergy solid leasable mineral extraction by limiting the available means for accessing mineral resources and transporting nonenergy solid leasable minerals to processing facilities and markets. Additional management actions that would cause impacts on nonenergy leasable minerals are defined by results from Application of RDFs, including such standards as noise restrictions, height limitations on structures, design requirements, water development standards, remote monitoring requirements, reclamation standards, and additional requirements on exploration and development. Closures and surface use restrictions could also cause an operator to move to nearby private or state land if similar resources are available with fewer such restrictions, however many states apply management actions to protect GRSG.

Under Alternative 1 most of the PHMA and IHMA in the planning area is closed to new leasing of nonenergy leasable minerals but states can consider expansion of existing leases. Idaho keeps known phosphate leasing areas open to leasing, and Wyoming keeps the Known Sodium Leasing Area open to exploration and consideration for leasing and development but closes it to prospecting permits. In some Wyoming field offices sodium leasing will be considered on a case-by-case basis and would be subject to conditional requirements. Wyoming and Montana have restrictions based on density and disturbance limits. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to nonenergy solid leasable mineral development, as could application of RDFs.

Under Alternative 2, PHMA all states would apply the same management and expect the same resulting impacts on non-energy leasable minerals as described under Alternative 1. The only change is that Nevada would add exception criteria to the closure in PHMA, described under the Nevada Environmental Consequences section. Individual states would have different mitigation measures that could influence the cumulative impacts under Alternative 2 but impacts on nonenergy leasable minerals would be similar to Alternative 1.

Under Alternative 3, more acres would be affected by closures, all PHMA would be closed to leasing, and fringe leases to expand existing mines would not be permitted in areas managed as closed. This would increase the level of cumulative impacts on nonenergy leasable minerals by reducing the amount of the planning area available for leasing and development of these resources, thus preventing development of known reserves and undiscovered deposits in PHMA which would reduce the availability of important minerals such as phosphate and sodium for use.

Under Alternative 4 nonenergy leasable minerals would be managed the same as under Alternative 1, all states are closed to leasing non-energy Leasable Minerals but can consider expansion of existing leases. Wyoming has seasonal restrictions, and Wyoming and Montana are subject to density and disturbance limits. IHMA (Idaho) is open in known phosphate lease areas, and Wyoming keeps the Known Sodium Leasing Area open to exploration and consideration for leasing and development but closes it to prospecting permits. In some Wyoming field offices sodium leasing will be considered on a case-by-case basis and would be subject to conditional requirements. The impacts would be the same as described under Alternative 1, above.

Alternative 5 would have the management and same impacts as Alternative 4. Alternative 6 would have the same as Alternative 5 except the ACECs would be closed to new leasing and to fringe leasing expansion associated with existing operations. Impacts would be the same as described under Alternative 1 except that any existing operations within ACECs could not expand on federal mineral estate and no new operations would be possible in ACECs, which could reduce the availability of some nonenergy leasable minerals.

Coal

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect coal are existing and planned coal development projects outside the decision area and federal coal policy decisions.

Closing an area to new coal leasing would directly impact coal production. This would be the result of removing the possibility of coal resources in that area from being accessed and extracted. Under Alternative 1, Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming manage PHMA as “essential habitat” for unsuitability evaluation. This would contribute to cumulative impacts on coal resouces by preventing the development of federal coal resources in PHMA outside of existing leases.

Under Alterntive 2 all states would apply the same management as under Alternative 1, except Utah which would be identify essential habitat as part of future unsuitability efforts in coordination with the State. Management and impacts on coal resources would be approximatly the same as described under Alternative 1. Idaho, Nevada California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development and no change in cumlative impcts is expected in these states.

Under Alternitve 3, all areas managed for GRSG would be PHMA. All essential habitat would be identified as part of future unsuitability criteria. Compared to Alternative 1 where all PHMA would be considered as “essential habitat” for unsuitability evaluation, this change in management might give flexibility to consider leasing in small areas that were included in PHMA but do not meet the criteria for essential habitat, such as important connectivity areas. Impacts of this management change would likely be minimal because the amount of PHMA that does not meet essential habitat criteria is small. Impacts of this alternative would otherwise be the same as described under Alternative 1.

Under Alternative 4 the consideration of PHMA as essential habitat for unsuitability evaluation in CO, MT/DK, UT, and WY would be removed as some areas of PHMA may not meet essential habitat criteria. However almost all essential habitat is likely to overlap with PHMA so the impacts would be approximately the same as described under Alternative 1.

The proposed management and impacts under Alternatives 5 and 6 would be the same as under Alternative 4.

Locatable Minerals

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect locatable minerals are existing and planned locatable mineral operations and withdrawal decisions, both of which occur outside of the RMP process. That is, the Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. In areas withdrawn from location and entry under the Mining Law, production of mineral resources is generally lower compared with similarly mineralized areas that are not withdrawn; thus a withdrawal potentially decreases production of locatable mineral resources on federal mineral estate. Locatable mineral resources are associated with the geological formations or units they are found within, which are typically localized and do not encompass large areas. As a result, withdrawals may impact the availability of certain mineral resources over a large area or they may, in fact, not impact any minerals of interest. Consequently, an assessment of locatable mineral occurrence potential is important to provide context associated with the impacts of any particular withdrawal.

BLM authorization of locatable mineral resources within areas withdrawn from location and entry under the Mining Law is also subject to additional processing and cost considerations as compared to mining operations on lands that are not withdrawn. Specifically, BLM will not approve a plan of operations or allow notice-level operations to proceed on withdrawn lands until a mineral validity examination report has been completed that confirms that every mining claim on which operations are proposed was existing and valid at the date of withdrawal and remains valid. If BLM determines that some or all of the mining claims on which operations are proposed are invalid, it would disapprove the proposed operations and the mineral resources would not be developed. Mineral validity examination reports can take several years to complete and can cost hundreds of thousands of dollars. Withdrawals and other actions that increase the costs of locatable mineral development would cumulatively impact locatable mineral development as these actions ultimately could decrease the amount of locatable mineral resources produced in the planning area during the planning period.

Alternative 1 recommended the withdrawal of all SFAs, from location and entry under the United States mining laws. This recommendation already occurred in the 2015 Plans and had no impact.

No recommendations for the withdrawal of SFAs from location and entry under the United States mining laws are made under this alternative, except in Montana which did not remove the recommendation for withdrawal of SFAs language as described in Alternative 1.

Under Alternative 3, the PHMA would be recommended for withdrawal from location and entry under the United States mining laws. Recommending areas for withdrawal from location and entry under the U.S. mining laws does not restrict any activities and therefore, such recommendation does not have any impacts. A withdrawal is initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA. Only the Secretary may withdraw lands through a Public Land Order. If the Secretary were to withdraw the lands as recommended in Alternative 3, there would be limited opportunities for locatable mineral development in the decision area.

Alternative 4 would recommend any areas for withdrawal from locatable mineral entry. This alternative would not contribute to cumulative impacts on locatable minerals because recommendations for withdrawal have no impact.

Under Alternative 5, the proposed management of locatable mineral resources would be the same as described under Alternative 4 above. Neither Alternative 5 nor Alternative 6 would recommend any areas for withdrawal from location and entry under the Mining Law. Alternative 6 would designate parts of the planning area as ACECs. Pursuant to 43 CFR Part 3809.11(c)(3), in ACECs operators must file a plan of operations for all operations causing surface disturbance greater than casual use. Processing plans of operations is more time-consuming than processing an exploration notice. Additionally, designation of an ACEC would increase costs to those operators who would otherwise conduct exploration under a notice, and potentially reduce development of locatable mineral resources on BLM-administered mineral estate in the planning area that would have resulted from exploration that could have been done under a notice. The requirement for a plan of operations for all locatable mineral activities causing surface disturbance greater than casual use would likely result in less impact on locatable minerals than a withdrawal.

Mineral Materials

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect mineral materials are existing and planned mineral material development projects outside the decision area. The predominant mining method for mineral materials is surface mining; therefore, restrictions on surface-disturbing activities would effectively close or limit mineral material mining in the subject areas to unless an exception is provided. Demand for mineral materials is generated primarily from road maintenance needs, commercial projects, and public use. Closing areas to mineral material disposal would directly impact mineral materials by removing the possibility of mineral resources in that area from being accessed and extracted for use under new contracts. Where areas are closed to mineral material disposal, new mines could relocate to nearby areas open to disposal if feasible. If demand for mineral materials could not be met by pits operated on federal lands, pits could be moved onto private or state lands where resources exist, this would generally increase costs associated with road construction and maintenance conducted by state, county and local governments which are able to develop federal mineral materials free of charge under free use permits. Closing an area to mineral material sales but not to new free use permits would remove this impact on road maintenance and other uses by state, county, and local governments, but would still result in impacts on commercial and private users.

Under Alternative 1, mineral material development would be restricted in PHMA and IHMA (variable by state). Mineral material disposal from the 47 existing community pits in GRSG habitat would be subject to timing restrictions. These timing restrictions could impact some operations by preventing use of the pit at certain times of the year which would result in additional costs due to transporting materials from further away or stockpiling material in advance, and therefore reduce overall development of federal mineral materials in the planning area.

Under Alternative 2 proposed management and impacts would be similar to those described under Alternative 1, except in Idaho which would manage PHMA and IHMA as closed to new mineral material sales, but open for new free use permits and expansion of existing pits, and Nevada which would allow certain exceptions to the closures. Compared to Alternative 1 these changes would allow more material use which would reduce the contribution to cumulative impacts on mineral materials.

Under Alternative 3, all areas managed for GRSG would be PHMA and mineral minerals would be closed to disposal in all PHMA. This would result in the termination and closure of all existing BLM mineral material sales, free use permits and community pits; and prevent the development and use of mineral material resources across the entire decision area. Compared to Alternative 1 this would result in a greater contribution to cumulative impacts on mineral materials in the cumulative impacts area.

Under Alternative 4, proposed management and impacts on mineral material development would be the same as described under Alternative 1, except in Idaho which would implement the same management as other states and manage PHMA and IHMA as closed to new mineral material sales, but open for new free use permits and expansion of existing pits. Compared to Alternative 1 these changes would allow more material use which would reduce the contribution to cumulative impacts on mineral materials.

Under Alternative 5, proposed management and cumulative impacts on mineral material development would be the same as described under Alternative 4. Under Alternative 6, proposed management and impacts on mineral material development would be the same as described under Alternative 4, except that ACECs would also be considered under this alternative. Under Alternative 6, ACECs would be closed to new all new mineral material sales and operations, except for free-use permits issued in order to support maintenance needs for existing local roads to ensure public safety.

Oil Shale and Tar Sands

Analysis of the cumulative impacts on oil shale and tar sands focuses on the impacts of conservation measures to protect GRSG. These impacts could result from closure of an area to oil shale and tar sand development. In Utah, the ROD for the Oil Shale and Tar Sands Programmatic EIS (BLM 2013) closed all of the federal mineral estate in mapped occupied GRSG habitat in Utah to oil shale and tar sands leasing except for the portion of the White River Oil Shale Research, Development, and Demonstration Preference Right Leasing Area overlapping habitat and the tar sands lease in the Asphalt Ridge Special Tar Sands Area. Management placing limitations on surface disturbing activities including the application of a disturbance cap would limit surface activities in these areas which could result in a reduction of production from oil shale and tar sands in these areas, contributing to cumulative impacts on these resources.

Under all alternatives, oil shale and tar sands development could continue to occur on federal mineral estate in Utah outside of HMAs in areas designated as open by the Oil Shale and Tar Sands Programmatic EIS. Oil shale and tar sands development could also continue to occur on state, private, and tribal mineral estate.

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources as fluid leasable minerals so management and impacts would be same as described under the Fluid Minerals section above.

4.21.9 ACECs

This section presents an assessment of the cumulative effects on the relevant and important values with respect to ACECs. This analysis considers the past, present, and reasonably foreseeable future actions that may impact these designated ACECs and their relevant and important values. The cumulative effects analysis covers a 20-year timeframe, corresponding to the duration of the GRSG RMPA. The spatial scope encompasses the rangewide planning area including the ACEC relevant and important values and their immediate surroundings, as these areas hold significant historical, cultural, and scenic values, and support important fish and wildlife and other natural resources.

Surface-disturbing activities, improper grazing, wild horses and burros, wildlife use, wildfires, and fuels management activities are examples of past, present, and reasonably foreseeable future actions and conditions that have affected and will likely continue to affect ACEC-relevant and important values in the cumulative effects analysis area. Impacts from surface-disturbing activities, improper grazing, wild horses and burros, wildlife use would be as described above in **Section 4.11**. Additionally, wildfires can impact relevant and important values like significant historical, cultural, and scenic values, as well as support for important fish and wildlife and other natural resources, due to the removal of vegetation, which can increase the risk of erosion. This erosion can transport soil particles into water bodies, potentially affecting water quality and aquatic habitats. On the other hand, fuels management projects, while aiming to reduce wildfire risk, can also help maintain soil stability by preventing large-scale vegetation removal that might lead to soil erosion. These projects can also contribute to preserving habitats for fish, wildlife, and other natural resources. Projects focused on managing vegetation and GRSG habitat can impact relevant and important values. Strategies like prescribed burns can help restore ecosystems, but they might also impact wildlife habitat temporarily. Recreation can also impact relevant and important values. Activities like off-road vehicle use can lead to soil compaction, vegetation damage, and habitat disturbance. Trails and paths can alter natural drainage patterns, potentially contributing to erosion and sedimentation of water bodies.

Federal resource management and land use plans will continue to be updated to reflect best management decisions for current conditions. These plans can influence the physical environment and potentially impact significant historical, cultural, and scenic values in the area. Decisions to allow certain activities, such as mining or energy development, could potentially lead to changes in the landscape and affect the visual aesthetics of the area. Inadequate planning or infrastructure development might disturb soil and result in erosion, impacting both natural and cultural resources. Comprehensive plans that prioritize sustainable practices and consider the preservation of values can contribute to maintaining the ACEC relevant and important values integrity and supporting its fish, wildlife, and natural resources.

The presence and extent of threats would be addressed in ACEC Activity Plans, as outlined in MS 1613. Strategies like ACEC Management of Land Boundary (MLB) Plans can help to identify areas of high-risk boundaries adjoining high value resources.

Potential Impacts of Climate Change

The cumulative impacts of climate change can impact relevant and important values. Climate change is expected to impact temperatures and precipitation, which will have a number of cascading impacts on ACEC relevant and important values. These impacts could include the loss of important plant and animal species, the degradation of ecosystems, and damage to important historical and cultural values.

Contribution of Alternatives to ACEC Cumulative Effects

The analysis evaluates the cumulative effects of each alternative proposed. Specifically, the potential impacts of each alternative on the ACECs' relevant and important values, such as historical, cultural, scenic values, fish and wildlife, and other natural resources, is assessed.

Alternative 1 would permit continued impacts on relevant and important values in some areas, since although there would be protective measures for GRSG applied, no additional ACECs would be designated. In areas where GRSG management would not apply, there could be effects on historical, cultural, and scenic values, as well as fish and wildlife and other natural resources within these areas.

Alternative 2 would contribute to cumulative effects to a greater extent than Alternative 1 since protective measures for GRSG would be applied over a smaller area and ACECs would still not be designated. Conversely, Alternative 4 would apply protective measures for GRSG over a larger area than Alternative 1 and ACECs would not be designated.

Alternative 3 would have the lowest contribution to cumulative effects of all alternatives owing to increased protections from prohibiting or limiting surface-disturbing activities throughout the rangewide planning area and designation of ACECs. This alternative could result in a more secure status for historical, cultural, and scenic relevant and important values, while also enhancing habitat conditions for fish, wildlife, and natural resources. Alternative 5 would have similar, though slightly greater contribution to cumulative effects than Alternative 3 because ACECs would be designated but protective measures for GRSG would be less stringent, which could allow for some degradation of relevant and important values in some areas.

4.21.10 Social and Economic Conditions

This section presents the anticipated cumulative impacts on the environment that could occur from implementing the alternatives presented in **Chapter 2**. A cumulative impact is the impact on the environment that results from the incremental impact of the action, when added to other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such actions. Additional details regarding the methodology for the cumulative impacts analysis, including the table of past, present, and reasonably foreseeable future actions, is presented in **Appendix 14**.

Cumulative impacts can result from individually minor, but collectively significant actions taking place over time. The cumulative impacts resulting from the implementation of the alternatives in this RMPA/EIS may be influenced by other actions, as well as activities and conditions on other public and private lands, including those beyond the planning area boundary. These include state GRSG conservation plans (see **Appendix 14**). As a result, the sum of the effects of these incremental impacts involves determinations that often are complex, limited by the availability of information, and, to some degree, subjective.

Because of the programmatic nature of an RMPA/EIS and cumulative impacts assessment, the analysis tends to be broad and generalized. This allows BLM to examine the impacts that could occur from a reasonably foreseeable management scenario, combined with other reasonably foreseeable activities or projects; consequently, this assessment is primarily qualitative for most resources because of a lack of detailed project-scaled information at the planning stage. A quantitative analysis is presented for GRSG; details regarding this methodology and supporting data are included in **Appendix 14**.

The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the baseline, as depicted in the affected environment, or the long-term resilience of a resource or social system.

The following factors were considered in this cumulative impact assessment:

- Federal, Tribal, nonfederal, and private actions
- Potential for combined impacts or combined interaction between impacts
- Potential for impacts across political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- Comparative scale of cumulative impacts across alternatives

Temporal and spatial boundaries used in the cumulative analysis are developed on the basis of resources of concern and actions anticipated to contribute to an impact. These boundaries vary by resource or resource use and are presented for each resource individually below.

4.21.11 Social and Economic Conditions

The following discussion analyzes the cumulative impacts on social and economic conditions as well as impacts on environmental justice concerns. This analysis considers the past, present, and reasonably foreseeable future actions that may impact these conditions. The cumulative effects analysis covers a 20-year timeframe, corresponding to the duration of the Greater Sage-Grouse Resource Management Plan. The spatial scope encompasses the rangewide planning area.

Economic Interest and Conditions

Planning and implementation decisions within planning areas that overlap the analysis area in this current effort could also affect future development. The BLM-management decisions in the federal resource management and land use plans throughout the planning area could contribute to cumulative impacts on the local and regional economies and the social conditions of local communities. These management decisions could lead to changes in employment, income, tax revenue, and economic output on top of the impacts discussed in **Section 4.11**, Social and Economic Conditions (Including Environmental Justice), as well as impacts on nonmarket and social conditions, as discussed below. The combined impact from these efforts could cause strain on the local economies, especially those that are reliant on industries that would be more likely impacted such as mining and agriculture industries as well as industries related to renewable energy development.

The state GRSG conservation plans and efforts could lead to cumulative impacts on economic contributions. The requirements in the state GRSG conservation plans would likely vary from state to state, which would increase costs for operators as they navigate the differing restrictions and requirements. Additionally, the type of state GRSG conservation plan could lead to cumulative impacts. Some conservation plans are regulatory in nature, such as the plans in Wyoming, Montana, and Oregon as well as Nevada's mitigation requirement, while the other plans are voluntary compliance. This difference could cause some confusion and conflict or create barriers to entry of markets in different areas for operators.

Past, present, and reasonably foreseeable mineral leasing, exploration, and development will likely contribute to cumulative, impacts on employment opportunities and fiscal revenues in local and regional economies that have historically been reliant on mineral extraction. Even in areas with a small percentage of employment in the mining sector, there could be impacts to the local economy, because mining often provides high-wage employment opportunities that are not easy to replace or find alternatives (see **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and the Socioeconomic Baseline report for more information on employment and labor income per industry). Updates to the Federal oil and gas regulatory framework, including changes in minimum bid requirements and royalty and rental rates included in the Inflation Reduction Act, could affect future levels oil of gas activity on federal lands. Although, these higher rates will increase the cost to develop Federal oil and gas resources leased on or after August 16, 2022, there is insufficient information to determine how these changes will impact federal oil and gas development given how dynamic and complex the global oil market is. Competitive federal leases are anticipated to remain competitive with leases on private and State lands which already impose higher rental and royalty rates, and operators' decisions related to exploration and extraction will continue to be based on global market conditions and trends, and individual firms' strategic goals and profit margins (US Department of Interior 2021).

In areas that have historically relied on fossil fuels as an economic driver for employment, income, economic output, and fiscal revenue streams, as demand continues to shift to lower carbon energy sources, the continued decline in production of higher carbon energy sources such as coal could have compounding, cumulative impacts in communities that could also be impacted by GRSG BLM-management decisions that would restrict mineral development, including oil and gas, nonenergy leasable minerals, locatable minerals, and mineral materials. Since 2012, coal mining jobs across the US have decreased by over 48,000 (Sachs 2023). Counties in the analysis areas that have oil and gas production on federal lands and have seen a decline in coal extraction over the last five years include Moffat and Rio Blanco counties in Colorado; Rosebud County in Montana, Carbon, and Sevier counties in Utah; and Campbell, Converse, Lincoln, and Sweetwater counties in Wyoming. These regions are more likely to see compounding cumulative impacts from the transition away from coal combined with impacts due to BLM-management decisions on oil and gas leasing. For BLM-management decisions on nonenergy leasable minerals, the counties that are likely to face cumulative impacts combined with the decline in coal due to their reliance on nonenergy leasable minerals are Rio Blanco County in Colorado, Carbon Counties in Utah, and Lincoln and Sweetwater counties Wyoming. Lastly, regions in Colorado, Montana, Utah, and Wyoming could also face cumulative impacts due to the decline in coal extraction. For locatable minerals, the level of cumulative impacts and locations of impacts depend on whether the Secretary actually withdraws the recommended areas from location and entry under the Mining Law of 1872 pursuant to the separate process outlined in section 204 of FLPMA (see the Socioeconomic Baseline Report and **Section 3.11**, Social and Economic Conditions (including Environmental Justice) for more information on current oil and gas, nonenergy leasable mineral, coal, and locatable mineral resource use in the analysis areas). The decrease in economic conditions from the decline in the coal industry would put additional strain on these regions and make it more difficult for local governments to support and sustain the public services that are important to the communities (see the Socioeconomic Baseline Report and **Section 3.11**, Social and Economic Conditions (including Environmental Justice) for more information on current conditions of public services that are supported by taxes on mineral activities). (CDLE, 2020).

Past, present, and reasonably foreseeable nonenergy mineral leasing, exploration, and development will likely contribute to the impacts on local and regional economies. Management actions in other planning efforts in the form of surface use restrictions such as closing areas to new nonenergy leasable mineral, prohibitions on surface mining, or creating ROW exclusion or avoidance areas, could impact local economics due to potential changes in nonenergy solid leasable mineral extraction by limiting the available means for accessing mineral resources and transporting nonenergy solid leasable minerals to processing facilities and markets.

Past, present, and reasonably foreseeable locatable mineral extraction will likely contribute to the impacts on local and regional economies. Any actions (including any future withdrawals) that increase the costs of locatable mineral development would cumulatively impact locatable mineral development and the local economies, through changes in employment, labor income, output, and tax revenue, as these actions ultimately could decrease the amount of locatable mineral availability and development in the planning area during the planning period.

Past, present, and reasonably foreseeable mineral materials extraction will likely contribute to the impacts on local and regional economies. The predominant mining method for mineral materials is surface mining; therefore, restrictions on surface-disturbing activities would effectively close or limit mineral material mining in the subject areas to unless an exception is provided. If feasible mineral materials extraction could relocate to nearby areas; however, this would likely result in increased costs associated with transportation or fees, if operations is moved to private or state lands. This increase in cost could result in cumulative impacts on the local economies.

Past, present, and reasonably foreseeable ROWs will likely contribute to the impacts on local and regional economies. These projects include development of pipelines and electricity transmission and distribution infrastructure as well as development of wind and solar. The BLM is working on a Solar Programmatic EIS to take steps to update its 2012 Western Solar Plan, which could have cumulative impacts on economic contributions. The on-going revisions on the Solar Programmatic EIS consider removing the slope requirement which may allow for more land available to ROW authorization. As there continues to be a transition away from fossil fuel use, there will likely be an increase in demand for renewable development on public lands. Based on resource potential, this increase is likely to be more pronounced in certain areas and states, such as California, Nevada, Utah, and Wyoming, where there has historically been interest in renewable energy development and there will likely continue to be development. However, labor income for employment in industries associated with renewable energy development and operations tends to be lower than labor income for employment mining industries. This means that as economies transition to renewable energy, there could continue to be cumulative impacts from lower wages (see **Section 4.8**, Lands and Realty (Including Wind and Solar) for more information).

The BLM will continue to issue livestock permits on land that is available to livestock grazing. These permits could contribute to the impacts on local and regional economies. Additionally, livestock grazing and operations can be affected by BLM-management decisions on vegetation management and surface disturbing activities such as mining and mineral exploration and ROW development as well as changing environmental conditions. These cumulative impacts on livestock grazing can affect costs incurred by ranchers and farmers, which would have cumulative impacts on the regional economies through changes in jobs, income, and economic output.

In many regions, such as in Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming, farming and ranching can provide economic stability for communities that are susceptible to boom and bust cycles due to historical dependence on mining industries that have fluctuated over time. In these regions, there could be cumulative impacts on the change in economic resilience and stability from BLM-management decisions that impact both grazing and mineral development, which are important sectors for these communities.

Nonmarket and Social Conditions

The BLM-management decisions in the federal resource management and land use plans throughout the planning area could contribute to cumulative impacts on the local and regional economies and the social conditions of local communities. These management decisions could lead to changes in social conditions and access to nonmarket values on top of the impacts discussed in **Section 4.11**, Social and Economic Conditions (Including Environmental Justice). These impacts include changes in access to products and resources, values from open spaces, values from wildlife species including GRSG. Potential impacts also could include changes in way of life and culture, social cohesion, and preservation of ecosystem services, such as services provided from GRSG and GRSG habitats.

Past, present, and reasonably foreseeable vegetation and wildfire fuels management that impact GRSG habitat will likely contribute to the impacts on communities through changes in access to nonmarket values. Potential for severe wildfire could result in damage to GRSG habitat, which could result in cumulative impacts on access to nonmarket values associated with GRSG and GRSG habitat, such as values from cultural and subsistence resources and nonuse values.

Environmental Justice

The BLM-management decisions in the federal resource management and land use plans throughout the planning area could contribute to impacts on environmental justice communities, if the BLM-management decisions lead to changes in water or air quality of the surrounding communities, access to subsistence resources or use, access to cultural resources, among others; however, these impacts would depend on site-specific conditions and analysis.

Execution of state GRSG conservation plans, which could impact access to resources or subsistence activities on nonfederal lands, could lead to cumulative impacts on environmental justice communities.

GRSG planning efforts could contribute to cumulative impacts by placing more constraints on mineral development in areas where sage-grouse habitats overlap with big game high priority habitats, which could reduce health impacts from oil and gas production and development. These could lead to disproportionate impacts on environmental justice communities, because environmental justice communities, such as low-income households, tend to live closer to mineral developments (Proville et al. 2022).

Climate change could lead to impacts on many resources and could contribute to adverse and disproportionate impacts on environmental justice populations. These impacts from climate change include increases risk and severity of wildfires, which can lead to damage and destruction of property, cultural resources, and impact public health and safety, increases in drought and reductions in forage for livestock, increases in risk of flooding, changes in subsistence resource access due to changes in climate and invasive species, and reductions in water supply. These impacts would likely have adverse and disproportionate impacts on environmental justice populations due to the limited resources available to mitigate impacts and because environmental justice populations are often located in areas that are vulnerable to impacts from climate change, such as areas that are prone to drought or flooding (Cho 2020).

Contribution of Alternatives

Contributions to cumulative impacts from BLM-management decisions are discussed below for each alternative.

Alternative 1 management actions would be based on the 2015 plan amendments. This includes restrictions on development that would occur within HMAs. All states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. Anticipated levels of economic activities associated with mineral exploration and development, renewable energy development, and livestock grazing on BLM-administered lands would continue from current conditions, and they would continue to support jobs, labor income, economic output, and tax revenue, which would continue to support public services. In areas where mineral development is open subject to stipulations, there would continue to be impacts on air quality and GHG emissions, which could disproportionately and adversely impact environmental justice populations. Additionally, there would continue to be impacts on GRSG and subsistence resources, which could impact access to nonmarket use and non-use values and could adversely and disproportionately impact environmental justice populations, especially those who value subsistence resources.

Under Alternative 2, there would be more areas open to mineral development and exploration, which could result in an increase in supported jobs, labor income, and economic output, compared to Alternative 1. However, due to the increase in areas open to mineral development there would be the potential for more surface disturbance, which could reduce access to values associated with GRSG and GRSG habitat. In areas that are open to mineral development, there could be greater impacts on air and water quality, than under Alternative 1, and these impacts could disproportionately and adversely impact environmental justice populations.

Alternative 3 would close all areas in PHMA to mineral development, ROW development, and livestock grazing. Alternative 3 would be the most restrictive on economic activities across all alternatives. The restrictions could lead to large cumulative, combined impacts on local economies and communities, especially those areas that rely on mining and agriculture for employment such as Caribou County in Idaho; Big Horn and Fallon counties in Montana; Pershing County in Nevada; and Big Horn, Converse, Crook, and

Sublette counties in Wyoming. These impacts could include cumulative impacts on jobs, labor income, economic output, tax revenue, public services, and economic stability. Additionally, the impacts could include social cohesion, and access to nonmarket values associated with historical mining and agricultural communities as detailed in the direct and indirect impacts discussion.

Under Alternatives 4 and 5, mineral development would be allowed in HMA boundaries, which is expected to increase the supported jobs, labor income, and economic output compared to Alternative 1. However, due to the increase in areas open to mineral development there would be the potential for more surface disturbance, which could reduce access to values associated with GRSG and GRSG habitat. In areas that are open to mineral development, there could be greater impacts on air and water quality, than under Alternative 1, and these impacts could disproportionately and adversely impact environmental justice populations. The potential for developments in PHMA and GHMA is still under review and will likely vary by state. Therefore, impacts on forage conditions and livestock grazing operations from mineral development, renewable energy development, ROW development, and travel development will vary by magnitude using the best available science.

Reasonably Foreseeable Scenarios	Examples from Appendix 14 (Reasonably Foreseeable Future Actions)	SE Indicator Discussion
Transition from fossil fuel development	Closure of coal powered power plants and coal mines	Loss of jobs and revenue
	Implementation of Inflation Reduction Act	Unclear impact on jobs and revenue – could push development to state and private lands; Increased royalty and rents could offset less quantity of federal development.
	BLM CO GJFO and CRVFO RMPA	Preferred alternative would lead to cumulative impacts that would reduce jobs and revenues from oil and gas. There would be compounding impacts and stress put on the local communities
	BLM CO Big Game and Gunnison Sage Grouse RMPA	Restrictions for oil and gas development in Moffat, Routt, Mesa, and Jackson are applicable for all three wildlife RMPAs. Hence, the predicted job and revenue loss in **Chapter 4** is the same as the cumulative job effort of these BLM CO planning efforts.

4.21.12 Air Quality

The cumulative impact analysis area for air quality includes the airsheds that encompass the lands within the range of GRSG habitat, regardless of land ownership. The larger cumulative analysis area is chosen because air pollutants can be transported into and/or out of the planning area and affect pollutant concentrations in the ambient air. The cumulative impact analysis timeframe for air quality is chosen based on the expected duration of the GRSG RMPA, which is approximately 20 years. The BLM's regional air quality model (Ramboll 2023) is incorporated by reference as a representation of future cumulative air quality.

In general, air pollution is cumulative in the way that exceedances of ambient air quality standards are based on existing conditions which depend on past and present development. Any change in the level of emission generating activities would affect existing pollutant concentrations in the cumulative impact analysis area. Past, present, and reasonably foreseeable future actions that contribute to the cumulative impacts on air quality include mining and mineral exploration and development such as fluid minerals (oil, gas and geothermal), locatable minerals, leasable minerals, and mineral materials; urban and industrial development including major and minor ROWS (e.g., for roads, pipelines, electrical transmission lines, infrastructure, and large renewable energy projects, such as solar and wind development projects); vegetation treatments; fire and fuels management; livestock grazing; and recreation and travel management. The nature and type of impacts from actions considered for the cumulative impact analysis are as described under the *Nature and Type of Effects.*

The cumulative impacts on air quality from all sources within the cumulative impact analysis area include direct emission of air pollutants from burning fossil fuels (e.g., vehicles and heavy equipment) and from wildland fire. Closing areas to mineral material development could increase impacts to air resources if additional transportation is needed to carry mineral materials to centrally-located facilities, rather than being developed and processed in close proximity. Indirect cumulative impacts on air quality arise from the generation of secondary pollutants, such as ozone, stemming from other compounds in the atmosphere. Additionally, surface disturbance can generate dust, contributing to regional visibility degradation. This clarification underscores that ground-level ozone is a result of these secondary pollutants, not a precursor. Cumulative air quality impacts can also indirectly affect vegetations and aquatic ecosystems through pollutant depositions (e.g., acid rain). Impacts to air quality from past, present, and reasonably foreseeable future actions, when added to the impacts under each alternative can either offset impacts from emissions (e.g., by limiting development and/or improving vegetation conditions) or contribute to pollutant concentrations in ambient air. These impacts would be similar to those described under *Nature and Type of Effects.*

Climate change trends which include an increasing trend in occurrence and severity of drought conditions, extreme weather, and more uncontrolled extreme wildfires can exacerbate the cumulative impacts on air quality. Extreme weather conditions and severe drought conditions can increase erosion potential and acres of disturbance, resulting in higher potential for fugitive dust formation. Furthermore, extreme temperatures particularly during a period of drought increase the potential for uncontrolled severe wildfires which further contribute to the cumulative air quality impacts from increased emissions.

Impacts to air quality from solar development include increased pollutant concentrations near the solar project development site during construction and reclamation activities (e.g., activities that involve burning fuel and surface disturbance, as described under *Nature and Types of Effects).* Maintenance and operation of solar project would result in significantly smaller emissions from vehicle and equipment operation. An increase in solar development is expected to reduce the dependence on fossil-fuel-based energy productions and indirectly reduce associated emissions, which continue to be a primary source of emissions.

Alternative 1, which is primarily based on management actions from the 2015 plan amendments, would continue to contribute to the cumulative impacts from past, present, and reasonably foreseeable future actions. This would result in air quality that resembles current local and regional conditions and follows known air quality trends. According to the modeled ambient air pollutant concentrations from BLM's 2032 Western US Photochemical Air Quality Modeling Study (Ramboll 2023), with the exception of particulate matter, circa 2032 cumulative emissions are not expected to result in exceedances of NAAQS for the portions of the planning area the overlap with the model's study area (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming only). Exceedances of $PM_{2.5}$ and PM_{10} in parts of the planning area in Colorado, Montana, South Dakota, Utah, and Wyoming were estimated, primarily due to modeled emission from wildfires.

An increase in air quality impacts from development of mineral and renewable energy projects under Alternative 2 would add to impacts from past, present, and reasonably foreseeable future actions that also result in emissions, to increase cumulative impacts compared with Alternative I, while the countervailing impacts of vegetation treatments and fire and fuels as well as any potential for replacement of emissions from fossil fuels through use of renewable sources for energy production would be the same as those under Alternative I. Therefore overall, Alternative 2, would result in an increase in cumulative impacts, compared with Alternative I.

Alternative 3, which has the most restrictions and resource protection measures among the alternatives, would offset the air quality impacts from past, present, and reasonably foreseeable future actions to the greatest degree compared with cumulative impacts under Alternative 1. Therefore, Alternative 3 would result in the lowest cumulative air quality impacts among the alternatives.

Under Alternative 4, since mineral and renewable energy development can occur in HMAs, there may be an increase in impacts to air quality from development-related emissions and surface disturbing activity, compared with Alternative 1. However, cumulative impacts on air quality would depend on site- and/or state-specific adjustments.

Similar to Alternative 4, development can occur in HMAs under Alternative 5. This would increase the potential for added contribution to cumulative air quality impacts in the form of increased pollutant concentrations, which when added to impacts from past, present, and reasonably foreseeable future actions would result in increased cumulative air quality impacts compared with Alternative 1. However, compared with Alternative 4, fewer restrictions on development under this alternative would result in a greater contribution to cumulative air quality impacts.

4.21.13 Climate Change and Greenhouse Gases

Climate change is a global issue, therefore the cumulative impact analysis area for climate change includes lands within the range of GRSG habitat regardless of land ownership, the nation, and the globe. The time frame for cumulative impacts on climate change depends primarily on the cumulative effects of GHGs and the cumulative change in carbon sequestration in the landscape. Due to the different atmospheric lifetime of various GHGs (e.g., methane lasts 12 years in the atmosphere while carbon dioxide can last much longer) the climate change cumulative impact analysis considers both a 20-year and a 100-year timeframe.

Climate change is cumulative by nature. Over time, GHGs accumulate in the atmosphere and contribute to an overall greenhouse gas effect which is a primary driver of cumulative global climate change that can be attributed to human-related activity. Past, present, and reasonably foreseeable future actions that contribute to the cumulative impacts on climate change include mining and mineral exploration and development such as fluid minerals (oil, gas and geothermal), locatable minerals, leasable minerals, and mineral materials; urban and industrial development including major and minor ROWS (e.g., for roads, pipelines, electrical transmission lines, infrastructure, and large renewable energy projects, such as solar and wind development projects); vegetation treatments; fire and fuels management; livestock grazing; and recreation and travel management. The impacts from actions considered for the cumulative impact analysis are as described under the *Nature and Type of Effects*.

The cumulative impacts from all sources within the cumulative impact analysis area include direct emissions from burning fossil fuel and wildland fire as well as methane emissions from livestock grazing. The total amount of carbon dioxide removed from the atmosphere though carbon sequestration and storage in soils and vegetation would contribute to the cumulative climate change impacts through a reduction in the total GHG concentrations in the atmosphere. These impacts would be similar to those described under *Nature and Type of Effects.*

Climate change trends, particularly the increasing trend in occurrence and severity of drought conditions affecting carbon sequestration, and the increasing trend uncontrolled large wildfires affecting GHG emissions can further exacerbate impacts to climate change.

Impacts to climate change from solar development include increased emissions near solar project development sites and reduced carbon sequestration and storage in land at the project location. An increase in solar development is expected to reduce the dependence on fossil-fuel-based energy productions and indirectly reduce associated emissions, which continue to be a primary source of emissions.

Alternative 1, which is based on management actions from the 2015 plan amendments, would continue to contribute to the cumulative impacts from past, present, and reasonably foreseeable future actions. This would result in conditions that resemble current local and regional conditions and follows known climate change trends.

Alternative 2, would result in an increase in cumulative impacts, due to fewer restrictions (e.g., fluid mineral development) which would result in an increase in emission of GHGs and fewer countervailing impacts climate change from carbon storage, compared with Alternative 1.

Alternative 3, which has the most restrictions and resource protection measures among the alternatives, would offset the climate change impacts from past, present, and reasonably foreseeable future actions to the greatest degree compared with cumulative impacts under Alternative 1. Therefore, Alternative 3 would result in the lowest cumulative climate change impacts among the alternatives. However, potential increases of acres burned by wildfire and increased fine fuels may result in increased GHG emissions from the burning of vegetation, reducing or negating offsets from other actions.

Under Alternative 4, since mineral and renewable energy development can occur in HMAs, there may be an increase in impacts to climate change from development-related GHG emissions and changes to carbon storage levels of the land, compared with Alternative 1. However, these impacts would depend on site- and/or state-specific adjustments.

Similar to Alternative 4, development can occur in HMAs under Alternative 5. This would increase the potential for added contribution to the cumulative climate change impacts in the form of increased GHGs and changes to carbon sequestration, which when added to impacts from past, present, and reasonably foreseeable future actions would result in increased cumulative climate change impacts compared with Alternative 1. However, compared with Alternative 4, fewer restrictions on development under this alternative would result in a greater contribution to cumulative climate change impacts compared with Alternative 4.

4.21.14 Soil Resources

The cumulative effects analysis area for soil resources includes the entire rangewide planning area. The time frame for the analysis is 20 years. Soil productivity is the ability of soil to support plant growth, and erosion is the removal of soil from the land surface. Soil productivity and erosion are affected by several factors, including soil type, climate, vegetation, and land use (See **Chapter 4**, Soil Resources, *Nature and Type of Effects* for a more detailed description).

Surface-disturbing activities, improper grazing, wild horses and burros, wildlife use, wildfires, and fuels management activities are examples of past, present, and reasonably foreseeable future actions and conditions that have affected and will likely continue to affect soil resources in the cumulative effects analysis area. Impacts from these activities would be as described above in **Section 4.14**. ROW MLB Plans can help assure surface disturbance activities are within or outside of the planning area. Additionally, wildfires can have impacts on soil productivity and erosion, such as vegetation removal which can lead to erosion. Fuels management projects can also help to reduce the risk of wildfires by preventing the large-scale removal of vegetation which can lead to soil erosion. Vegetation and habitat management projects can help to improve the condition of soil productivity and erosion. For example, restoring sagebrush can help to stabilize the soil and reduce erosion. However, some of these projects, such as prescribed burning, can also have some impacts on soil productivity and erosion. In addition, recreation can have impacts on soil resources, including soil compaction and erosion. For example, OHVs can compact the soil, making it less able to absorb water and support plant growth. This can lead to erosion, as water and wind can more easily remove the compacted soil. OHVs can also damage vegetation, which can further increase the risk of erosion.

Federal resource management and land use plans can have impacts on soil productivity and erosion, as they can determine how land is used and how vegetation is managed. For example, a plan that allows for more development could lead to increased soil erosion.

Potential Impacts of Climate Change

Climate change is expected to have impacts on soil productivity and erosion in the GRSG range. Increased temperatures and decreased precipitation could lead to increased soil evaporation, decreased water availability, and more intense rainfall events. These changes could all contribute to increased soil erosion, which could lead to decreased soil productivity and the loss of important habitat for the GRSG. The impacts of climate change on soil productivity and erosion are cumulative, meaning that they will likely increase over time.

Cumulative Effects on Soil Resources by Alternative

Alternative 1 would continue the current trend of impacts on soil productivity and erosion. This is because the alternative does not make any significant changes to the management of activities that can impact soil, such as changes in livestock grazing, changes in surface-disturbing activities (including minerals development, renewable energy development, travel, and ROW development), and changes in vegetation treatments, prescribed burns, and potential for wildfire.

Cumulative effects on soil productivity and erosion would be greater under Alternative 2 compared with Alternative 1 because development activities are anticipated to be greater under this alternative. This is because it would provide more flexibility in the management of activities that can impact soil resources conditions. This could lead to increased soil compaction and erosion, which could reduce soil productivity. For example, if more development is allowed, this could lead to more roads, pipelines, and other infrastructure being built. This could, in turn, reduce soil productivity and make it more difficult for plants to grow.

Cumulative effects would be less intensive under Alternative 3, compared with Alternative 1. This is because it would prohibit or limit the number of surface-disturbing activities. This would help to protect soil productivity and prevent erosion. For example, this alternative would prohibit the construction of new roads or pipelines in sensitive areas. It would also require that development activities be carefully managed to minimize soil disturbance. This would help to protect soil productivity and prevent erosion. However, the lack of vegetation management practices can effectively reduce fuels, thereby diminishing the potential for increased wildfires that might otherwise contribute to decreased soil productivity and increased erosion.

Alternative 4 would depend on the specific adjustments that are made. This is because it would be based on Alternatives 1 and 2, with adjustments based on HMA review, or other state-specific considerations. The potential impacts of this alternative on soil productivity and erosion will depend on the specific adjustments that are made. For example, if HMA review identifies areas that are particularly sensitive to soil erosion, then these areas could be protected from development.

Alternative 5 would involve an increase in areas designated as PHMA compared to Alternatives 1 and 2. The potential impacts on soil productivity and erosion in this alternative will depend on the specific adjustments made. For instance, if HMA review identifies areas particularly sensitive to soil erosion, protective measures could be implemented to limit development. Similarly, should an ACEC be identified, stricter regulations might safeguard soil resources within that area. However, the reduced protection of Alternative 5 could result in noteworthy cumulative effects on soil productivity and erosion, lacking the additional safeguards present in Alternative 1.

4.21.15 Water Resources

The cumulative impact analysis for water resources conditions will assess the potential impacts of past, present, and reasonably foreseeable future actions on water quality and quantity in the entire rangewide planning area over a 20-year time frame. Water quality is the physical, chemical, and biological characteristics of water that determine its suitability for a variety of uses. Water quantity is the amount of water available in a given area. Water resource conditions are affected by several factors, including geology, soil type, climate, vegetation, and land use (See **Chapter 4**, Water Resources, *Nature and Type of Effects* for a more detailed description).

Surface-disturbing activities, improper grazing, wild horses and burros, wildlife use, wildfires, and fuels management activities are examples of past, present, and reasonably foreseeable future actions and conditions that have affected and will likely continue to affect water resources conditions in the cumulative impact analysis area. Impacts from these activities would be as described above in **Section 4.12**. Additionally, wildfires can also have impacts on water resources conditions through soil erosion, sedimentation, and water quality degradation. Wildfires can remove vegetation, which can increase the risk of erosion. They can also deposit ash and debris into streams and rivers, which can pollute water supplies. Vegetation and habitat management projects can help to improve the condition of water resources conditions by improving soil productivity and plant growth and decreasing erosion which can lead to sedimentation and contamination. However, some of these projects, such as prescribed burning, can also have some impacts on water resources. For example, prescribed burning can release pollutants, which can then be deposited into water supplies. Furthermore, vegetation management and restoration methods to keep water on the landscape longer within riverscapes will help improve function of these areas. In addition, recreation can have impacts on water resources conditions, including soil compaction, erosion, and water quality degradation. For example, off-highway vehicles can compact the soil, making it less able to absorb water and support plant growth. This can lead to erosion, as water and wind can more easily remove the compacted soil.

Federal resource management and land use plans will continue to be updated to reflect best management decisions for current conditions. These plans determine what activities are allowed on federal lands, like mining, livestock grazing, and recreation. Decisions enabling various projects in land use can cause soil to erode, leading to more sediment in water bodies. Sediment inputs to surface water can lead to increased turbidity and decreased water quality and aquatic habitat. Pollutants such as metals and bacteria can attach to soil particles. Turbidity in streams can also increase the solar energy that is absorbed by the water, thereby increasing the water temperature and impacting aquatic species' habitat. Higher turbidity levels can also reduce the amount of light the water receives and could impact ecological productivity.

Potential Impacts of Climate Change

Climate change is expected to have impacts on water resource conditions in the rangewide planning area. Increased temperatures and decreased precipitation could lead to changes in the timing and amount of water availability, as well as changes in water quality. These changes could have several downstream impacts, including decreased water supplies, increased risk of flooding and water contamination, growth of harmful algae blooms, and increased salinity among others.

Cumulative Effects on Water Resources by Alternative

Alternative 1 would result in a continuation of current trend of impacts on water resources conditions. This is because the alternative does not make any significant changes to the management of activities that can impact water resources conditions, such as changes in livestock grazing, changes in surface-disturbing activities (including minerals development, renewable energy development, travel, and ROW development), and changes in vegetation treatments, prescribed burns, and potential for wildfire.

Cumulative effects on water resource conditions would be greater under Alternative 2 compared with Alternative 1. This alternative would allow for more development and could lead to greater water degradation. This is because it would provide more flexibility in the management of activities that can impact water resources conditions. This could lead to increased soil compaction, erosion, and sedimentation, which could degrade water quality. For example, if more development is allowed, this could lead to more roads, pipelines, and other infrastructure being built. This could increase the risk of soil compaction and erosion, which could lead to sedimentation in streams and rivers. This could, in turn, degrade water quality and otherwise impact water resources conditions.

Cumulative effects would be less intensive under Alternative 3, compared with Alternative 1, because of increased protections from prohibiting or limiting the number of surface-disturbing activities including changes in livestock grazing, changes in surface-disturbing activities (including minerals development, renewable energy development, travel, and ROW development), and changes in potential for wildfire. This would result in the greatest protections of any alternative for water resources conditions in the planning area. For example, this alternative could prohibit the construction of new roads or pipelines in sensitive areas. It could also require that development activities be carefully managed to minimize soil disturbance. This would help to protect water resources conditions.

Alternative 4 would be based on Alternatives 1 and 2, with adjustments based on HMA review, presence of a potential ACEC, or other state-specific considerations. The potential impacts of this alternative on water resources conditions will depend on the specific adjustments that are made. For example, if HMA review identifies areas that are particularly sensitive to soil erosion, then these areas could be protected from development. Similarly, if an ACEC is identified, then this area could be subject to stricter regulations to protect water resources.

Alternative 5 would involve an increase in areas designated as PHMA compared to Alternatives 1 and 2. The potential impacts on water resources conditions in this alternative will depend on the specific adjustments made. For instance, if HMA review identifies areas particularly sensitive to water resources degradation, protective measures could be implemented to limit development. Similarly, should an ACEC be identified, stricter regulations might safeguard water resources within that area. However, the reduced protection of Alternative 5 could result in noteworthy cumulative effects on water resources conditions, lacking the additional safeguards present in Alternative 1.

4.21.16 Cultural Resources

The effects of past, present, and reasonably foreseeable future actions would, when combined with impacts from the decisions made in this planning effort, produce cumulative impacts on cultural resources that differ by alternative. Every impact to cultural resources is cumulative and adverse impacts are permanent; beneficial impacts cannot reverse these impacts. The cumulative effects study area for cultural resources is the planning area and the time frame is 20 years, or the anticipated lifetime of the GRSG RMPA.

Surface-disturbing activities associated with development are the greatest contributor to cumulative impacts to cultural resources. Past and present actions contributing to cumulative impacts on cultural resources in the planning area include mineral exploration, development, and production (including oil and gas); increased recreation and tourism; urban and rural community development; livestock grazing; wild horse and burro management; land use authorizations for ROWs; road construction associated with a variety of uses; renewable energy development, fuels and vegetation treatments, and wildfire. The effects of climate change also present an ongoing threat to cultural resources. Increasing soil erosion, wildfire occurrence and severity, and events such as severe storms that increase weathering and erosion all impact cultural resources and are influenced by a changing climate. Land planning efforts such as this resource management plan tend to offer increased protections to cultural resources, even if incidental to their purposes. Future actions with the potential to affect cultural resources are expected to be very similar to the described past and present actions, influenced by the future social, economic, and regulatory landscape.

Contribution of Each Alternative

Under all the alternatives, the over-arching goal or objective of preserving and reducing impacts to GRSG habitat and populations will likely lead to reductions in cumulative impacts on cultural resources by reducing activities like surface-disturbance in GRSG habitat. However, the likely contribution to cumulative effects on cultural resources in the planning area varies by alternative.

Alternative 1 would result in a continuation of current impacts on cultural resources from GRSG management decisions regarding activities such as mineral development, renewable energy development, livestock grazing, and ROW location.

Under Alternative 2, potential for impacts on cultural resources is similar in magnitude, but likely greater than under Alternative 1 due to increased potential for mineral and renewable energy development, as well as increased potential for ROW location in PHMA. This alternative would result in the highest level of cumulative impacts on cultural resources in the planning area.

Due to the most robust disturbance cap and highest acreage of designated PHMA, Alternative 3 would offer the greatest restrictions on surface disturbing activities such as minerals development, renewable energy development, and ROW location. This alternative would result in the lowest level of cumulative impacts on cultural resources in the planning area.

Alternative 4 would be based on Alternatives 1 and 2, with adjustments based on HMA review and other state-specific considerations. While it is anticipated that impacts under Alternative 4 will be similar in magnitude to those under Alternatives 1 and 2, the potential impacts on cultural resources from selection of this alternative will depend on the specific adjustments that are made.

Alternative 5 would also be based on Alternatives 1 and 2, with adjustments based on HMA review and other state-specific considerations. While it is anticipated that impacts under Alternative 5 will be similar in magnitude to those under Alternatives 1, 2, and 4, the potential impacts on cultural resources from selection of this alternative will depend on the specific adjustments that are made.

4.21.17 Tribal Interests

The effects of past, present, and reasonably foreseeable future actions would, when combined with impacts from the decisions made in this planning effort, produce cumulative impacts on resources and areas of tribal interest that differ by alternative. The cumulative effects study area for cultural resources is the planning area and the time frame is 20 years, or the anticipated lifetime of the GRSG RMPA.

Increasing development pressure including increased oil and gas and renewable energy development; recreation uses; construction of pipelines, transmission lines, and roads; urban expansion within the planning area; and livestock grazing would likely continue on a regional scale. Resource management activities within the planning area and surrounding areas would likely result in a trend toward increased adverse impacts and ultimately the destruction of many cultural resources and other areas of tribal interest through time and across political boundaries. If this trend continues as expected, the preservation of cultural resources, research, public education, and consultation with Native American Tribes will become even more critical.

Surface-disturbing activities are the greatest contributor to cumulative impacts to resources and areas of tribal interest. Residential development and associated recreation opportunities and access on adjacent public lands, both within and near the planning area, will continue to be a likely avenue for adverse effects on resources and areas of tribal interest. Other past and present actions that have affected and would continue to adversely affect resources and areas of tribal interest include energy and mineral exploration and development; range improvements; lands and realty ROWs; OHV travel and recreation use; wildland fires, and vegetation treatments for fire management and forest health. These actions have cumulative impacts on resources through surface disturbance that contributes to erosion and subsequent sedimentation; exposure of contributing cultural features and artifacts from removal of vegetative cover; and better vehicular access to resources and areas that could lead to relic hunting, and/or disturbance to contributing features and artifacts by vandals.

Contribution of Alternatives

Under all the alternatives, the over-arching goal or objective of preserving and reducing impacts to GRSG habitat and populations will likely lead to reductions in cumulative impacts on cultural resources by reducing activities like surface-disturbance in GRSG habitat. However, the likely contribution to cumulative effects on cultural resources in the planning area varies by alternative.

Alternative 1 would result in a continuation of current impacts on resources and areas of tribal interest from GRSG management decisions regarding activities such as mineral development, renewable energy development, livestock grazing, and ROW location. However, cumulative adverse impacts to resources and areas of tribal importance under alternative 1 are anticipated to be minor to moderate based on Section 106 compliance procedures, in addition to authorities mentioned in **Section 3.16**, which include appropriate tribal consultation on a case-by-case basis on undertakings on BLM-administered land that could affect Native American concerns.

Under Alternative 2, potential for impacts on resources and areas of tribal interest is similar in magnitude, but likely greater than under Alternative 1 due to increased potential for mineral and renewable energy development, as well as increased potential for ROW location in PHMA. This alternative would result in the highest level of cumulative impacts on resources and areas of tribal interest in the planning area.

Under Alternative 3, the level of surface-disturbing activities on BLM-administered public lands would greatly reduce impacts and improve protection to resources and areas of tribal interest over the other alternatives. Alternative 3 would provide the best protection and would result in the least cumulative impacts when compared to the other alternatives. Cumulative adverse impacts to resources and areas of tribal importance under Alternative 3 are anticipated to be minor based on Section 106 compliance procedures which include appropriate tribal consultation on a case-by-case basis on undertakings on BLM-administered land that could affect Native American concerns.

Cumulative impacts to resources and areas of tribal interest under Alternative 4 would be similar to those of Alternatives 1 and 2, with state-specific considerations and adjustments to HMA allocations based on data review. While impacts under Alternative 4 would be similar in type to those under Alternatives 1 and 2, the degree of the potential impacts on resources and areas of tribal interests from selection of this alternative will vary based on the specific adjustments that are made.

Alternative 5 would also be based on Alternatives 1 and 2, with adjustments based on HMA review and other state-specific considerations. While it is anticipated that impacts under Alternative 5 will be similar in magnitude to those under Alternatives 1, 2, and 4, the potential impacts on resources and areas of tribal interest from selection of this alternative will depend on the specific adjustments that are made.

4.21.18 Lands with Wilderness Characteristics

The cumulative effects study area for lands with wilderness characteristics includes BLM-administered lands in the planning area where completed inventories have identified wilderness characteristics to be present. The period of potential cumulative impacts is the approximately 20-year timeline of the plan.

Past and present actions in the cumulative effects study area that affected lands with wilderness characteristics include resource uses, such as, mineral extraction, utility and infrastructure development, recreation and travel management, and livestock grazing and range improvements as these activities affect the naturalness and outstanding opportunities for solitude and primitive recreation. Reasonably foreseeable future actions would have similar effects to the extent that they occurred within lands with wilderness characteristics units.

Alternative 1 would result in a continuation of existing trends of current impacts on lands with wilderness characteristics because there would be no changes to the existing management of GRSG habitats where they occur within lands with wilderness characteristics units.

Mining and mineral leasing, exploration, and development have and continue to occur throughout the planning area. Areas under this alternative that are managed as open to fluid, salable, and locatable mineral entry would impact lands with wilderness characteristics through surface disturbances associated with these types of projects which reduce the opportunities for solitude and primitive and unconfined recreation in lands with wilderness characteristics.

Proposed utility and infrastructure development projects for major ROW projects, such as, the Solar Programmatic EIS and the West-wide energy corridors would reduce the size of lands with wilderness characteristics units and impair the apparent naturalness of the area and the experience of solitude. There could be additional impacts to lands with wilderness characteristics within PHMAs that are managed as avoidance areas which would encourage ROW development outside of PHMAs, but not prevent ROW developments from these areas.

Recreation has increased on public lands in general and if this continues, it would affect lands with wilderness characteristics. Recreational use would create alterations to the landscape over time through an increase in human presence, vehicle use, and road use in certain areas. Although the effects from these uses may be substantially unnoticeable, they may cumulatively affect the area's solitude with increased use. PHMAs and GHMAs would be limited to existing roads and trails with cross-country use allowed where suitable which would preserve the size of lands with wilderness characteristics in these areas.

Existing livestock grazing management would not directly impact lands with wilderness characteristics, but the addition of any reasonably foreseeable developments that increase the number of rangeland improvements (such as fencing and stock ponds) could lessen the apparent naturalness and limit unconfined recreation found within lands with wilderness characteristics.

Compared to Alternative 1, Alternative 2 would include more areas open to mineral development and exploration. Fewer restrictions to mineral development under this alternative would create more opportunities for wilderness characteristics to be impacted by increasing surface disturbing activities. For example, if more development is allowed, this could lead to more mines, roads, pipelines, and other infrastructure being built which would directly impact the size of lands with wilderness characteristics units and opportunities for solitude and primitive recreation. Cumulative impacts from ROWs, recreation, and livestock grazing under Alternative 2 would be the same as those described under Alternative 1, with no additional additive effects due to similar management actions being proposed for these resource uses in the range of alternatives.

Management actions under Alternative 3 would provide the overall greatest potential to maintain wilderness characteristics on lands with wilderness characteristics units within PHMAs when compared to all other alternatives due to the closure of fluid, salable, and non-energy mineral leasing, ROWs being managed as exclusion, and PHMAs being unavailable for livestock grazing.

Management actions under Alternative 4 and 5 would not offer as many protections to wilderness characteristics as those under Alternative 3, but would reduce impacts when compared to Alternatives 1 and 2. For example, under Alternatives 4 and 5 fluid mineral leasing would be managed to minimize the potential for conflict and associated impacts from subsequent development in important GRSG habitats or connectivity areas which would indirectly protect overlapping lands with wilderness characteristics units.

4.21.19 Recreation and Visitor Services

The cumulative effects study area for recreation and visitor services is the BLM-administered lands in the planning area over a 20-year time frame.

Dispersed, organized, and concentrated recreation would continue throughout the planning area and overall visitation would be expected to continue to increase but vary by season, year, location, and type of activity. Present, past, and reasonably foreseeable future actions, such as mineral development and livestock grazing and agriculture, would continue to affect recreation throughout the cumulative effects analysis area. These actions as well as management actions related to Big Game RMPA and Gunnison Sage-Grouse RMPA that alter the landscape and affect naturalness or remoteness would lead to conflict with these other resources, while reducing or affecting recreation opportunities and experiences. All alternatives would lead to a continuation of reviewing and approving SRPs on a case-by-case basis within the planning area.

Alternative 1 would result in a continuation of existing trend of current impacts on recreation because there would be no changes to the existing management.

Compared to Alternative 1, Alternative 2 would have greater cumulative impacts on recreation since there would be more exceptions to restrictions on other resources uses than under Alternative 1. This would reduce impacts on recreation that would otherwise continue to occur and maintain the naturalness and remoteness for recreation in those locations. Compared to Alternative 1, Alternative 2 would also have fewer acres of PHMA and IHMA. This would restrict fewer acres of land to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, this would have the potential to restrict fewer acres against the construction of new recreation facilities when compared to Alternative 1.

Alternative 3 would reduce the cumulative impacts in the planning area on recreation since Alternative 3 has the greatest restrictions on other resource uses, such as season restrictions on fluid mineral development. This would reduce the resource conflicts with recreation in PHMA, IHMA, and GHMA that occur as resources that could lead to resource conflict with recreation would otherwise continue in the project area. These restrictions would reduce the degradation of physical setting characteristics in the planning area, which would enhance the recreational user experience more than Alternative 1 Compared to Alternative 1, Alternative 3 would also have the greatest acres PHMA. Which would subject the greatest acreage to disturbance caps. Therefore, if future recreation would have the potential exceed the disturbance cap in a particular area, the disturbance cap would have the potential to prohibit the construction of new recreation facilities over the largest area when compared with the other alternatives.

Compared to Alternative 1, Alternative 4 would have additional criteria for avoidance of GRSG, which would limit developments over a greater area, which would maintain naturalness and remoteness for recreation experiences where activities, such as mineral exploration, would have been pursued. Compared to Alternative 1, Alternative 4 would also have fewer acres of PHMA and IHMA. This would restrict fewer acres of land to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, this would have the potential to restrict fewer acres against the construction of new recreation facilities when compared to Alternative 1.

Compared to Alternative 1, Alternative 5, would have less restrictive avoidance of GRSG which would decrease the naturalness and remoteness for recreation experiences where activities such as mineral exploration, would have been pursued. Compared to Alternative 1, Alternative 5 would also have fewer acres of PHMA and IHMA. This would restrict fewer acres of land to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, this would have the potential to restrict fewer acres against the construction of new recreation facilities when compared to Alternative 1.

4.21.20 Transportation and Travel Management

The cumulative impact analysis area includes all BLM-administered lands within the range of GRSG as well as other federally managed lands, and adjacent state, tribal, county, and privately owned lands within the planning area. The larger analysis area is necessary because transportation and travel management has consequential effects on ecosystems that extend over larger areas. Ongoing and planned actions in and near the cumulative impact analysis area would influence conditions for transportation and travel management to be effective across the planning area. The time frame for cumulative environmental consequences for future actions is 20 years.

Cumulative impacts on travel and transportation management would occur primarily from actions that facilitate, restrict, or preclude motorized and mechanized access. Management actions that restrict motorized and mechanized use would limit the degree of travel opportunities and the ability to access certain portions of the planning area for the public. Such past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect transportation and travel include restrictions in GRSG HMAs on mining and mineral exploration and development, other planning efforts, such as those for Gunnison sage-grouse and big game in Colorado, and continued maintenance of federal and state highways which provide arterial connections to BLM system roads. Project-specific travel management plans would be encouraged where high levels of new traffic on existing roads (e.g., resource transportation) will occur near occupied GRSG leks, which would improve travel management in these areas. Increasing development and population growth have increased demand and construction of roads.

The management actions considered in the alternatives, including land use restrictions, such as management of ROW avoidance or exclusion areas and NSO stipulations on fluid mineral development, would not result in the inability of the BLM to provide public access. The degree of impact would be lowest under Alternative 2 because of fewer land use restrictions. Conversely, increasing the restrictions to protect GRSG under Alternative 3 would result in the greatest level of impact on transportation and access. Alternatives 1, 4, 5, and 6 would have more restriction, and therefore more impact, than Alternative 2.

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Chapter 5. Consultation and Coordination

5.1 Introduction

This chapter describes the efforts undertaken by the BLM in developing the Draft RMPA/EIS to ensure the process remained open and inclusive. Efforts to comply with legal requirements to consult and coordinate with various government agencies are also described. These include public scoping; identifying, designating, and coordinating with cooperating agencies; formally consulting with applicable federal, state, and tribal governments; and identifying "any known inconsistencies with State or local plans, policies or programs" (43 CFR 1610.3-2(e)).

The BLM land use planning activities are conducted in accordance with NEPA requirements, CEQ regulations, and DOI policies and procedures implementing NEPA, as well as specific BLM planning and NEPA policies. The NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in and throughout the planning process to develop a range of reasonable alternatives and to prepare environmental documents disclosing the potential impacts of proposed alternatives.

Public involvement and agency consultation and coordination have been a critical component of the planning process leading to this Draft RMPA/EIS. These efforts were achieved through Federal Register notices, public meetings, individual contacts, media releases, and the GRSG ePlanning website. This chapter documents the outreach efforts that have occurred to date. Additional efforts will continue as the planning process continues and the Proposed RMPA and Final EIS is prepared.

5.2 Formal Consultation Efforts

The BLM is required to consult with American Indian Tribes, the State Historic Preservation Offices, and the USFWS during the planning/NEPA decision-making process. This section documents specific consultation and coordination efforts undertaken in the development of the RMPA/EIS.

5.2.1 Federally Recognized Tribes

Federally recognized tribes are sovereign nations and retain inherent powers of self-government. They interact with the United States on a government-to-government level. In accordance with the National Historic Preservation Act and several other legal authorities (see BLM Manual 8120), and in recognition of the government-to-government relationship between individual tribes and the federal government, the BLM sought to initiate tribal consultation efforts in the preparation of this RMPA. The BLM contacted Tribes in a variety of methods, twice mailing letters to 53 Federally recognized Tribes within or with cultural interest in the planning area notifying them of the effort. These letters provided a summary of the project and invited them to participation in government-to-government consultation and be cooperating agencies in the planning effort. Subsequent outreach continued through emails, phone calls, and meetings with Tribal personnel, as they have expressed interest. Through these efforts, the BLM has, and will continue to invite formal consultation on this process with interested Tribes.

5.2.2 State Historic Preservation Officer Consultation

The National Historic Preservation Act and regulations at 36 CFR Part 800 govern the BLM's cultural resource management programs. These regulations provide specific procedures for consultation between the BLM and State Historic Preservation Offices. Proposed changes to land use plans can comprise a federal undertaking subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations. The Draft RMPA/EIS was provided to the State Historic Preservation Officers (SHPO) of each participating state concurrently with its release to the public.

Any formal comments submitted by the SHPOs will be addressed in the Final EIS. As the BLM continues in developing the Proposed LUPA/Final EIS, formal consultation will be initiated with the SHPOs regarding the potential affects to cultural resources regarding the proposed alternative. The BLM will finalize these formal consultation efforts before the ROD is signed. This portion of Chapter 5 will be updated in the Final EIS to reflect continuing consultation efforts with the SHPO.

5.2.3 US Fish and Wildlife Consultation

Consultation with USFWS is required under Section 7(c) of the ESA prior to initiation of any project by the BLM that may affect any federally listed or endangered species or its habitat. The Draft RMPA/EIS defines potential impacts on threatened and endangered species because of management actions proposed in the alternatives. The USFWS is a cooperating agency in this planning process, and USFWS staff has participated in interdisciplinary team meetings and been provided drafts of alternative decisions and analyses for discussion and input. The BLM has initiated development of a biological assessment and will coordinate with the USFWS to complete that analysis and initiate the Section 7 consultation once public comments are received on the Draft RMPA/EIS. The USFWS will evaluate the biological assessment and either concur with the determination via memorandum or prepare a biological opinion. The USFWS response to this consultation process (either the memorandum or the biological opinion) will be included in the ROD.

5.3 Cooperating Agencies

Federal regulation directs the BLM to invite eligible federal agencies, state and local governments, and federally recognized Indian tribes to participate as cooperating agencies when amending RMPs (43 CFR 1610.3-1(b)). A cooperating agency is any such agency or tribe that enters into an agreement with the lead federal agency to “work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks” (BLM Land Use Planning Handbook H-1601-1). These agencies are invited to participate because they have jurisdiction by law or can offer special expertise. Cooperating agency status provides a formal framework to engage in active collaboration with a lead federal agency in the planning process. Invitations were sent to potential cooperating agencies in December 2021 and January 2022 to the list of cooperating agencies provided in **Table 5-1**. The BLM invited many other cooperators to engage in this effort who either did not reply or chose not to participate. In addition, the BLM engaged the U.S. Forest Service, U.S. Fish and Wildlife Service and Environmental Protection Agency at the national level to identify and receive feedback on specific issues under the jurisdiction of those agencies.

Table 5-1. List of Cooperating Agencies

Cooperating Agency Name
Range-Wide Level
United States Forest Service
U.S. Fish and Wildlife Service
Environmental Protection Agency
Colorado
City of Steamboat Springs
Colorado Department of Agriculture
Colorado Department of Natural Resources (includes the Colorado Oil and Gas Commission and Colorado Division of Reclamation Mining and Safety)

Cooperating Agency Name
Colorado Department of Transportation—Region 3 (includes the Colorado Department of Transportation State Office)
Colorado First Conservation District
Colorado Parks and Wildlife
Douglas Creek Conservation District
Eagle County Board of Commissioners
Garfield County Board of Commissioners
Grand County Board of Commissioners
Jackson County Board of Commissioners
Mesa County Board of Commissioners
Moffat County Board of Commissioners
Rio Blanco County Board of Commissioners
Routt County Board of Commissioners
White River Conservation District
Idaho
State of Idaho, including Idaho Governor's Office of Species Conservation, Idaho Governor's Office of Energy and Mineral Resources Idaho Department of Fish and Game, Idaho Department of Lands, Idaho State Department of Agriculture, and Idaho Department of Parks and Recreation
Idaho Army National Guard
Blaine County
Clark County
Custer County
Montana and the Dakotas
Blaine County Commission
Bowman-Slope Conservation District
Fergus County Commission
McCone County Commissioners
Montana Department of Agriculture
Montana Department of Environmental Quality
Montana Department of Livestock
Montana Fish, Wildlife and Parks
Montana Grass Conservation Commission
Montana Sage-Grouse Habitat Conservation Program
North Dakota Game and Fish Department
Phillips County Commission
Prairie County Commissioners
Rosebud County Commissioners
Slope County Commissioners
Sweet Grass County Commissioners
Valley County Commission
Nevada/California
Nevada Department of Wildlife
Nevada Department of Agriculture
Nevada Department of Conservation and Natural Resources
Nevada Division of Minerals
Churchill County
Elko County
Eureka County
Humboldt County
Lincoln County
Mineral County

Cooperating Agency Name
Nye County
Pershing County
White Pine County
Oregon
Deschutes County
Harney County
Harney Soil and Water Conservation District
Lake County
Malheur County
Oregon Department of Fish and Wildlife
Oregon Department of Geology and Mineral Industries
Oregon State University - Institute of Natural Resources
Umatilla County
Utah
State of Utah
Utah County
Department of Defense (including Utah Test and Training Range and Hill Air Force Base)
Garfield County
Daggett County
Beaver County
Emery County Public Lands
Wyoming
Big Horn County Commissioners
Campbell County Commissioners
Campbell County Conservation District
Carbon County Commissioners
Converse County Commissioners
Converse County Conservation District
Crook County Commissioners
Fremont County Commissioners
Hot Springs County Commissioners
Johnson County Commissioners
Laramie Rivers Conservation District
Lincoln County Commissioners
Lincoln Conservation District
Lingle-Fort Laramie Conservation District
Lower Wind River Conservation District
Medicine Bow Conservation District
Meeteetse Conservation District
Natrona County Commissioners
Niobrara County Commissioners
Park County Commissioners
Popo Agie Conservation District
Saratoga-Encampment-Rawlins Conservation District
Sheridan County Commissioners
South Big Horn Conservation District
Shoshone Conservation District
State of Wyoming
Wyoming Department of Agriculture
Wyoming Oil and Gas Conservation Commission
Wyoming State Historic Preservation Office

Cooperating Agency Name
Wyoming State Parks and Cultural Resources
Wyoming State Forestry
Wyoming Game and Fish Department
Wyoming Department of Environmental Quality
Wyoming Office of State Lands and Investment
Sublette County Conservation District
Sublette County
Sweetwater County Conservation District
Sweetwater County
Teton County Commissioners
Uinta County Conservation District
Uinta County
Washakie County Commissioners
Washakie County Conservation District
Weston County Commissioners

The BLM also actively engaged the Western Governor's Association Conservation Task Force (Task Force) to share and collect information relevant to this planning effort, conservation of GRSG, and impacts of BLM authorizations on state and local economies and livelihoods. Members of the Task Force are also members of cooperating agencies within their home states. Meetings were initiated in 2022, and occurred monthly (both virtual and in person) through September, 2023. At that point, weekly meetings were conducted to get feedback on the draft range of alternatives and the associated language.

Each BLM State Office coordinated with cooperating agencies in their states to establish information sharing processes and meeting schedules. The frequency of meetings varied by state needs and cooperator requests. BLM Headquarters staff virtually attended most individual state coordination meetings when invited to share rangewide planning information and consider individual state concerns and suggestions in drafting the range of alternatives. Logistical restrictions precluded in-person meetings with all cooperating agencies across the entire planning area. Coordination with the cooperating agencies has included project presentations and working meetings discussing the purpose and need, new science, high level alternative strategies, range of alternatives, review of alternative text, meetings to review subsequent changes and further refine the alternatives, and a review of the administrative Draft EIS.

A GRSG Planning update newsletter was released to cooperating agencies on March 29, 2023 which presented information refining the list of management topics to be addressed in this current effort, and high level conceptual summary of preliminary draft range of alternatives. The list of management topics included were the result of scoping comments received and a review of management decisions from previous GRSG planning efforts. Some management topics were not carried forward to this amendment as they were extensively addressed in the previous planning efforts and new scientific information did not support changing associated management.

In June 2023 draft text was provided for review, including a draft range of alternatives and associated management topic language to cooperating agencies for their review and comment. Comments from the cooperating agencies were reviewed and incorporated as appropriate. In December 2023, a pre-draft version of the entire Draft EIS was provided to the cooperating agencies for review and input. As a result of these reviews, the BLM made many changes to improve the EIS.

Future meetings will be held following the release of the Draft RMP/EIS to incorporate the agencies' feedback and to refine and finalize content. This will also include development of state specific Proposed RMP amendments.

5.4 Public Involvement

Public involvement is a vital and legal component of both the land use planning and NEPA processes. Public involvement provides public opportunities to raise issues to be addressed in the planning process, disclosure of the alternatives and effects anticipated, and, in general, invests the public in the decision-making process. Guidance for implementing public involvement under NEPA is codified in 40 CFR 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of the FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on public lands. These procedures can be found in the BLM's Land Use Planning Handbook (H-1601-1). Public involvement for this RMPA/EIS includes the following four phases:

- Public scoping before NEPA analysis begins to determine the scope of issues and identify potential alternatives to be addressed in the RMPA/EIS
- Public outreach via news releases
- Collaboration with federal, state, local, and tribal governments and cooperating agencies
- Public review of and comment on the Draft RMPA/EIS, which analyzes likely environmental effects and identifies the preferred alternative

The public scoping phase of the process has been completed and is described below. Public outreach and collaboration phases are ongoing throughout the RMPA/EIS process. Information about the process can be obtained by the public at any time on the RMPA website (https://eplanning.blm.gov/eplanning-ui/project/2016719/510). This website contains background information about the project, a public involvement timeline, and copies of public information documents released throughout the RMPA/EIS process.

5.4.1 Scoping Process

The formal public scoping process for the RMPA/EIS began on November 22, 2021, with the publication of the NOI in the Federal Register (Vol. 86 No. 222). The NOI notified the public of the BLM's intent to develop RMPAs for the management of GRSG and initiated the public scoping period, which closed on February 8, 2022. During the comment period, the BLM received 258 total submissions containing 1,865 unique comments. A summary of comments received can be found on the project's ePlanning site under "documents." The issues identified during public scoping and outreach helped refine the list of planning issues, summarized in Section 3 of the Scoping Report.

Virtual Public Scoping Meetings

The BLM hosted two virtual public meetings to gather input on issues to consider while amending BLM RMPs regarding GRSG and sagebrush management, and specifically language from the 2015 and 2019 RMPAs. The virtual public forums were held on January 11, 2022, from 1:00 to 2:30 p.m. mountain standard time, and January 24, 2022, from 6:30 to 8:00 p.m. mountain standard time. The meeting recordings can be found on the project's ePlanning site within the "Documents" tab. The meetings' purpose was to provide the public with opportunities to become involved, learn about the project and the planning process, and participate in a question-and-answer session where participants were able to ask BLM specialists questions and receive live responses.

5.4.2 Project Website

The BLM maintains a national GRSG conservation website (https://www.blm.gov/programs/fish-and-wildlife/sage-grouse) as part of its efforts to maintain and restore GRSG habitat on public lands. The site is intended to help the public learn how the BLM is working on maintaining and restoring GRSG habitat. It includes background information related to government and BLM roles in GRSG conservation. In addition to the national GRSG conservation website, the BLM has an ePlanning project website with information related to this planning effort. It includes background documents, information on public meetings, and contact information (https://eplanning.blm.gov/eplanning-ui/project/2016719/510).

5.4.3 Future Public Involvement

Public participation opportunities will continue throughout the RMPA/EIS planning process. A substantial contribution to this effort is the opportunity for members of the public to review and comment on this Draft RMPA/EIS during a 90-day comment period. The BLM will consider and address substantive comments within the Proposed RMPA/Final EIS. The release of the Proposed RMPA/Final EIS will be followed by a 30-day protest period, as well as consistency reviews by the governors of states within the planning area. The resolution of legitimate protests and issues raised through the consistency reviews will culminate in the issuance of a Record of Decision (ROD) and Approved RMP Amendment by the BLM for each applicable BLM State Office.

Public meetings are planned after the release of this Draft RMPA/EIS. The purpose of these meetings is to help members of the public understand the content of the Draft RMPA/EIS to better provide meaningful and constructive comments. Information on meeting locations and dates and more information about agency outreach will be provided on the project website and other agency outreach material.

5.5 List of Preparers

This RMPA/EIS was prepared by an interdisciplinary team of staff from the BLM and Environmental Management and Planning Solutions, Inc. (see **Table 5-2**, Range-wide Preparers). In addition to the staff on this list, additional staff from numerous BLM field, district and state offices, as well as other federal, state, and local agencies reviewed and provided comments on various iterations of internal drafts of the RMPA/EIS.

Table 5-2. Range-wide Preparers

Name	Role/Responsibility	Qualifications
BLM Headquarters/National Operations Center		
Quincy Bahr	Project Manager	Quincy has a B.S. in Parks, Recreation Tourism- Natural Resource Planning and Management. He has over 25 years natural resources planning and management experience with federal land management agencies (NPS, USFS, and BLM), including over 18 years working on BLM NEPA and land use planning projects.

Name	Role/Responsibility	Qualifications
Pat Deibert	BLM National Sage-grouse Conservation Coordinator	Pat has a B.A. in biology from Earlham College, a M.S. in ecology from the University of Dayton and aPhD from the University of Wyoming in wildlife management. She has worked for two State wildlife agencies, USFWS and BLM, totaling nearly 35 years of experience with sagebrush ecosystems and greater sage-grouse.
Jennifer Schein Dobb	Socioeconomics	Jenn has a B.A. in Economics and a Master of Science degree in Agricultural and Resource Economics. She has over 10 years of experience providing federal land management agencies (USFS, and BLM) with socioeconomic support, including 6 years working on BLM NEPA and land use planning projects.
Kimberly Hackett	Livestock Grazing/Range	Kimberly has a B.S. in wildlife management with a rangeland management emphasis from New Mexico State University. She has more than 35 years of experience with the BLM, including over 20 years as a rangeland management specialist in several western states and 14 years working in the range program for headquarters.
AECOM		
Meredith Linhoff	Project Manager and Greater Sage Grouse and Wildland Fire Management	Meredith has B.S. degrees in biology and environmental science from SUNY Binghamton and a M.A. in biology from Boston University. She has 17 years of consulting experience as a biologist and NEPA planner.
Andrew Wilkins	Assistant Project Manager and Cultural Resources and Tribal Interests	Dr. Wilkins has a B.A. in Historic Preservation from the University of Mary Washington, a M.A. in Historical Archaeology from the University of Massachusetts Boston, and a PhD in Anthropology from the University of Tennessee. He has 18 years of cultural resource management and NEPA experience.
Lilly Benson	Air and Climate	Lily has a Bachelor of Arts degree in Environmental Studies from the University of California, Santa Cruz. She has two years of NEPA experience.
Lindsay Chipman	Greater Sage-Grouse	Dr. Chipman has a B.S. in Physics from the College of William and Mary, a M.S. and PhD degree in Oceanography from Florida State University. She has four years of experience as an environmental professional.

Name	Role/Responsibility	Qualifications
Amy Cordle	Air and Climate	Amy has a B.S. in Civil Engineering from Virginia Polytechnic Institute and State University. She has 26 years of experience in management, public involvement, planning, environmental analysis, and air quality analyses.
Francis Craig	Mineral Resources	Francis has B.S. degrees in Geoscience, Psychology and a Minor in Environmental Studies from Hobart College, and a M.A. in Environmental Remote Sensing and GIS from Boston University. He has 10 years of Energy and Minerals experience.
Noelle Crowley	Lands and Realty and Renewable Energy	Noelle has a B.S. in Environmental Studies from the University of Southern California and a Master of the Environment degree in Sustainability Planning and Management from the University of Colorado Boulder. She has 3 years of NEPA experience.
Sean Cottle	Lands with Wilderness Characteristics	Sean has a B.S. in Ecohydrology from the University of Nevada, Reno. He has 10 years of experience as an environmental professional.
Emma Davis	Lands with Wilderness Characteristics	Emma has a B.S. in Geography, with a minor in Renewable Energy from the University of Nevada, Reno. She has over 2 years of experience as an environmental professional.
Zoe Ghali	Socioeconomics and Environmental Justice	Zoe has a B.S. in biology from the University of California Santa Barbara and a M.S. in environmental physiology and a certificate in environmental policy from the University of Colorado Boulder. She has 15 years of experience as a NEPA specialist.
Derek Holmgren	Soil and Water	Derek has a B.A. in International Studies and a B.S. degree in Environmental Studies from Oregon State University. Additionally, he has a M.S. in Environmental Science and a M.P.A. in Environmental Policy and Natural Resources Management from Indiana University, He has 20 years of NEPA experience.
Erin Hudson	Cultural Resources	Dr. Hudson has a B.A. in Anthropology from the University of Colorado, Boulder; a M.A. in Anthropology from Georgia State University and the University of New Mexico; and a PhD in Anthropology from the University of New Mexico. She has over 15 years of experience as an environmental professional.

Name	Role/Responsibility	Qualifications
Perry Lown	Cultural Resources	Perry has a B.A. in Anthropology from the University of New Mexico. He has seven years of experience in cultural resource management.
Courtney Luxford	Mineral Resources	Courtney has a B.S. in Geology from Humboldt State University. He has 15 years of experience as a geologist and environmental professional.
Mike Meany	Lands and Realty and Renewable Energy	Mike has B.S. degrees in Geography and Environmental Planning and Policy from the University of Maine at Farmington. He has 10 years of experience as an environmental professional.
Bronson Pace	Soil, Water, and Special Designations	Dr. Pace has a B.S. in History with a minor in Zoology from Weber State University, a J.D. in Natural Resources and Environmental Law from the University of Idaho, and a PhD in Water Resources: Law, Management, and Policy from the University of Idaho. He has over 5 years of NEPA experience.
Rachel Redding	Fish and Wildlife and Special Status Species and Wildland Fire Management	Rachel has a B.S. in Wildlife Ecology and Conservation from the University of Nevada, Reno. She has five years of wildlife and natural resource experience.
Shannon Regan	Vegetation	Shannon has a B.S. degree in Marine Science, from Coastal Carolina University and a M.S. in Fisheries, Wildlife, & Conservation Biology, with a GIS minor from North Carolina State University. She has 10 years of wildlife biology experience.
Camila Reiswig	Socioeconomics	Camila has a B.A. in Economics from Portland State University and a Master of Science in Agriculture and Applied Economics from the University of Illinois, Urbana-Champaign. She has over 6 years of experience as an environmental professional
Shine Roshan	Mineral Resources	Shine has a B.S. in Physics with a concentration in Astrophysics and a M.S. in Physics from San Francisco State University. She has 5 years of experience as an environmental professional.
Eduardo Sanchez	Transportation	Eduardo has a B.S. in Natural Resources and Wildlife Management from the University of Texas at San Antonio and a Master of Natural Resources Stewardship degree in Ecological Restoration from Colorado State University. He has three years of experience as an environmental professional.

Name	Role/Responsibility	Qualifications
Andy Spellmeyer	Livestock and Wild Horses and Burros, 508 Compliance	Andy has a B.S. and a M.S. degree in Biology from Wichita State University. He has 10 years of Biology experience.
Val Stanson	Recreation	Val has a B.S. in Biology from the State University of New York at New Paltz and a Master of Public Health degree in Environmental Health from the State University of New York at Albany. She has five years of experience as an environmental professional.
Morgan Trieger	Fish and Wildlife and Special Status Species	Morgan has a B.S. in Conservation and Resource Studies with a minor in Forestry from the University of California, Berkeley. He has over 17 years of experience as an environmental professional.
Kim Murdoch	Technical Editing	Kim has a B.S. degree in marketing and entrepreneurship from the University of Colorado and a Master of Business Administration in marketing and management information systems from the University of Denver. She has 15 years of writing and editing experience.
Cindy Schad	Formatting	Cindy has a B.F.A degree in Creative Writing from Emerson College. Cindy has 30 years of formatting experience.

Table 5-3. California Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Amy McGowan	Planning Coordinator	Amy has a B.A. in biology from Colorado College and a Post-Degree certificate in Technical Writing and Communication from Pima Community College. She has over 10 years of experience in NEPA and Planning.
Arlene Kosic	Greater Sage-Grouse	Arlene has a B.S. from the State University of NY, College of Environmental Science and Forestry and over 20 years of experience as a wildlife biologist with the BLM.

Table 5-4. Colorado Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Diane Mastin Dixon	Planning Coordinator, GRSG, and ACECs	Diane has a bachelor's degree in environmental science and GIS certificate from Colorado Mesa University and a master's degree in natural resources stewardship with an emphasis on rangeland ecology and management from Colorado State University. She has 10 years of interdisciplinary experience with the BLM and has spent the last 6 years implementing sage-grouse management.
Forrest Cook	Air	Forrest holds a bachelor's degree in atmospheric science from the University of Georgia and has over 20 years of experience analyzing atmospheric phenomena. He joined the BLM in early 2013 as an air resource specialist for the Colorado State Office.
James Miller	Climate	James has a bachelor's degree in meteorology from the University of Utah and a Ph.D. in geography with an emphasis on regional climatology from Arizona State University. He has over 20 years of experience in climate and atmospheric science as a research scientist, university professor, and land management professional.
Ed Rumbold	Soil and Water	Ed has a B.S. in watershed management from SUNY College of Environmental Science and Forestry with over 30 years of aquatic resources experience with USFS as well as BLM Field, District and State Office levels. His experience includes design and implementation of stream restoration and stream crossing replacements, NEPA, aquatic resources monitoring, fluvial geomorphology, riparian resources, sediment transport, water resources, water quality and modeling.
Carol Dawson	Vegetation	Carol has a MS degree in Botany from Arizona State University and a PhD in Biology from the University of Denver. Carol has over 30 years' experience in developing and implementing conservation strategies for rare plants, demographic trend monitoring for rare plants, plant identification, and teaching.

Name	Role/Responsibility	Qualifications
Tom Fresques	Fish and Wildlife	Tom has a B.S. in fish biology from Colorado State University. He has 24 years of interdisciplinary experience with the BLM, and six years with the Arizona Game and Fish Department prior to that. For the past 2 years, he has served as the CO State Lead for Fisheries and Riparian resources under the Aquatic Resources Program.
Natalie Clark	Cultural Resources	Natalie has a B.A. in Anthropology from Colorado College and a Master of Arts degree in Anthropology from Washington State University, both with an emphasis in archaeology. She has over 15 years of experience in cultural resource management, tribal consultation, and collections management. She is currently the BLM Colorado State Archaeologist/ Deputy Preservation Officer.
Ian Barrett	Wildland Fire Management	Ian has a bachelor's degree in forestry from Colorado State University. He has 18 years of experience with fire/fuels management and has spent the last 8 years implementing treatments and managing wildfires within sage-grouse landscapes.
Dan Ben-Horin	Lands with Wilderness Characteristics	Dan has a master's degree in Urban and Regional Planning concentrating in Land Use and Environmental Planning from the University of Colorado Denver. He has over a decade of experience in public lands management with a focus on wilderness and special designations.
Laria Lovec	Livestock Grazing	Laria has an Associate of Science degree in AgBusiness from Dawson Community College and a Bachelor of Science degree in Rangeland Ecology and Management from University of Idaho. She has over 20 years of experience working for the BLM and USFS in Montana, Nevada, Nebraska, and Colorado.
Tim Finger	Recreation	Tim has dual Bachelor of Science degrees in Wildlife Management and Zoology from Washington State University. Tim has over 40 years of experience in the federal land management agencies managing recreation, visual, tourism, wilderness, Travel and Transportation Management, wild and scenic rivers and other related programs in an interdisciplinary team setting. Tim has been the BLM Colorado Recreation Program Manager since 2015.

Name	Role/Responsibility	Qualifications
Jeff Christenson	Travel and Travel and National Trails	Jeff has a Bachelor of Science degree from Oregon State University in Forestry Recreation with a minor in Planning. He has 7 years of seasonal and volunteer experience with the BLM and USFS as a Recreation Technician and 23 years as an Outdoor Recreation Planner at the Field and State Office levels.
Kemba Anderson	Mineral Resources	Kemba has a Bachelor of Science degree in Business Administration from Wesleyan College and MBA in Finance from Capella University. She has over 18 years of experience working in the minerals arena.
Carmia Wooley	Mineral Resources	Carmia has a bachelor's degree in watershed science from Colorado State University. She has 20 years of experience in environmental science and has spent the last 9 years in BLM's fluid minerals program.
Kristin Elowe	Mineral Resources and NEPA	Kristin has a bachelor’s degree in geoscience from the University of Texas at Austin and a master’s degree in petroleum geoscience from the University of London. She has 25 years of experience, 12 years in federal service with the last 2 years in planning and environmental coordination within BLM’s fluid minerals program.
Shay Romine	Mineral Resources	Shay has a BS in Geology from the University of Wyoming and completed graduate work in geophysics and mineral economics. She has spent the last 3 years as the Colorado State office Fluid Minerals Program lead and over 7 years in the Office of the Secretary, Appraisal Valuation Services, Division of Minerals Evaluation. Earlier experiences include work in the mining and environmental sectors, forestry, fire, trails and wilderness experience.
Amy Stillings	Socioeconomics and Environmental Justice	Amy has Master of Science in Agriculture and Resource Economics from Oregon State University. She has over 26 years of experience as an environmental professional.
Erin Leifeld	Tribal Interests	Erin has a bachelor’s and master’s degree in Anthropology with an emphasis in Archaeology from Colorado State University. She worked for the BLM in Colorado for 14 years as an archaeologist. She recently moved into the role of Tribal Liaison Officer for the BLM Colorado State Office in 2023.

Table 5-5. Idaho Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Sylvia Copeland	Planning Coordinator, GRSG	Sylvia has a Bachelor of Science in Biology from University of Massachusetts at Amherst and a Master of Science in Wildlife Science from Viriginia Polytechnic Institute and State University. She has worked for industry and consulting, and several state and federal agencies. She has nearly 25 years of experience in wildlife studies and management and environmental planning, with most experience on sagebrush ecosystems. She has been with BLM Idaho for 7 years and is the Sage-grouse Lead at the Idaho State Office.
Ethan Ellsworth	Water and Fish and Wildlife	Ethan has a Bachelor of Science degree in Zoology and Botany from Wisconsin-Oshkosh University, a MS in raptor Biology from Boise State University, and a PhD in Wildlife Resources from University of Idaho. He has 12 years of experience with the BLM in wildlife, threatened and endangered species, and aquatic habitat. Ethan's is the BLM Idaho Aquatic Resource State Lead.
Anne Halford	Vegetation and ACECs	Anne has a Bachelor of Science Degree from the University of Colorado-Boulder in Environmental Science and a Master of Science Degree in Plant Physiology from the University of Nevada Reno. She has 32 years of experience with the BLM in botany, plant ecology, native plant restoration and rare plant management and her current position is as the BLM Idaho State Botanist.
Paul Makela	GRSG, ACEC, Special Status Species, and Fish and Wildlife	Paul has a Bachelor of Science in Natural Resources (Wildlife Management Option) from the University of Michigan and a Master of Science degree in Wildlife Biology from the University of Montana. He has over 35 years of experience with the BLM and USFS. Most of his career has involved wildlife and habitat conservation in sagebrush ecosystems. He currently serves as lead for the BLM Idaho Wildlife Habitat Management program.

Name	Role/Responsibility	Qualifications
Christa Bruan	Geospatial Analyst	Christa has a Bachelor of Science in Wildlife Biology from Washington State University and Master of Public Administration from Boise State University. Christa has 22 years of experience working with the Bureau of Land Management as a GIS Specialist supporting multiple disciplines including botany, wildlife, planning, lands & realty, fire & fuels and recreation.
Donald Major	ACEC	Don has a Master's Degree in Wildlife Biology from Wahington State University and a PhD in Wildlife Ecology from Utah State University. He has 20 years of professional experience (USGS and BLM) working in wildlife/fire/landscape ecology in sagebrush ecosystems.
Robin Fehlau	Lands with Wilderness Characteristics and Recreation	Robin has a Bachelor of Science in Physical Geography from the University of California at Davis and a Master's Degree in Outdoor Recreation from the University of Utah. Robin 31 years of experience working for BLM, including the last 25 years as the Recreation and National Conservation Lands Lead at the BLM Idaho State Office.
Melissa Davis	Lands and Realty and Renewable Energy	Melissa has a Bachelor of Science in Business Information Systems from the University of Phoenix. She has 23 years of experience with federal agencies in lands adjudication, lands and realty, project management, and as a Field Manager. She currently serves the BLM Idaho State office as Supervisory Realty Specialist.
Devin McLemore	Locatable Minerals	Devin has a Bachelor of Science in Geology from Southern Utah University and a Professional Master's Degree in Geosciences from the University of Northern Colorado. She has over 6 years with the BLM. She detailed as the Idaho State Office Locatable Minerals Program lead. Her permanent position is in the Utah Richfield Field Office as a geologist.

Table 5-6. Montana/Dakotas Preparers

Name	Role/Responsibility	Qualifications
	BLM	
David Wood	Planning Coordinator, GRSG, ACECs	David has Bachelor of Science and Masters Degrees from University in Arizona in Fish and Wildlife Management and a PhD in Ecology and Environmental Sciences from Montana State University. He has 16 years of professional experience working in landscape ecology, natural resource management, and sagebrush systems for the BLM and USGS.
Dan Brunkhorst	Planning and NEPA Coordination, ACECs	Dan has a Bachelor of Science in Resource Conservation from the University of Montana. He has over 25 Years professional experience working in wildlife, vegetation, fisheries, recreation, range and planning with Montana/Dakotas BLM, US Forest Service and the State of Montana.
Jess McDermott	Geospatial Analyst and Fish and Wildlife	Jess has a Bachelor of Arts and a Master of Science degree in Environmental Science from Clark University. She has six years of experience with the BLM working in GIS and natural resource management.
<u>With Review and Program Support from the Following:</u>		
Mark Peterson	Air	Montana/Dakotas Program Leads, Blue Sky Zone and/or Senior Specialists for assigned areas of responsibility
Josh Buckmaster	Soil	
James Johnson	Water	
Wendy Velmen	Vegetation	
Chris Boone	Special Status Species and Fish and Wildlife	
Amy Waring	Wild Horses and Burros, Planning and Coordination	
Zane Fulbright	Cultural Resources	
Karly DeMars	Wildland Fire Management	
Jamie Tompkins	Lands with Wilderness Characteristics and National Trails	
Reyer Rens	Livestock Grazing	
Whitney Patterson	Recreation	
Brad Colin	Travel	
Cindy Eide	Lands and Realty and Renewable Energy	
John Zeise	Mineral Resources	
Tessa Wallace	Mineral Resources	
Joel Hartmann	Mineral Resources	
Dorothy VanOss	Mineral Resources	
Amy Stillings	Socioeconomics and Environmental Justice	
Marcia Pablo	Tribal Interests	

Table 5-7. Nevada Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Carolyn Sherve	Planning & Environmental Specialist, ACECs	Carolyn has a Bachelor of Arts degree in German from the University of Montana and a Master of Arts degree from the University of Nevada, Reno in Anthropology with an emphasis in Archaeology. She has fifteen years of experience in cultural resource management and sixteen years of experience working on BLM NEPA and land use planning projects.
Tim Bowden	Greater Sage-Grouse Program Lead, Wildlife Biologist	Tim has a Bachelor of Science degree from Cal Poly Humboldt and a Master of Biological Science from Montana State University, with an emphasis in Quantitative Ecology. He has 20 years of experience as a wildlife biologist within the Department of Interior (NPS, USFWS, BLM). He is the BLM Nevada State Office Sage-Grouse biologist.
Jamie Lange	Geospatial Analyst	Jamie has a Bachelor of Science degree in Animal Ecology from Iowa State University and a Master of Science in Environmental Science from the University of Illinois, with a GIS certificate. She has 7 years of experience as a GIS Specialist with the BLM Nevada State Office.
Alan Shepherd	Deputy State Director, Resources, Lands, and Planning	Alan has Bachelor of Science degrees in Range Management and Wildlife Management from the University of Idaho. He has over 34 years of professional experience working in wildlife, vegetation, range, wild horses and burros, restoration, and planning with Nevada and Wyoming BLM as well as BLM Headquarters.
Brock Uhlig	Wildland Fire Management	Brock has 27 years of experience in fire and fuels management in Nevada. He has an A.S. from Great Basin College in Elko and years of practical rangeland management experience being raised on a small ranch in northeastern Nevada.
Tyson Gripp	Wildland Fire Management	Tyson has a Bachelor of Science degree in Rangeland Management from Oregon State University. He has 22 years of experience in range, post fire rehabilitation, and fuels management in Nevada.
Dylan Rader	Wildland Fire Management	Dylan has a Bachelor of Science degree in Education and Fire Ecology from the University of Nevada. He has 28 years of experience in fire and fuels management in Nevada.

Table 5-8. Oregon Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Jim Regan-Vienop	Planning Coordinator, Wildland Fire Management, Research Natural Areas	Jim has a Bachelor of Art's degrees in biology from Humboldt State University, California and a Master of Science degree in Regional and Community Planning from the University of Texas, Austin. He has more than 30 years of planning and project management experience in many different locations and levels of government, including eight years as a Planning & Environmental Coordinator at the Oregon/Washington BLM State Office in the Branch of Planning, Monitoring, Social Sciences.
Angel Dawson	Planning and Environmental Coordinator	Angel has a bachelor's degree from Reed College and a master's degree from the University of Oregon both in anthropology. She has 35 years of federal land management experience (BLM and USFS) including 20 years as a natural resource advisor and seven years as a cultural and tribal program specialist.
Mike Brown	Air, Soil, and Water	Mike has Master of Science degree in Geology, a graduate degree Geography, a Bachelor of Science in Geology and a Bachelor of Science in Natural Resources and Environmental Sciences from Kansas State University. Mike has 20 years of federal land management experience (BLM, USFS, NPS) which includes experience in land management planning and implementation for water resources and soils related actions, and fire, fuels and emergency management.
Stacy Johnson	Vegetation	Stacy has a Bachelor of Science degree in Botany from Northern Arizona University. She has 19 years of experience as a Botanist spanning several western states and ecoregions. She is a coauthor of the Service First publication "Rare Plants of Southwestern Oregon" (2018). She is the Invasive Species Program lead for Oregon Washington BLM State Office Branch of Biological Resources.

Name	Role/Responsibility	Qualifications
Sarah Canham	Vegetation and ACECs	Sarah has a Bachelor of Science degree in Ethnobotany from the University of Massachusetts, Amherst and a Master of Forest Science degree from the School of Forestry & Environmental Studies at Yale University. She has over 17 years of Federal employment in botanical resources, across four states, with the NPS, USFWS, USFS, and 13 years with the BLM Oregon. Sarah is the Plant Conservation & Restoration Program Lead for Oregon/Washington BLM.
Glenn Frederick	GRSG and Fish and Wildlife	Glenn has a Master of Science degree in wildlife management from Humboldt State University. He has 30 years of experience as a wildlife biologist, including 11 years as the BLM ORWA Wildlife Program Lead and Greater Sage-grouse Biologist.
Rob Huff	Special Status Species	Rob has a bachelor's degree in Ecology and Evolutionary Biology from Northwestern University in Evanston IL. Rob has 36 years of federal experience with USFS and BLM as a wildlife biologist and general biologist, and currently serves as the Conservation Planning Coordinator in the Interagency Sensitive and Special Status Species Program for BLM Oregon/Washington and Region 6 of the Forest Service.
Kelli Van Norman	Planning Coordinator and Sage-Grouse Coordinator	Kelli has a Bachelor of Science degree in Geography with a minor in Biology from University of Oregon and a Master of Science degree in Forest Science from Oregon State University with an emphasis on landscape ecology disturbance. She has 25 years federal land management experience (BLM, USFS) including 18 years working on PNW Sensitive Species.
Emily Lent	Wild Horses and Burros	Emily has a Bachelor of Science in Rangeland Management & Natural Resources from the University of Arizona. 17 years of experience BLM Rangeland & Natural Resource Management. She currently works as a Rangeland Management Specialist in the Oregon/Washington State Office Branch of Biological Resources.

Name	Role/Responsibility	Qualifications
Heather Ulrich	Cultural Resources	Heather received her bachelors degree in Anthropology in 2001 from the University of Oregon and then her Masters in Anthropology with a focus on Archaeology in 2009. She has worked permanently for the BLM in Oregon since 2009 first as a District Archaeology, then as the OR/WA Cultural and Paleontological Program Lead. She is currently the OR/WA Tribal Liaison.
David Lachapelle	Wildland Fire Management	David is the Deputy Fire Management Officer (Fuels) for Vale BLM. He has 34 years in fire and fuels management with the Payette National Forest and Vale BLM. He was educated at Oregon State University, University of Idaho, Colorado State University, and Treasure Valley Community College.
Lauren Pidot	Lands with Wilderness Characteristics	Lauren has 15 years of experience with the BLM, primarily focused on NEPA and planning and national conservation lands. She has a BA in Government from Wesleyan University and an MS in Environmental Policy and Planning from the University of Michigan.
Rebecca Carter	Livestock Grazing	Rebecca has a Bachelor of Science degree in Earth Sciences with emphasis in range management and ecology from Montana State University. She has 20 years' experience with the government and has worked in the fields of cartography, forestry and rangeland management. She is the OR/WA Rangeland Management program lead and OR/WA Emergency Stabilization and Burned Area Rehab (ES&R) program lead.
Dan Davis	Recreation	Dan has a Bachelor of Science degree in sociology from Linfield University, and a Master of Business Administration, with a concentration in Environmental Compliance and Sustainability from Southern New Hampshire University. He has eight years as an Outdoor Recreation Planner.
Chris Knauf	Travel and National Trails	Chris has a Bachelor of Science degree in biology and environmental science from Evergreen State College in Olympia. Chris has worked for the BLM as a Biologist, Natural Resource Specialist, and Project Manager for 6 years, and an Outdoor Recreation Planner for 18 years.

Name	Role/Responsibility	Qualifications
Trisha Skerjanec	Lands and Realty and Renewable Energy	Trisha has an Associates Degree in Paralegal Studies. She has spent 27 years working from the Vale District Office. She is a Realty Specialist for the Oregon State Office.
Greta Krost	Mineral Resources	Greta has a Bachelor of Science in geology from Portland State University. Greta has 18 years of experience in managing and administering the federal mineral estate. Greta worked for the USFS for 7 years and has currently worked for the BLM for 11 years. Greta is a State Registered Geologist with the State of Oregon.
Stewart Allen	Socioeconomics and Environmental Justice	Stewart has been the Zoned Socioeconomic Specialist (California, Oregon/Washington and Alaska), in the Oregon State Office, Branch of Planning, Monitoring, and Social Science, since 2013. He has dual B.A.s in Psychology and Mass Communications from the University of Utah, an M.A. in Psychology from Claremont Graduate School, and a Ph.D. in Forestry from the University of Montana. He has 43 years of experience in social science aspects of natural resource management, including 29 years as a Federal employee with the Tennessee Valley Authority, USFS, USFWS, NOAA Fisheries, and BLM.
Paul Whitman	Planning and Environmental Coordinator, Lakeview District	Paul has a BA in Biology, Illinois Wesleyan University; MS in Zoology, Southern Illinois University - Carbondale
Jerome (Ted) Benson	Natural Resource Specialist (weeds)- Baker City Field Office	Ted Benson has a Masters of Science in forestry from Stephen F. Austin State University. He has served on Forestry, Weeds, Recreation, and Water Quality Interdisciplinary Teams over a 25 year career with the BLM.
Jonah Blustain	Field Manager - Malheur Field Office	Jonah has a Bachelor of Arts degree from Boston University in Anthropology and Archaeology and a Master of Arts in Anthropology from the University of Nevada, Reno. He has 16 years of natural and cultural resource management experience in the consulting industry and the BLM.
Caryn L. Burri	Planning and Environmental Specialist	Caryn has a Bachelor of Science in Natural Resource Management with 16 years in government service and 3 years as a Planning & Environmental Coordinator/Project Manager with the BLM.

Name	Role/Responsibility	Qualifications
Annie Franks	Forestry Technician- Baker City Field Office	Annie has a Bachelor of Science in Exercise Science and a Masters of Science in Exercise Science from Central Washington University and a non-degree seeking credits in Forestry through Oregon State University. She has worked for the BLM for 16 years, all in the Forestry discipline and is a Certified Cruiser/Appraiser and Certified Check Scaler, through the BLM.
Susan Fritts	Natural Resource Specialist- Malheur Field Office	Susan has a Bachelor of Science degree in biology with a botany emphasis and a minor in ecology from Washington State University. She has 25 years of experience as a botanist working for both the USFS and BLM.
Michele McDaniel	Supervisory Rangeland Management Specialist- Malheur Field Office	Michele has a Bachelors of Science Degree in Natural Resource Management from the University of Nevada Reno, College of Agriculture, Biotechnology, & Natural Resources. She has over 20 years of experience with the BLM in natural resource management and planning.
Megan McGuire	Wildlife Biologist- Malheur Field Office	Megan McGuire has a Bachelor of Science in Biology from Colorado Mesa University and 20 years experience in wildlife biology.
Shelli Pence	Land Law Examiner- Baker Field Office	Shelli Pence is the Land Law Examiner for the Baker Field Office and is currently working as the Realty Specialist for the Malheur Field and Baker Field Office, and the Vale District. Shelli has worked for the Vale District BLM since 2010 and for the federal government since 1998. She is a fully qualified Land Law Examiner with extensive administrative experience.
Amber M. Pike	Geologist	Amber has a Bachelor of Science in Geology from University of South Alabama and Master of Science in Geology/Geochemistry from Northern Illinois University. She has eight years as a Geologist with two years in private industry and six years with the federal government. with the federal government.
Kari A. Points	Outdoor Recreation Planner-Jordan Field Office	Kari has Bachelor of Science degree in Environmental Science from University of Kansas and a Master of Arts degree in Environmental Science from University of Idaho. She is an American Institute of Certified Planners (AICP #018426, July 2003). She has 29 years of experience as NEPA project manager and 14 years at the Vale BLM as an Outdoor Recreation Planner.

Name	Role/Responsibility	Qualifications
John G. Quintela	Fishery Biologist- Baker City Field Office	John has a Bachelor of Science degree in Environmental Science from Lubbock Christian University and a Master of Science degree in Fishery Resources from the University of Idaho. He has 23 years of experience as a fisheries biologist; seven years with the Forest Service in Idaho, Montana, and Oregon; and has served as the Fisheries Biologist for the BLM Vale District Baker Field Office for the last 16 years.
John A. Rademacher	Supervisory Natural Resource Specialist- Baker City Field Office	John has a Bachelor of Science from the University of Idaho in Range Management and Ecology and a Master of Science in Ecology from the University of Toledo. He has co-authored three peer reviewed manuscripts and a master's thesis on subjects related to carbon storage/allocation and habitat fragmentation. He has worked in range management for 22 years and has been a supervisor for 18 years.
Sarah Sherman	Acting Field Manager- Baker Field Office	Sarah has a Bachelor of Science in environmental science and a Bachelor of Arts in English from the University of Virginia. She has two years of experience as a NEPA planner and five years in BLM Resources and Planning.
Lynne F. Silva	Range Technician-Malheur Field Office	Lynne has worked for the BLM for 32 years, including 30 years in the Weed Program/Invasive Species. She holds DOI/BLM Pesticide Applicator's Certification in 5 categories (Ag Plant Pests, Aquatic Pests, Forest Pests, Rights of Way Pests and Research and Development), and an Oregon Department of Agriculture Public Applicator's License in Agriculture Plant Pests.
Daniel J. Thomas	Range Technician-Malheur Field Office	Daniel has 20 years at the Vale District BLM working in the Range and National Conservation Lands System programs.

Name	Role/Responsibility	Qualifications
Brian T. Woolf	Outdoor Recreation Planner- Baker City Field Office	Brian has a Bachelor of Science Degree in Recreation Resource Management from Oregon State University with an emphasis in Adventure Tourism. Brian spent six years as a primary firefighter before pursuing more experience in Recreation Management. He has worked for the BLM since 2007 as Lead Interpretive Specialist at Garnet Ghost Town, Work Leader for the Upper Missouri River Breaks, Interpretive Center Director at the Upper Missouri River Breaks, and two detailed assignments as Supervisory Recreation Planner and Interpretive Center Manager with cumulatively, 17 years in BLM Recreation Resource Management.
Melissa N. Yzquierdo Primus	Natural Resource Specialist- Baker City Field Office	Melissa has a Bachelor of Science in Wildlife Resources from the University of Idaho with 23 years with the BLM in resources for wildlife and botany.

Table 5-9. Utah Preparers

Name	Role/Responsibility	Qualifications
	BLM	
Tia Arbogast	Planning Coordinator, GRSG, and ACECs	Tia has a Bachelor of Arts degree in Environmental Studies from University of North Carolina at Greensboro and a Master in Natural Resources – Policy and Administration from North Carolina State University. She has 8 years of experience as a NEPA practitioner.
Christine Fletcher	Planning Coordinator and GRSG	Christine has a Bachelor of Science from the University of Wyoming in Wildlife Biology & Management with a minor in Botany. She has worked for three federal agencies and has 24 years of experience in wildlife management, GRSG, and NEPA.
Ben Gaddis	Planning Coordinator	Ben has Bachelor of Science degrees in environmental science from Willamette University and a Master of Environmental Management in watershed management from Duke University. He has 17 years of experience as a NEPA practitioner.
Erik Vernon	Air	Erik has a Bachelor of Science and a Master of Science from the University of Utah in Meteorology. He has over 21 years of experience in the fields of boundary layer meteorology, atmospheric dispersion, climate, air quality, and noise.
Jared Dalebout	Soil and Water	Jared has a Bachelor of Science degree in Geology at Weber State University 16 years federal experience with BLM.

Name	Role/Responsibility	Qualifications
Jason Burgess Conforti	Vegetation	Jason has a PhD from the University of Arkansas in Environmental Dynamics with a focus on soil science and hydrology. He has worked for NRCS and BLM and has experience in assessing management effects on ecological health.
Adrienne Pilmanis	Vegetation	Adrienne has a B.A. in Biology, a M.S. in Botany (Paleoecology) and a PhD (ABD) in Botany (Biogeochemistry) with research projects focused on global change impacts in arid ecosystems. She has 19 years working for BLM Natural Resources in several states and leads the Colorado Plateau Native Plant Program.
Aaron Roe	Vegetation and Special Status Species	Aaron has a Master of Science in Botany from the University of Wyoming. He has worked fourteen years of experience with the BLM in botany; special status species management, including Endangered Species Act implementation; and NEPA.
Cassie Mellon	Vegetation, Special Status Species, and Fish and Wildlife	Cassie has a Master of Science in Fisheries from the University of Alaska Fairbanks. She has fifteen years of experience with state and federal agencies in sensitive aquatic species and aquatic habitat management.
Josh Robbins	Vegetation	Josh has a Bachelor of Science from the University of Nevada, Reno, in Animal Science, with a minor in Rangeland Management. He has work for the BLM for 16 years, participating in many resource management disciplines; including, rangeland management, wildlife, fisheries, fire, and ES&R.
Jared Reese	GRSG	Jared has a Bachelor of Science in Wildlife Science from Utah State University. He has over 15 years of BLM experience ranging from grazing, oil and gas development and wildlife management. He has solely been focused on Sage-grouse management for the BLM since 2016.
Dave Cook	Special Status Species and Fish and Wildlife	Dave has a Bachelor of Science in Wildlife Biology from the University of Idaho. He has 35 years of wildlife management experience with 17 years with Utah DNR, 5 years with Texas Parks and Wildlife and 13 Years with the BLM.
Victor (Gus) Warr	Wild Horses and Burros	Gus has a Bachelor of Science degree from Utah State University. He has 35 years of experience in wild horse and burro management with the BLM.

Name	Role/Responsibility	Qualifications
Nate Thomas	Cultural Resources & Tribal Interests	Nate has a Bachelor of Science from Utah State University in Anthropology, and a Master's degree in Archaeology and Ancient History from the University of Leicester. He has worked for federal agencies, including the BLM and USFS in Nevada and Utah since 2000.
Nicole Lohman	Cultural Resources	Nicole has a Masters in Applied Anthropology with a focus in Archaeology. She serves as the Assistant State Archaeologist for BLM Utah, with over 13 years of service as an archaeologist for the Federal Government with both the National Park Service and BLM.
Geoffrey Wallin	Wildland Fire Management	Geoff studied Environmental Science at Utah State University. He has worked federally (BLM, USFS) in fire suppression fuels management for the last 28 years in Nevada, Montana, Oregon, and Utah. He is currently BLM Utah's Fuels Program Lead.
Mark Williams	Wildland Fire Management	Mark has a PhD in Fire Ecology and has worked for two federal agencies in multiple states across the western US. He has more than 20 years of experience with NEPA related to Hazardous Fuels and Fire Management.
Ray Kelsey	Lands with Wilderness Characteristics	Ray has a Master of Science in Parks, Recreation, and Tourism with a Natural Resources Management emphasis from the University of Utah. He previously worked in the field for 15 years as a BLM Outdoor Recreation Planner before joining the staff at the Utah State Office as the National Conservation Lands Program Lead in 2019.
Alan Bass	Livestock Grazing	Alan has a Bachelor of Science in Botany from Weber State University and a Bachelor of Science in Rangeland Resources from Utah State University. Alan has over 17 years of experience in the Rangeland Management Program.
Josh Robbins	Livestock Grazing	Josh has a Bachelor of Science in Animals Sciences with a minor in Rangeland Management from the University of Nevada, Reno. He has over 16 years of BLM experience in the Rangeland Management Program.
Michelle Campeau	Lands and Realty and Renewable Energy	Michelle has over 18 years of service with the BLM primarily in Land and Realty processing Land Use Authorizations in Southern Utah. Michelle currently serves as BLM's Renewable Energy Program Coordinator for Colorado, New Mexico, Utah and Wyoming.

Name	Role/Responsibility	Qualifications
Mary Higgins	Lands and Realty and Renewable Energy	Mary has over 30 years' experience working in BLM, Utah, in the Cadastral Survey and Oil and Gas Programs, including 14 years in the Lands and Realty Program working on all types of rights-of-way projects.
Terry Snyder	Mineral Resources	Terry has a B.A. in Geology and a Professional Geologist license from the State of Utah. She has over 40 years of BLM experience as a field office, district office and a state office geologist and currently serves as the Utah Solid Minerals Branch Chief. In these positions she created with the assistance of contractors a technical guidance entitled "Verification of Risk at Abandoned Mine site on BLM Management Lands in Utah."
Nathan Packer	Mineral Resources	Nate has a Bachelor of Science in Fisheries and Wildlife and a Master of Natural Resources from Utah State University. He has 24 years of experience with the BLM in Wildlife, Hazardous fuels, Fluid Minerals, and NEPA Planning. He currently works on Oil, Gas, and Geothermal leasing.
Rob Sweeten	National Trails	Rob has a Bachelor of Landscape Architecture and Environmental Planning from Utah State University. He has 31 years of experience as an employee of the BLM. He has served as a District and State Landscape Architect and for 13 years and the BLM Administrator for the Old Spanish National Historic Trail.
Matt Fockler	Socioeconomics and Environmental Justice	Matt has two Bachelor of Arts degrees in history and English from the University of Nevada, Reno, a Master of Science in Geography from the University of Nevada, Reno, a M.A. in Education from Sierra Nevada College, and a PhD in Earth Sciences (Geography and Natural Resource Management) from Montana State University. He has two years of experience as the BLM's Great Basin Zone Socioeconomic Specialist (ID, NV, UT).
Amber Koski	Planning & Environmental Specialist	Amber has a Bachelor of Arts in Anthropology (archaeology emphasis) and a M.S in Environmental Policy and Management. She has 20 years of Federal service and currently serves as a National Conservation Area Manager for BLM Colorado.

Table 5-10. Wyoming Preparers

<table>
<tr><th>Name</th><th>Role/Responsibility</th><th>Qualifications</th></tr>
<tr><th colspan="3">BLM</th></tr>
<tr><td>James Halperin</td><td>Planning Coordinator and Soil</td><td>Jamie has a Bachelor of Arts in Political Science, an AAS in Geographic Information Systems, and Master of Science and PhD degrees in forestry. He has 20 years of environmental planning and project implementation experience.</td></tr>
<tr><td>Matt Holloran</td><td>Planning Coordinator, GRSG, and ACECs</td><td>Matt has a BS in biology from Colorado College, and an MS and PhD in zoology and physiology from the University of Wyoming. He has 24 years of sagebrush-dependent wildlife management and environmental planning experience.</td></tr>
<tr><td>Tia Flippin</td><td>Geospatial Analyst</td><td>Tia has a Bachelor of Science degree in Environmental Biology from Fort Lewis College and a Masters of Science degree in Geographic Informational Science and Technology from the University of Southern California. She has 10 years experience in geospatial data generation, standardization and management.</td></tr>
<tr><td colspan="3"><u>With Review and Program Support from the Following:</u></td></tr>
<tr><td>Ryan McCommon</td><td>Air</td><td rowspan="16">Wyoming BLM Program Leads and/or Senior Specialists for assigned areas of responsibility</td></tr>
<tr><td>Chad Mickschl</td><td>Water</td></tr>
<tr><td>Kim Wahl</td><td>Vegetation</td></tr>
<tr><td>Mark Goertel</td><td>Vegetation and Livestock Grazing</td></tr>
<tr><td>Chris Keefe</td><td>Special Status Species and Wildlife</td></tr>
<tr><td>June Wendlandt</td><td>Wild Horses and Burros</td></tr>
<tr><td>Georges (Buck) Damone</td><td>Cultural Resources and Tribal Interests</td></tr>
<tr><td>Reed Oldenburg</td><td>Wildland Fire Management</td></tr>
<tr><td>Gwenan Poirier</td><td>Wildland Fire Management</td></tr>
<tr><td>Katy Kuhnel</td><td>Lands with Wilderness Characteristics, Travel, and National Trails</td></tr>
<tr><td>Travis Bargsten</td><td>Lands and Realty and Renewable Energy</td></tr>
<tr><td>Kurt Triscori</td><td>Mineral Resources</td></tr>
<tr><td>George Varhalmi</td><td>Mineral Resources</td></tr>
<tr><td>Allen Stegeman</td><td>Mineral Resources</td></tr>
<tr><td>Karsyn Lamb</td><td>Socioeconomics and Environmental Justice</td></tr>
<tr><td>Susan Hunter Norman</td><td>Geospatial Analyst</td></tr>
</table>

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Glossary Terms

Acquisition. Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, donations, or receipts from the Federal Land Transaction Facilitation Act sales or exchanges.

Adaptive management. A type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices.

Allocation. The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions.

Amendment. The process for considering or making changes in the terms, conditions, and decisions of approved Resource Management Plans or management framework plans. Usually only one or two issues are considered that involve only a portion of the planning area.

Area of Critical Environmental Concern (ACEC). Areas within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The identification of a potential ACEC shall not, of itself, change or prevent change of the management or use of public lands.

Artifact. A human-modified object, often appearing on an archaeological site, that typically dates to over 50 years in age.

Authorized Officer. Any employee of the BLM to whom authority has been delegated to perform the duties described.

Avoidance/avoidance area. These terms usually address mitigation of some activity (i.e., resource use). Paraphrasing the CEQ Regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts of an action. Therefore, the term "avoidance" does not necessarily prohibit a proposed activity, but it may require the relocation of an action, or the total redesign of an action to eliminate any potential impacts resulting from it. Also see *"right-of-way avoidance area"* definition.

Best management practices (BMPs). A suite of techniques that guide or may be applied to management actions to aid in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Biologically significant unit (BSU). A geographical/spatial area that includes Greater Sage-Grouse priority habitat management areas that is used as the basis for comparative calculations to support evaluation of changes to habitat. In Utah, each BSU correlates to the priority habitat management area within a population area.

Collocation (communication sites). The installation of new equipment/facilities on or within or adjacent to existing authorized equipment/facilities or within a communication site boundary as designated in the Communication Site Plan.

Collocation (electrical lines). Installation of new rights-of-way adjacent to current ROWs boundaries, not necessarily placed on the same power poles.

Collocation (other rights-of-way). The installation of new rights-of-way within the existing footprint of an approved ROW boundary or adjacent to an approved ROW boundary.

Communication site. Sites that include broadcast types of uses (e.g., television, AM/FM radio, cable television, broadcast, translator) and non-broadcast uses (e.g., commercial or private mobile radio service, cellular telephone, microwave, local exchange network, passive reflector).

Controlled surface use (CSU). CSU is a category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values and is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads). On BLM-administered lands, CSU areas are open to fluid mineral leasing but the stipulation allows the BLM to require special operational constraints, or the activity can be shifted more than 200 meters (656 feet) to protect the specified resource or value.

Cultural resources. The present expressions of human culture and the physical remains of past activities, such as historic buildings, structures, objects, districts, landscapes, and archaeological sites. These resources can be significant in the context of national, regional, or local history, architecture, archaeology, engineering, or culture. They may also include sacred sites and natural features of landscapes that are significant to living communities.

Cultural resource inventories. Both a systematic review of records, files, and archived databases and a survey to determine the past human use of an area.

Cumulative Impact (Effect). The impact on the environment that results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

De-watering. The process of removing surface and ground water from a particular location.

Designated Roads and Trails. Those roads and trails that are specifically identified by the BLM as the only allowable routes for motor vehicle travel in the specific area involved. Travel on designated roads and trails may be allowed seasonally or yearlong. Additional roads or trails may be constructed and authorized for travel as need dictates in conformance with the land use plan or activity plan.

Disposal lands. Transfer of public land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act of 1926, Desert Land Entry or other land law statutes.

Disturbance response groups. A process that examines local knowledge, soil mapping data and published literature on soils, plant ecology, plant response to various disturbances, disturbance history of the area, and any other important attributes necessary to sort pre-existing ecological sites into groups of ecological sites based on their responses to natural or human-induced disturbances.

Easement. A right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecological site. A distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Ecological site description. A report that provides detailed information about an ecological site.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geological agents.

Ethnographic resources. Variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users.

Exchange. A transaction whereby the federal government receives land or interests in land in exchange for other land or interests in land.

Exclusion areas. An area on the public lands where a certain activity(ies) is prohibited to ensure protection of other resource values present on the site. The term is frequently used in reference to lands/realty actions and proposals (e.g., rights-of-way, etc.), but is not unique to lands and realty program activities. This restriction is functionally analogous to the phrase "no surface occupancy" used by the oil and gas program and is applied as an absolute condition to those affected activities. These less restrictive term is avoidance area. Also see "right-of-way exclusion area" definition.

Exploration. Active drilling, geophysical operations, surface sampling and trenching, or smallscale mining or similar activities, to: a. Determine the presence of the mineral resource; or b. Determine the extent of the reservoir or mineral deposit.

Feature. In reference to archaeology, a feature is a collection of one or more contexts representing some non-portable activity, such as a hearth or wall.

Federal mineral estate. Subsurface mineral estate owned by the US and administered by the BLM. Federal mineral estate under BLM jurisdiction is composed of mineral estate underlying BLM lands, tribal lands, privately owned lands, and state-owned lands.

Federal mineral interest. See Federal mineral estate.

Fine scale. Scale used in the GRSG Habitat Assessment Framework to describe seasonal use areas.

Fluid minerals. Oil, gas, coal bed natural gas, and geothermal resources.

Fully Processed Grazing Authorization. A grazing permit or lease that has been issued in accordance with all applicable laws, regulation, and policy including the NEPA, Endangered Species Act (ESA), and decision processes provided in 43 CFR 4160.

General Habitat Management Areas. Occupied (seasonal or year-round) habitat outside of priority habitat. These areas have been identified by the BLM/Forest Service in coordination with respective state wildlife agencies.

Geophysical exploration. Efforts to locate or better define mineral or oil and gas deposits, using geophysical methods such as seismic refraction, electrical resistivity, induced magnetism, or other methods.

Geothermal energy. Natural heat from within the Earth captured for production of electric power, space heating, or industrial steam.

Habitat. Existing GRSG habitat currently provides resources (such as space, food, cover, and water) and environmental conditions (such as temperature, precipitation, presence or absence of predators and competitors) that promote occupancy of sage-grouse during a particular stage of its annual life cycle (e.g., breeding, nesting).

Indicators. Factors that describe resource condition and change and can help the BLM determine trends over time.

Invasive Species (Invasive Plant Species, Invasives). An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. The species must cause, or be likely to cause, harm, and be exotic to the ecosystem it has infested before considered invasive.

Key areas of critical environmental concern. Special management areas that have been identified as having a high utility for GRSG conservation. These land allocations were designated in previous RMPs to protect other relevant and important resource values; however, they also contain quality GRSG habitat, are within PHMA, and contain leks. They should be priority areas for GRSG management as well as the values for which the ACEC was designated; site-specific ACEC management plans will be prepared at the implementation level.

Key research natural area. A special type of ACEC that was designated in a previous RMP to protect specific intact representative native plant communities. These areas are in PHMA and are used for long term vegetation monitoring of relatively unaltered native plant communities important for GRSG. These areas can provide baseline vegetation information on natural processes such as successional changes, and future vegetation shifts in the plant communities from changes in precipitation and temperature (climate change). Key RNAs either contain GRSG leks or are within 0.1 to 4 miles of leks and are, or likely are, used for nesting, brood-rearing, foraging, breeding or wintering.

Land tenure adjustments. Land ownership or jurisdictional changes. To improve the manageability of BLM-administered lands and their usefulness to the public, the BLM has numerous authorities for repositioning lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land pattern improvements are completed primarily through the use of land exchanges but also through land sales, through jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases.

Leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. These include energy-related mineral resources such as oil, natural gas, coal, and geothermal, and some nonenergy minerals, such as phosphate, sodium, potassium, and sulfur. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

Lease. Section 302 of the Federal Land Policy and Management Act of 1976 provides the BLM's authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for purposes such as a commercial filming, advertising displays, commercial or noncommercial croplands, apiaries, livestock holding or feeding areas not related to grazing permits and leases, native or introduced species harvesting, temporary or permanent facilities for commercial purposes (does not include mining claims), residential occupancy, ski resorts, construction equipment storage sites, assembly yards, oil rig stacking sites, mining claim occupancy if the residential structures are not incidental to the mining operation, and water pipelines and well pumps related to irrigation and nonirrigation facilities. The regulations establishing procedures for processing these leases and permits are found in 43 CFR 2920. (BLM)

Lease stipulation. A modification of the terms and conditions on a standard mineral lease form established at the time of the lease sale.

Lek. An area of sparse vegetation within sagebrush habitats where male GRSG display to and breed with females. An important factor in lek location is proximity to and configuration and abundance of nesting habitats.

Lessee. A person or entity authorized to use and occupy National Forest System land under a specific instrument identified as a lease. Forest special use leases are limited to authorize certain wireless communication uses. Leases are also used for certain mineral leasable activities.

Linkage and Connectivity Habitat Management Area (LCHMA). BLM-administered lands that have been identified as broader regions of connectivity important to facilitate the movement of Greater Sage-Grouse and maintain ecological processes.

Linkage Management Area. Areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and to maintain ecological processes.

Locatable minerals. Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale (17 Stat. 19-96).

Mid scale. Scale used in the GRSG Habitat Assessment Framework to describe GRSG subpopulations.

Mineral. Any naturally formed inorganic material, solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), and salable (subject to the Materials Act of 1947).

Mineral entry. The filing of a claim on public land to obtain the right to any locatable minerals it may contain.

Mineral estate. The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mining claim. A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, millsite, and tunnel site.

Mining Law of 1872, as amended. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the “Mining Law.”

Mitigation. Includes specific means, measures, or practices that could reduce, avoid, or eliminate adverse impacts. Mitigation can include avoiding the impact altogether by not taking a certain action or parts of an action; minimizing the impact by limiting the degree of magnitude of the action and its implementation;

rectifying the impact by repairing, rehabilitation, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments.

Modification. A change to the provisions of a lease stipulation, either temporarily or for the term of the lease. Depending on the specific modification, the stipulation may or may not apply to all sites within the leasehold to which the restrictive criteria are applied.

Naturalness. Refers to whether an area looks natural to the average visitor who is not familiar with the biological composition of natural ecosystems versus human-affected ecosystems. New, nonrecreational modifications are not visually obvious or evident from trails.

National Register of Historic Places. A listing of resources that are considered significant at the national, state, or local level and that have been found to meet specific criteria of historic significance, integrity, and age.

No surface occupancy (NSO). A major constraint where use or occupancy of the land surface for fluid mineral exploration or development and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads) are prohibited to protect identified resource values. Areas identified as NSO are open to fluid mineral leasing, but surface occupancy or surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area.

Nonenergy leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. Nonenergy minerals include resources such as phosphate, sodium, potassium, and sulfur.

Priority habitat management areas (PHMA). Areas prioritized for managing Greater Sage-Grouse populations (management is only applicable to actions on BLM-administered lands). These management areas include high-quality habitat and may also include areas with poor or potential habitat, and nonhabitat. PHMA largely coincides with the State of Utah's Sage-Grouse management areas (SGMA). Within the SGMA, the State identified areas of seasonal habitat, nonhabitat, and opportunity areas, though management is focused on the habitat. PHMA includes areas that include all the seasonal habitats for the corresponding Greater Sage-Grouse populations, including breeding, late brood-rearing, winter areas, and migration or connectivity corridors.

Required design features (RDFs). Means, measures, or practices intended to reduce or avoid adverse environmental impacts. A suite of features that would establish the minimum specifications for certain activities (i.e., water developments, mineral development, and fire and fuels management) and mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of best management practices. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level.

Remoteness. Represents how far a visitor is from a road or trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting.

Renewable energy. Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro, and biomass. Although particular geothermal formations can be depleted, the natural heat in the Earth is a virtually inexhaustible reserve of potential energy.

Rights-of-way (ROW). Public lands authorized to be used or occupied for specific purposes pursuant to a right-of-way grant, which are in the public interest and which require ROWs over, on, under, or through such lands.

Right-of-way avoidance area. An area identified through resource management planning to be avoided but may be available for ROW location with special stipulations.

Right-of-way exclusion area. An area identified through resource management planning that is not available for ROW location under any conditions.

Riparian Area. A form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (See BLM Manual 1737). Included are ephemeral streams that have vegetation dependent upon free water in the soil. All other ephemeral streams are excluded.

Runoff. The total stream discharge of water, including both surface and subsurface flow, usually expressed in acre-feet of water yield.

Sagebrush Focal Area. Areas identified by the USFWS that represent recognized "strongholds" for Greater Sage-Grouse that have been noted and referenced as having the highest densities of Greater Sage-Grouse and other criteria important for the persistence of Greater Sage-Grouse.

Spatial relationships. How one object is located in space relative to another, important for spatial analysis of cultural resources.

Split estate. This is the circumstance where the surface of a particular parcel of land is owned by a different party than the minerals underlying the surface. Split estates may have any combination of surface/subsurface owners: federal/state; federal/private; state/private; or percentage ownerships. When referring to the split estate ownership on a particular parcel of land, it is generally necessary to describe the surface/subsurface ownership pattern of the parcel.

Salable Minerals. Minerals that may be disposed of through sales and free use permits under the Materials Act of 1947, as amended. Included are common varieties of sand, stone, gravel, and clay (See also Mineral Materials).

Season of Use. A livestock grazing permit term and condition identifying the time during which livestock graze a given area to achieve management and resource condition objectives.

Special Use Authorization. A written permit, term permit, lease, or easement that authorizes use or occupancy of National Forest System lands and specifies the terms and conditions under which the use or occupancy may occur.

Stipulation (oil and gas). A provision that modifies standard oil and gas lease terms and conditions in order to protect other resource values or land uses and is attached to and made a part of individual lease requirements at the time the lease is issued. Once a mineral lease is issued, the applied stipulations cannot generally be changed or altered. Exceptions, modifications, or waivers may be granted under certain conditions outlined in the LUP. Typical lease stipulations include No Surface Occupancy (NSO), Timing Limitations (TL), and Controlled Surface Use (CSU), and Protection of Survey Corner and Boundary Line Markers. Lease stipulations are developed through the land use planning (RMP) process.

Surface Discharge. The release of produced water onto the unconfined land surface or into an existing drainage system.

Surface Disturbing Activities. An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited (WY IB-2007-029).

Surface Management Agency (SMA). Depicts surface estate Federal land for the United States and classifies this land by its active Federal surface managing agency.

Timing limitation (TL). The TL stipulation, a moderate constraint, is applicable to fluid mineral leasing, all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads), and other surface-disturbing activities (i.e., those not related to fluid mineral leasing). Areas identified for TL are closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames. This stipulation does not apply to operation and basic maintenance activities, including associated vehicle travel, unless otherwise specified. Construction, drilling, completions, and other operations considered to be intensive in nature are not allowed. Intensive maintenance, such as workovers on wells, is not permitted. TLs can overlap spatially with NSO and CSU, as well as with areas that have no other restrictions.

Traditional cultural property (TCP). A property that is eligible for inclusion in the National Register of Historic Places (NRHP) based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. TCPs are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community.

Transmission line. An electrical utility line with a capacity greater than or equal to 100 kilovolts or a natural gas, hydrogen, or water pipeline greater than or equal to 24 inches in diameter.

Utility corridor. Tract of land varying in width forming passageway through which various commodities such as oil, gas, and electricity are transported.

Valid existing rights. Documented, legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include but are not limited to fee title ownership, mineral rights, rights-of-way, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Vandalism. An action involving deliberate destruction or damage, in this case to cultural resources.

Watershed. The area of land, bounded by a divide, that drains water, sediment, and dissolved materials to a common outlet at some point along a stream channel (Dunne and Leopold, 1978), or to a lake, reservoir, or other body of water. Also called drainage basin or catchment

West Nile Virus. A virus that is found in temperate and tropical regions of the world and most commonly transmitted by mosquitoes. West Nile virus can cause flu-like symptoms in humans and can be lethal to birds, including Greater Sage-Grouse.

Wetlands. Those areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Withdrawal. Withdrawals are used to transfer jurisdiction of management of public lands to other federal agencies.

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