

**United States Department of the Interior
Bureau of Land Management
Burns District Office
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**BRIDGE CREEK AREA
ALLOTMENT MANAGEMENT PLANS**

**DRAFT ENVIRONMENTAL IMPACT
STATEMENT**

**DOI-BLM-ORWA-B060-2021-0004-EIS
<https://eplanning.blm.gov/eplanning-ui/project/2013546/510>**

December 19, 2024



Bridge Creek Area Allotment Management Plans

Draft Environmental Impact Statement

DOI-BLM-ORWA-B060-2021-0004-EIS



United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965, Portland, Oregon 97208
<http://www.blm.gov/or>



Dear Permittees and Interested Public:

The Bureau of Land Management (BLM) Burns District is announcing the availability of the Bridge Creek Area (BCA) Allotment Management Plans Draft Environmental Impact Statement (EIS). This document analyzes a range of alternatives related to livestock grazing of the Hammond, Mud Creek, Hardie Summer, and Hammond Fenced Federal Range (FFR) Allotments, located approximately ten miles southeast of the town of Frenchglen, Oregon. The BLM is proposing to issue one or more grazing permits associated with the four allotments within the BCA, develop four allotment management plans (one for each allotment in the BCA), and construct and maintain developments for each allotment.

All alternatives in the Draft EIS are in conformance with the Andrews Management Unit (AMU) and Steens Mountain Cooperative Management and Protection Area (CMPA) Resource Management Plans (RMP) Records of Decision (ROD), dated August 2005, as amended by the 2015 Oregon Greater Sage-Grouse (GRSG) Approved Resource Management Plan Amendment (ARMPA) ROD. All alternatives follow applicable required design features and best management practices from the 2015 Oregon GRSG ARMPA. The proposed management actions would lead to maintaining and/or making progress towards the attainment of the Oregon/Washington Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a) and ensuring any authorized grazing would not be a causal factor in non-attainment of the standards for rangeland health.

The Draft EIS is prepared in accordance with the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA). The FLPMA provides that the BLM shall manage the public lands under the principles of multiple use and sustained yield. The Draft EIS considers a range of alternative management options, and I invite you to carefully consider each alternative and its expected effects.

As a member of the public, your timely comments on the Draft EIS for the project will help the BLM formulate the Final EIS. This Draft EIS will be circulated for forty-five calendar days following U.S. Environmental Protection Agency's publication of the Notice of Availability in the Federal Register. The BLM can best use your comments and information if received within this review period.

Draft EIS comments are most helpful when they do the following:

- Present current information relevant to the analysis.
- Present reasonable alternatives, other than those already included in the Draft EIS.
- Make suggestions, with a reasonable basis, for the development of the Final EIS.
- Question, with reasonable basis, the adequacy of, method for, or assumptions used in the analysis.

- Question, with reasons, the accuracy of information contained in the Draft EIS.
- Are unique, as letters making all the same points (form letters) are considered as only one unique submission.
- Reference a specific section of the EIS and include page and line numbers where appropriate.

The BLM encourages the public to provide information and comments regarding the Draft EIS. Please submit written comments by email or U.S. mail to:

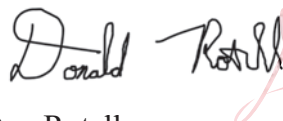
Email: BLM_OR_BU_BCA_AMP@blm.gov	U.S. Mail: Bureau of Land Management Attn: Don Rotell Burns District Office 28910 Hwy 20 W Hines, Oregon 97738

Comments, including names and street addresses of respondents, will be available for public review at the address listed above during regular business hours (8:00 a.m. to 4:30 p.m.) Monday through Friday, except holidays. The BLM may publish comments as part of the EIS document or other related documents. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware 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 your personal identifying information from public review, we cannot guarantee that we will be able to do so.

All the planning documents are posted on the BLM's ePlanning website, under "Documents" in the BCA Allotment Management Plans EIS project page at <https://eplanning.blm.gov/eplanning-ui/project/2013546/510>. If you do not have access to the internet, you may request a paper copy by contacting the BLM Burns District Office during regular business hours or by calling 541-573-4400.

Your input to this planning process is appreciated, and I look forward to your continued interest and participation. For more information or clarification regarding this document, please contact Don Rotell at 541-573-4400.

Sincerely,



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Don Rotell
Burns District Manager
BLM Oregon/Washington

EXECUTIVE SUMMARY

Within the Bridge Creek Area (BCA), there is currently no grazing preference or grazing authorization associated with four allotments: Hammond, Mud Creek, Hardie Summer, and Hammond Fenced Federal Range (FFR). The allotments are located within the Andrews Management Unit (AMU) and partially within the Steens Mountain Cooperative Management and Protection Area (CMPA). The entire project area is identified as habitat for the Greater Sage-Grouse (GRSG), has wilderness study areas (WSA), and a small amount of the Steens Mountain Wilderness (approximately thirty-eight acres). Since 1980, fire has affected approximately 38,624 acres (cumulative), with some acres burning multiple times. The burned acres have mostly been within the Hammond and Mud Creek Allotments.

The allotments have been largely ungrazed since 2014 following the BLM's decision to not renew livestock grazing authorization #3602564 (which covered all active animal unit months in the four allotments) and to remove grazing preference from the associated base property. The permittee administratively appealed this decision, and the Secretary of the Interior resolved the administrative appeal in January 2019 by instructing the BLM to reissue the grazing permit. The BLM reissued the grazing permit under a categorical exclusion, but, due to intervening on-the-ground adjustments and court orders, the 2019 BLM grazing season varied from the planned and authorized grazing. The reissued permit and related Secretarial Order were vacated and remanded to the Department by the U.S. District Court for the District of Oregon in late 2019.

In 2020, the BLM initiated an environmental assessment to analyze potential alternatives related to livestock grazing within this area. Following receipt of multiple protests of the proposed decision, on January 19, 2021, outgoing Secretary Bernhardt issued a Notice of Final Decision to apportion available forage within the Bridge Creek Allotment, assign a grazing preference, issue a 10-year livestock grazing permit and allotment management plans for the Bridge Creek Area allotments, and authorize the construction and removal of range improvements within the Bridge Creek allotments. On February 25, 2021, Western Watersheds Project, Oregon Natural Desert Association, WildEarth Guardians, and the Center for Biological Diversity appealed the decision. On February 26, 2021, the Senior Advisor to the Secretary Exercising the Delegated Authority of the Department of the Interior Assistant Secretary for Land and Minerals Management rescinded the decision and directed the BLM to "initiate any additional processes and opportunities for public involvement that it may determine appropriate under applicable law following a careful and considered review of the protests."

Allotment management plans (AMP) focus on the necessary instructions for the proper management of livestock grazing on specified public lands to meet resource condition, sustained yield, multiple use, economic, and other objectives (43 CFR 4100.0-5). These AMPs are unique because, although there was limited grazing in 2019, this area has been largely ungrazed since 2014, despite still being considered open for livestock grazing in the 2005 Andrews Management Unit (AMP)/Steens Resource Management Plans (RMP) and Records of Decisions (ROD). These allotments have had no permitted grazing connected to them since 2014, nor has any grazing preference associated with these allotments been assigned to base property since the decision to not renew that grazing permit. This grazing gap was due to legal issues and litigation

and was not considered to be rest due to resource issues. These AMPs would allow a resumption of grazing after an extended period of no grazing.

While environmental impact statements (EIS) are not typically needed to analyze the authorization of a grazing permit and development of AMPs, these specific AMPs are unique due to their history of litigation, along with related political and social concerns. The BLM has conducted several analyses of grazing on these allotments in prior National Environmental Policy Act (NEPA) documents and decided that there were no potentially significant effects from proper grazing management at that time. However, as grazing has been largely absent from the allotments since 2014, and to address the court's findings of fact in the July 16, 2019, order, the BLM has determined that it would be prudent to complete a more extensive analysis through an EIS to ensure due diligence in the BLM decision for this specific case.

In 2023, a BLM interdisciplinary team (IDT) assessed the Hammond, Mud Creek, Hardie Summer, and Hammond FFR Allotments for conformance to Oregon and Washington Standards for Rangeland Health (further referred to as Standards) and Guidelines for Livestock Grazing Management (further referred to as Guidelines; Standards and Guidelines together are referred to as S&Gs) (BLM 1997a) through a land health (LH) assessment (LHA), which is incorporated by reference. While the BLM completed earlier S&G determinations in 2020, these new determinations include updated information from additional monitoring that has occurred since 2020. The BLM found in the 2023 BCA LHA and LH determination documents that Standards are achieved, or where not achieved, livestock grazing authorized on the pre-2014 grazing permit was not a causal factor. However, within the Krumbo Creek Pasture of the Hammond Allotment, unauthorized livestock grazing is one of the causal factors for not achieving Standards. Throughout the BCA, causal factors for not achieving Standard 5 include reduction in shrub cover through fire and historic sagebrush removal, maintained crested wheatgrasses seedings, increase in annual grasses following fire, juniper encroachment, channel incisions caused by historical uses (including historical improper grazing) and upstream conditions. As there is no current authorized livestock grazing, Guidelines are currently not applicable. However, all proposed grazing identified within this EIS would ensure conformance to Guidelines.

This Draft EIS analyzes proposed management actions, which include issuing a 10-year grazing permit(s) to one or more qualified applicants and approving four AMPs outlining grazing systems and grazing utilization thresholds; reducing fine fuel biomass accumulation; monitoring, construction, and maintenance of developments, including construction of up to 7.6 miles of new fence; and removal of up to 8.7 miles of existing fencing. The fence modifications include short lengths of riparian management fences and realigning fences along BLM-administered public land boundaries. Authorized management actions must meet S&Gs (43 CFR 4180) and ensure grazing is consistent with resource and management objectives from the 2005 AMU and Steens Mountain Cooperative Management and Protection Area (CMPA) RMPs and RODs, as amended by the 2015 Oregon GRSB ARMPA/ROD.

Grazing management alternatives within the Draft EIS range from issuing grazing permit(s) with terms and conditions identical to the previously issued permit (Alternative 1); issuing grazing permit(s) with site specific terms and conditions, developments, and changed allotment and/or pasture boundaries (Alternatives 2 – Agency Developed) and 3); issuing grazing permit(s) at 50

percent of previously permitted levels (Alternative 4); and no livestock grazing (Alternative 5 – No Action). All alternatives, except for Alternative 3, also include actions designed to continue achieving or making progress towards achieving Standards and improving the BCA ecological condition where Standards are currently achieved but are at future risk of not being achieved. In addition to actions analyzed within this Draft EIS, the BLM is also planning to treat noxious weeds and invasive annual grasses, increase deep-rooted perennial bunchgrasses and shrubs (including sagebrush), and reduce juniper encroachment through restoration activities within the entire BCA, but mostly within the Mud Creek Allotment. These actions were analyzed and implemented under other previous decisions and are reasonably foreseeable future actions considered in cumulative effects analysis but are not analyzed specifically within this Draft EIS.

The BLM began public outreach for this process during the 2020 BCA Environmental Assessment (EA) (DOI-BLM-ORWA-B060-2020-0001-EA), which proposed similar alternatives and was presented to the public for their consideration. In December 2021, the BLM issued a Notice of Intent in the Federal Register, starting a 30-day scoping period for this Draft EIS. Additionally, the BLM mailed a scoping letter to interested publics, asking for issues, potential impacts, and alternatives for analysis in the Draft EIS. This scoping period provided a public involvement opportunity in the NEPA process and helped the BLM gauge the concerns of those who have a stake in the management of the public lands in this area.

The BLM mailed separate letters to the Burns Paiute Tribe and other agencies, inviting them to be cooperating agencies on this project.

Throughout the scoping process, the BLM received comments on many topics. A more detailed discussion of the issues identified through public and internal scoping can be found in Section 1.6 Consultation, Coordination, and Identified Issues of the EIS.

Based on comments on this Draft EIS, the BLM will prepare a Final EIS and issue a ROD identifying the selected BLM management actions for the BCA. If the ROD allows for livestock grazing, permittee(s) would be selected following appropriate grazing regulations to issue grazing permit(s) and allocate grazing preference, ensuring grazing management practices occurring on public land meet the S&Gs (43 CFR Subpart 4180) and are consistent with resource and management objectives from the August 2005 AMU/Steens Mountain CMPA RMPs/RODs, as amended by the 2015 Oregon GRSG ARMPA/ROD. If the BLM selects the No Action Alternative in the ROD, then the BLM would not issue any grazing permits or attach grazing preference to any base properties.

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ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
AIM.....	Assessment, Inventory, and Monitoring
AMP	Allotment Management Plan
AMU	Andrews Management Unit
ARMPA	Approved Resource Management Plan Amendment
AUM	Animal Unit Month
BCA	Bridge Creek Area
BLM.....	Bureau of Land Management
BSC	Biological Soil Crusts
CEAA.....	Cumulative Effects Affected Area
CFR	Code of Federal Regulations
CMPA	Cooperative Management and Protection Area
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESD	Ecological Site Description
ESR.....	Emergency Stabilization and Rehabilitation
GHMA	General Habitat Management Area
GIS	Geospatial Information System
GRSG	Greater Sage-Grouse
HMA	Herd Management Area
HMAP	Herd Management Area Plan
IDT	Interdisciplinary Team
IIRH	Interpreting Indicators of Rangeland Health
IPCC.....	Intergovernmental Panel on Climate Change
LCT	Lahontan cutthroat trout
LMF	Landscape Monitoring Framework
LWC	Lands with Wilderness Characteristics
MD	Management Decisions
MIM	Multiple Indicator Monitoring
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NLCS	National Landscape Conservation System
NR.....	Non-Renewable
NRHP	National Register of Historic Places
OAT	Observed Apparent Trend
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-Highway Vehicle
ORC	Open Range Consulting
PAC	Priority Area for Conservation
PDE	Project Design Element
PFC	Proper Functioning Condition
PHMA	Priority Habitat Management Area
PL.....	Public Land
PRMP	Proposed Resource Management Plan

RAP	Rangeland Analysis Platform
RDF	Required Design Features
RFFA	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
RNA	Research Natural Area
ROD	Record of Decision
ROW	Right-Of-Way
SFA	Sagebrush Focal Area
SSF	Soil Surface Factor
SSS	Special Status Species
TGA	Taylor Grazing Act of 1934
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTV	Utility Terrain Vehicle
VRM	Visual Resource Management
WNV	West Nile Virus
WSA	Wilderness Study Area

1 INTRODUCTION

1.1 General Location and Background

This draft environmental impact statement (Draft EIS) will analyze allotment management actions, potential issuance of one or more term grazing permits, and proposed developments within the Bridge Creek Area (BCA) on Bureau of Land Management (BLM)-managed land.

The BCA consists of four allotments: Hammond (06023), Mud Creek (06005), and Hardie Summer (06025), and the Hammond Fenced Federal Range (FFR) (06100). This area is located approximately 60 miles south of Burns, Oregon, near the town of Frenchglen, Oregon, which is situated at the foot of the Steens Mountain (Appendix A: Map A – Vicinity¹). The allotments are located within the Andrews Field Office and partially within the Steens Mountain Cooperative Management and Protection Area (CMPA). Each allotment is further divided into pastures. See table 1-1 and Appendix A: Map B – Land Status & Special Management Areas. See table 1-2 for a list of current pastures within each allotment.

Table 1-1: Land Status for BCA (Acres) by Allotment²

LAND ADMINISTRATION	HAMMOND	MUD CREEK	HARDIE SUMMER	HAMMOND FFR
BLM ³	11,048	8,20	6,007	1,159
CMPA	2,881	8,143	9,723	2,549
Bridge Creek Wilderness Study Area (WSA)	1,609	6,911	-	92
Steens Mountain Wilderness	-	-	39	-
Bridge Creek Parcel with Wilderness Characteristics ⁴	-	0.22	1526	0.04
Fir Groves Area of Critical Environmental Concern (ACEC)	-	-	464	13
U.S. Fish and Wildlife Service (USFWS)	636	0.5	-	11
Private	2,072	0.1	3,774	6,148
TOTAL ALLOTMENT ACRES⁵	13,757	8,206	9,781	7,318

¹ All maps are created using the best information available at the time. Many of the range improvements and boundaries shown in these maps have been digitized and not GPS'd. While the BLM continues to GPS these features and is continuously updating their data for accuracy, maps should only be used to provide a general visual. The actual location of the feature on the ground takes precedence over the location on maps.

² Acreages within the table are determined through the boundaries identified in GIS. As the BLM gathers better data (such as GPS'd lines vs. digitized lines) these values are updated.

³ The row titled "BLM-Managed" includes all BLM-managed acres including acres of special designations and acres with no special designations; this number is the total BLM-managed acres within the allotment. Bulleted special designations are identified; however, these acreages are not additive as some special designations overlap.

⁴ The 2005 Steens CMPA RMP (Bureau of Land Management 2005a) designated the Bridge Creek Parcel with Wilderness Characteristics. Updated policy now calls these "Lands with Wilderness Characteristics." The BLM considers these terms to be interchangeable.

⁵ This row is total acres within the allotment and is not additive of all the special designations.

24

Table 1-2: Current Pastures by Allotment

HAMMOND	MUD CREEK	HARDIE SUMMER	HAMMOND FFR
01 N. Dutch Oven	01 Lower Field	01 Cabin	01 Dust Bowl
02 Krumbo Creek	02 Upper Field	02 North	02 Krumbo Springs
03 Kern Reservoir		03 Bridge Creek	03 Webb Springs
04 Webb Springs		05 Sylvies	04 Mud Creek
05 Knox Spring			
06 Larkspur Reservoir			
07 Baca Lake			
08 Knox Pond			
09 Landing Strip			
10 S. Dutch Oven Seeding			
11 Hole in the Ground			
12 Artesian			

25

26 **1.1.1 Hammond Allotment**

27

28 The Hammond Allotment is located approximately 45 miles south of Burns, Oregon. The
 29 allotment elevation ranges from 4,200 feet along the Malheur Wildlife Refuge to 5,000 feet in
 30 the Webb Springs Pasture.

31

32 The BLM designated the Hammond Allotment as an “improve” (I) management category
 33 allotment (H-1734-2 – Rangeland Monitoring Handbook, (Bureau of Land Management 1988) in
 34 the August 2005 Steens Mountain CMPA Resource Management Plan (RMP)/Record of
 35 Decision (ROD) ((Bureau of Land Management 2005a), as amended by the 2015 Oregon Greater
 36 Sage-Grouse (GRSG) Approved Resource Management Plan Amendment (ARMPA)/ROD
 37 (Bureau of Land Management 2015a), Appendix J-27. The “I” category identifies allotments
 38 with management and resource concerns as well as allotments where resource use conflicts and
 39 debate may exist. These allotments receive priority for implementation and effectiveness
 40 monitoring, as well as for funding to construct or maintain rangeland developments needed to
 41 improve resource conditions (when needed) and/or resolve resource conflicts (as necessary). The
 42 BLM categorized the Hammond Allotment as an “I” allotment due to management and resource
 43 concerns related to the Bridge Creek WSA special designation, GRSG presence and associated
 44 habitat, critical mule deer winter range, noxious weeds and invasive annual grasses, water
 45 quality, and riparian area concerns.

46

47 The BLM separated the area currently referred to as the Hammond Allotment from the Krumbo
 48 Allotment through a 1991 decision. The 1991 BLM decision created a new allotment containing
 49 eleven pastures. A total of 794 animal unit months (AUM⁶) were removed from the Krumbo
 50 Allotment and became the permitted use in the new Hammond Allotment. A land exchange
 51 reduced the permitted use in the Hammond Allotment from 794 to 473 AUMs on BLM-managed
 52 land. The BLM completed an allotment evaluation in 1993 and determined that more forage was
 53 available than allocated. The BLM made this forage determination again after the 2007 allotment
 54 evaluation (Bureau of Land Management 2007a); however, the additional forage was not added
 55 to the permitted use through National Environmental Policy Act (NEPA) analysis because an

⁶ An AUM is defined as the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month (43 CFR 4100.0-5 Definitions).

allotment management plan (AMP) had not been completed for the Hammond Allotment. In the 2023 BCA Land Health (LH) Assessment (LHA) (Bureau of Land Management 2023a) the BLM utilized remote sensing data and determined that the Hammond Allotment can support 1,712 AUMs utilizing only reliable water, and when all water is available it can support 1,742 AUMs⁷ (Bureau of Land Management 2023a).

The Hammond Allotment was most recently permitted (on the pre-2014 grazing authorization) for 68 cattle, with a season of use from April 1 to October 30 for 473 active use AUMs.

Within the Hammond Allotment, approximately 62 percent of the BLM-managed land was planted to crested wheatgrass in the 1960s and 1970s. Crested wheatgrass is the dominant vegetation component in the North Dutch Oven, Hole in the Ground, South Dutch Oven, Larkspur Reservoir, Landing Strip, and Knox Spring Pastures. Since the original plantings, these crested wheatgrass seedings were maintained and managed as crested wheatgrass seedings.⁸ The Webb Springs and Artesian Pastures have a small component of crested wheatgrass but mostly contain native vegetation. See Appendix A: Map C – Current Grazing Allotments & Developments for seeding locations.

The BLM also authorized nonrenewable (NR) AUMs to the grazing permit holder between 1993 and 2012, which varied from 1,000 to 1,500 AUMs using annual authorizations and agreements. These NR AUMs were authorized to specifically manage the crested wheatgrass seedings on a year-to-year temporary basis and were not included on the 10-year grazing permit. The amount of NR AUMs authorized from 1993 to 2012 varied according to the weather and grazing season forage conditions. Additionally, use monitoring over time demonstrated that NR AUMs were sustainable, and available forage was consistently higher than the permitted active use AUMs.

The Hammond Allotment received one partial season of authorized livestock grazing since 2014, which occurred in 2019. This use was authorized per the July 16, 2019, Opinion and Order from the U.S District Court for the District of Oregon in BLM in Western Watersheds Project et al. v. Bernhardt et al. (Case No. 2:19-cv-0750-SI, D. Or.). Use began by the livestock operator on March 22 and continued through October 1, with use occurring in most pastures. Only Kern Reservoir, Baca Lake, and Knox Pond did not receive use. In all, 2,975 AUMs were utilized in 2019.

1.1.2 Mud Creek Allotment

The Mud Creek Allotment is located about 60 miles south of Burns, Oregon, near the town of Frenchglen, Oregon. The allotment elevation ranges from 4,400 feet adjacent to the Malheur Wildlife Refuge to 5,900 feet in the Upper Pasture.

⁷ These numbers have been adjusted for utilization thresholds, slope, and water locations.

⁸ Crested wheatgrass seedings are managed differently than areas of native vegetation, as crested wheatgrass is more tolerant of grazing. The 2005 Steens RMP (Bureau of Land Management 2005a) identified a utilization threshold of 60% in crested wheatgrass seedings and 50% in pastures of native vegetation.

The BLM designated the Mud Creek Allotment as an “improve” (I) management category allotment in the August 2005 Steens Mountain CMPA RMP/ROD (Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a), Appendix J–11. BLM categorized Mud Creek Allotment as an “I” allotment due to management and resource concerns related to the Bridge Creek WSA designation, GRSG presence and associated habitat, critical mule deer winter range, noxious weeds (and invasive annual grasses), water quality, riparian concerns, juniper encroachment,⁹ and the Steens Mountain CMPA designation.

The Mud Creek Allotment was most recently permitted (on the pre-2014 grazing authorization) for 390 cattle, with a season of use of May 16 to June 30 for 590 active use AUMs.

In 1960, the Mud Creek Allotment was allocated 558 AUMs. In 1968, the BLM wrote a grazing plan and implemented a three-pasture modified rest-rotation grazing system. The Mud Creek Seeding Pasture, which incorporated 770 acres of Malheur National Wildlife Refuge (MNWF) land, was dissolved in 1980 when the refuge built a fence on the property boundary. The Upper and Lower Pastures are the only two pastures in the allotment. The 2005 Andrews/Steens CMPA RMP (Bureau of Land Management 2005a) authorized 590 total AUMs within this allotment.

Since 2013, the Mud Creek Allotment has not had any permitted authorized use. However, trailing through this allotment was authorized for fourteen days total in 2019. The Mud Creek Allotment received one partial season of authorized livestock grazing in the form of trailing. This use was authorized per the July 16, 2019, Opinion and Order from the U.S District Court for the District of Oregon in BLM in Western Watersheds Project et al. v. Bernhardt et al. (Case No. 2:19-cv-0750-SI, D. Or.). Use occurred from July 30–31 as the operator moved livestock into the Hardie Summer Allotment, and again from October 1–13 as the operator moved livestock back to privately owned property. Four pairs of livestock that had been missed were trailed through the Mud Creek Allotment on October 29.

Crested wheatgrass, seeded after the 2006 Grandad Fire, is the dominant vegetation component in the low elevation portions of the Lower Field #1 Pasture. Areas not seeded with crested wheatgrass have native perennial bunchgrasses as the dominant vegetation since the shrub component was largely reduced in the 2006 fire that burned most of the allotment.

There are two existing water gaps (livestock watering locations), one on Bridge Creek and one on Mud Creek.

The BLM completed a LHA for the Mud Creek Allotment in 2023 (Bureau of Land Management 2023a); the previous allotment evaluation was completed in 2007 (Bureau of Land Management 2007b). There is no previous AMP for this allotment.

⁹ For the purposes of this document, encroachment is defined as including both expansion (establishment of juniper into areas previously devoid of trees) and infill (increasing closure of previously sparse juniper canopies) (Coates et al. 2017).

1.1.3 *Hardie Summer Allotment*

The Hardie Summer Allotment is located about 70 miles south of Burns, Oregon, and about 10 miles east of Frenchglen, Oregon. The elevation of the allotment ranges from 5,800 feet to 7,200 feet.

The BLM designated the Hardie Summer Allotment as a “maintain” (M) management category allotment in the August 2005 Steens Mountain CMPA RMP/ROD (Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a), Appendix J–29). The “M” categorization identifies allotments with low or no management and resource concerns. These allotments receive lower priority for monitoring and are targeted for effectiveness and performance monitoring, unless monitoring data indicate a need for a change to management strategy. Potential resource concerns identified include riparian, GRSG, noxious weeds, water quality, juniper encroachment, and the Steens Mountain CMPA.

The Cabin and North Pastures were the original pastures comprising the Hardie Summer Allotment. The BLM added Bridge Creek and Thompson Pastures in 2004; however, the Thompson Pasture was incorporated into the Cabin Pasture. The Bridge Creek Pasture was previously an independent single pasture allotment prior to becoming part of the Hardie Summer Allotment. Adjustments to the pastures’ boundaries and names occurred in late 2007. While the addition of these pastures increased the acres within the Hardie Summer Allotment, the BLM did not increase permitted AUMs within the allotment.

The Hardie Summer Allotment was most recently permitted (on the pre-2014 grazing authorization) for 408 cattle, with a season of use of July 1 to September 30 for 408 active use AUMs.

The Hardie Summer Allotment has had no permitted livestock grazing since 2013. However, in 2019 the Bridge Creek, North, Cabin, and Sylvies Pastures of the allotment were grazed per a court order, with a reduced utilization threshold of 30 percent, for a partial season. On July 16, 2019, the U.S. District Court for the District of Oregon ordered BLM in *Western Watersheds Project et al. v. Bernhardt et al.* (Case No. 2:19-cv-0750-SI, D. Or., Opinion and Order) to “monitor the actual use on the Hardie Summer Allotment at least once per month during the permitted grazing season on the allotment (July, August, and September).” The operator moved 408 cow/calf pairs onto the Hardie Summer Allotment on July 31, 2019. The grazing rotation began in the Bridge Creek Pasture and continued for three weeks. The livestock were moved to the North Pasture August 21, 2019, and stayed until September 15. On September 15, livestock were moved into the Cabin and Sylvies Pastures of the Hardie Summer Allotment and stayed until September 30. The operator then moved the livestock to private property within the Hammond FFR, adjacent to the Hardie Summer Allotment before beginning trailing them through the Mud Creek Allotment enroute back to the operator’s headquarters. The court order

also included a prohibition of grazing the Fir Creek portion of the Cabin Pasture,¹⁰ since the area was not fenced out of the Cabin Pasture, a temporary electric fence was installed to keep livestock out.

The Fir Groves Area of Critical Environmental Concern (ACEC) (477 acres) is within the Hardie Summer Allotment in the Thompson and Cabin Pastures. The ACEC is in two separate areas, with multiple groves of grand fir trees (See Appendix A: Map B – Land Status & Special Management Areas).

The BLM completed an LHA for the Hardie Summer Allotment in 2023 (Bureau of Land Management 2023a); the previous allotment evaluation was completed in 2007 (Bureau of Land Management 2007c), and the last AMP was completed in 1991.

1.1.4 Hammond FFR

The Hammond FFR is located approximately 46 miles south of Burns, Oregon, and is located in two parts. One part is adjacent to the Hammond Allotment, and the other part is adjacent to the Hardie Summer Allotment. Most recently, on the pre-2014 grazing authorization, the BLM permitted the Hammond FFR for 32 cattle from April 1 to April 30 for 32 active use AUMs.

The BLM designated this FFR as a “custodial” (C) management category allotment in the identifies causal factors¹¹ for non-achievement of Standards. For the ease of reference in this document, evaluating standards combined with the causal factor determination is collectively referred to as a determination (see (Kachergis et al. 2020) for additional information). The 2023 BCA LHA and LH determination (Bureau of Land Management 2023a; Bureau of Land Management 2023b) documents replace all previous S&G assessments and determinations as they includes updated monitoring data allowing for updated and improved analysis and evaluation.

The BLM 2023 BCA Land Health Determination (Bureau of Land Management 2023b) found that not all standards within these four allotments were achieved. However, authorized livestock grazing after the signature of the 2005 Steens CMPA ROD (Bureau of Land Management 2005a) is not a causal factor for not achieving these standards. Causal factors include shrub cover reduction through fire and historic sagebrush removal, crested wheatgrass seeding and maintenance, annual grass increases following fire, juniper encroachment, drought, upstream impacts, and channel incisions caused by historic improper grazing (grazing prior to the 1983 Andrews Grazing Management Plan (Bureau of Land Management 1983). In addition, current unauthorized grazing in the Hammond Allotment, Krumbo Creek Pasture, is a causal factor for not achieving Standards 2 and 4 within that allotment. The BCA LH Determination (Bureau of Land Management 2023b) found that Guidelines are not currently applicable as there is no

¹⁰ In 2006/2007, the Cabin Pasture was subdivided, with the southern area becoming the Sylvies Pasture. Also, during that period, the BLM planned to create another pasture to be called “Little Fir” Pasture. However, though some BLM maps showed that pasture, a fence was never constructed, and that area continued to be managed as part of the Cabin Pasture.

¹¹ As an example, if livestock management is found to be a significant causal factor in the determination process, then the livestock management practices responsible for the non-conformance would be identified so that corrective management actions can be taken.

221 currently authorized grazing within any of the allotments. Table 1-3 provides a summary of the
 222 land health determinations (Bureau of Land Management 2023b) for each allotment.

223
 224

Table 1-3: 2023 BCA Allotment Standards Determinations Summary

ALLOT.	STANDARD 1: WATERSHED FUNCTION – UPLANDS	STANDARD 2: WATERSHED FUNCTION – RIPARIAN/ WETLAND	STANDARD 3: ECOLOGICAL PROCESSES	STANDARD 4: WATER QUALITY	STANDARD 5: NATIVE, T&E, LOCALLY IMPORTANT SPECIES
Hammond	Achieved: In all pastures, except Krumbo Creek (82%). Not Achieved: Krumbo Creek Pasture (18%). Causal Factors: Drought, invasive species (annual grasses), juniper encroachment, and wildfire	Achieved: Bridge Creek, Webb Spring Creek, 1.2 stream miles Krumbo Creek (65.7%). Not Achieved: 2.3 stream miles of Krumbo Creek (34.3%). Causal Factors: Channel incision due to historic overgrazing, juniper encroachment, invasive reed canary grass, and current unauthorized livestock use.	Achieved: In all pastures, except Krumbo Creek (82%). Not Achieved: Krumbo Creek (18%). Causal Factors: Drought, invasive species (annual grasses), juniper encroachment, and wildfire.	Achieved: Bridge Creek (40.7%). Not Achieved: Krumbo Creek (59.3%). N/A: Webb Spring Creek. Causal Factors: Channel incision due to historic overgrazing, drought, tree and shrub encroachment, regulated flow, upstream / downstream channel conditions, and current unauthorized livestock use.	Aquatic Achieved: Redband Trout - Bridge Creek (40.7%). Aquatic Not Achieved: Redband Trout - Krumbo Creek (59.3%). N/A: Webb Spring Creek. Causal Factors - Aquatic: Historic overgrazing, fire that removed vegetation and increased invasive annual grasses, and current unauthorized livestock use. Terrestrial Achieved: Woodland habitat for woodland and other generalist species (100%; 2% allotment total). Terrestrial Not Achieved: Shrubland habitat for GRSG and sagebrush obligates (100%, 98% allotment total). Causal Factors - Terrestrial: Drought, fire, managed crested wheatgrass seeding, sagebrush removal, invasive species, and tree & shrub encroachment.
Mud Creek	Achieved: 100%. Invasive annual grasses and juniper expansion put the allotment at risk of not achieving this Standard in the future.	Achieved: 100%. On all perennial water open to grazing.	Achieved: 100%. Invasive annual grasses and juniper expansion put the allotment at risk of not achieving this Standard in the future.	Achieved: Bridge Creek (54.3%) Not Achieved: Mud Creek (45.7%) Causal Factors: Upstream impacts. While beaver ponds and dams further upstream may be impacting water temperatures, increased temps are most likely due to rockiness of the stream area, southern aspect, and limited water flow.	Aquatic Achieved: Redband Trout - Bridge Creek (54.3%) Aquatic Not Achieved: Redband Trout - Mud Creek (45.7%) Causal Factors - Aquatic: Upstream impacts. Beaver ponds and dams upstream may impact water temperatures, they are most likely due to rockiness of the stream area, southern aspect, and limited water flow. Terrestrial Achieved: Woodland habitat for woodland and other generalist species (100%; 6% allotment total). Terrestrial Not Achieved: Shrubland habitat for GRSG and sagebrush obligates (100%, 94% allotment total). Causal Factors – Terrestrial: Drought, crested wheatgrass seeding, invasive species, tree & shrub encroachment, and fire.

ALLOT.	STANDARD 1: WATERSHED FUNCTION – UPLANDS	STANDARD 2: WATERSHED FUNCTION – RIPARIAN/ WETLAND	STANDARD 3: ECOLOGICAL PROCESSES	STANDARD 4: WATER QUALITY	STANDARD 5: NATIVE, T&E, LOCALLY IMPORTANT SPECIES
Hardie Summer	Achieved: 100%. Allotment continues to be threatened by western juniper expansion and invasive annual grasses.	Achieved: 100%. All streams, perennial, ephemeral, and intermittent were determined to be in functioning condition as appropriate for the stream type, with suitable vegetation. Streams show a stable to upward trend.	Achieved: 100%. Allotment continues to be threatened by western juniper expansion and invasive annual grasses.	Achieved: 100%. All streams were determined to be meeting ODEQ Temperatures, as appropriate. This Standard is N/A on 3.8 miles of intermittent and ephemeral streams within the allotment.	Aquatic Achieved: Redband Trout & Mottled Sculpin - 100%. The high level of habitat and water temperatures below the ODEQ standard have resulted in this Standard being achieved. Terrestrial Achieved: Woodland habitat for woodland and other generalist wildlife species (100%, 12% of allotment). Terrestrial Not Achieved: Shrubland habitat for GRSG and sagebrush obligates (100%, 78% allotment) Casual Factors -Terrestrial: Drought, Tree or Shrub Encroachment, and Fire.
Hammond FFR	Achieved: 100%. Standard 1 continues to be threatened by further western juniper encroachment and invasive annual grasses.	Achieved: 100%. All streams were determined to be in PFC and data has shown riparian vegetation and channel characteristics support good riparian function.	Achieved: 100%. Standards 1 continues to be threatened by further western juniper encroachment and invasive annual grasses.	N/A: There are no fish bearing streams on public land within the FFR, this Standard is not applicable.	Aquatic: N/A. Terrestrial Achieved: Shrubland habitat for GRSG and sagebrush obligates (0%, 0% of allotment) Terrestrial Not Achieved: Shrubland Habitat for GRSG and sagebrush obligates (100%, 100% of allotment). Casual Factors – Terrestrial: Drought, invasive species, sagebrush removal, managed crested wheatgrass seedings, tree or shrub encroachment, and fire.

1.2 Purpose and Need for Action

The purpose of the action is to:

1. Respond to external requests to consider issuing 10-year term livestock grazing permit(s) for the Hammond, Mud Creek, Hardie Summer, and Hammond FFR allotments.
2. Consider assigning grazing preference to one or more base properties, per the grazing regulations, if a decision is made to issue one or more 10-year term livestock grazing permits.
3. Respond to internal and external requests to adjust pasture and allotment boundaries and administratively move pastures dominated by private property into the Hammond FFR. Correspondingly adjust AUMs between the allotments as appropriate with pasture or allotment boundary changes.
4. Respond to an external request to adjust available active use AUMs in the Hammond Allotment to manage the higher crested wheatgrass production within the allotment, and the availability of sustained forage, while staying within a determined utilization threshold.

5. Implement AMPs for the Hammond, Hardie Summer, Mud Creek, and Hammond FFR allotments and install, modify, or remove range development projects to aid management of the allotments, promoting ecological health, and ensuring S&G achievement, or, if not achieved, significant progress toward achievement is made per 43 CFR 4180.1(a).¹²
6. Reduce standing fine fuel biomass through biological thinning¹³ of forage in the Hammond, Hardie Summer, and Mud Creek allotments.

The BLM need for the action is to:

1. Respond to external requests for issuance of grazing permit(s) and modification of grazing management related activities. The need is in accordance with 43 CFR 4130.2(a) which states, "Grazing permits or leases shall be issued to qualified applicants to authorize use on the public lands and other lands under the administration of the BLM that are designated as available for livestock grazing through land use plans." When issued, grazing permits must also include appropriate terms and conditions designed to "achieve management and resource condition objectives for the public lands...and to ensure conformance with part 4180" (43 CFR Part 4130.3).
2. Ensure that grazing management practices occurring on public land meet the Standards of Rangeland Health and are in conformance with the Guidelines for Livestock Grazing Management (43 CFR Subpart 4180).
3. Ensure livestock grazing, if authorized, is consistent with resource and management objectives from the August 2005 Andrews Management Unit (AMU) and Steens Mountain CMPA RMPs/RODs (Bureau of Land Management 2005b; Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a).
4. Ensure proper active use AUM levels, season of use, and management in order to maintain or improve the health, vigor, and ecological processes within the allotments.
5. Reduce fine fuel biomass accumulation to maintain plant vigor. Standing dead material in deep-rooted perennial grasses results in decreased plant vigor, and residual buildup of fine fuels increases fire intensity and plant kill risk. In addition, accumulating fine fuels poses an elevated risk of catastrophic wildfire within the BCA. Wildfires often result in subsequent annual grasses spread, which further results in reduced ecological function and increased risk of catastrophic wildfire.

1.3 Decision to be Made

The authorized officer will decide whether to issue one or more 10-year grazing permit(s), with specific terms and conditions, in the Hammond, Hardie Summer, Mud Creek, and Hammond FFR allotments. The authorized officer will decide whether to increase AUMs in the Hammond Allotment above the pre-2014 grazing authorization level due to forage availability in the crested wheatgrass seedings, and whether to adopt and implement the proposed AMPs in all four

¹² The Federal District Court for the District of Idaho enjoined the BLM from implementing the July 12, 2006, grazing regulations nationwide. Accordingly, the BLM is implementing the grazing regulations in place on July 11, 2006. All citations to the grazing regulations at 43 CFR Part 4100 are to the July 11, 2006, regulations unless otherwise specifically noted.

¹³ Biological thinning in this document is defined as the use of managed livestock grazing to reduce fuels (43 CFR 4190.1(a)(1)).

allotments. The authorized officer will determine whether to install, modify, or remove developments within the allotments. Additionally, the decision will include whether to adjust pasture and allotment boundaries, issue trailing permits, and whether to authorize NR AUMs along with associated terms and conditions within the Hammond, Hardie Summer, and Mud Creek allotments.

1.4 Conformance with Land Use Plan

The following is a description of the relevant resource management plan direction for the actions proposed in this Draft EIS.

The alternatives considered in this Draft EIS conform to all applicable laws, policies, and the AMU and Steens Mountain CMPA RMPs/RODs, dated August 2005 (Bureau of Land Management 2005b; Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a), even though they are not specifically provided for, because they are consistent with the RMP decisions and the 2015 GRSG ARMPA (Bureau of Land Management 2015a) goals, objectives, and management decisions (MD) identified in that document's Appendix B – Resource Objectives¹⁴.

Actions submitted during scoping that are in conformance with BLM law, policy, and regulation were incorporated and considered in the Draft EIS. Actions not in conformance are summarized in Section 2.9 Alternatives Considered but Eliminated from Further Analysis. Under NEPA, the BLM may analyze alternatives/actions that do not comply with land use plans, law, and policy. However, the BLM may not select an alternative or action that does not comply with the land use plans and laws listed below. There are proposed actions in Alternative 3 that are fully analyzed in this Draft EIS even though the proposed actions are not in conformance with the 2005 AMU/Steens Mountain CMPA RMPs/RODs (Bureau of Land Management 2005b; Bureau of Land Management 2005a), as amended, and therefore cannot be selected. A specific description of nonconformance can be found in Chapter 3 of this EA, which analyzes proposed actions. Outside of a few proposed actions within Alternative 3, all of the other proposed actions analyzed in this Draft EIS would conform to applicable policy, laws, and regulations.

In 2014, the BLM decided not to renew livestock grazing authorization #3602564, which covered all active AUMs in the Hammond, Hardie Summer, Mud Creek, and Hammond FFR Allotments. The permittee administratively appealed BLM's decision and the Secretary of the Interior (Secretary) resolved the administrative appeal in January 2019, by instructing the BLM to reissue the grazing permit. The BLM reissued the grazing permit under a categorical exclusion (CX). Due to intervening on-the-ground adjustments and court orders, grazing use was authorized in the 2019 grazing season. This use varied from what the BLM authorized following

¹⁴ The U.S. District Court for the District of Idaho has issued a preliminary injunction, preventing the BLM from implementing the 2019 amendments to the GRSG Plans (Bureau of Land Management 2024a Sep 25), but not vacating them or their Records of Decision. Due to the U.S. District Court of Idaho's preliminary injunction preventing implementation of the 2019 amendments BLM is currently managing GRSG habitat on public lands under the 2015 amendment (Bureau of Land Management 2015a). There is a 2024 planning effort to update the 2015 GRSG ARMPA (Bureau of Land Management 2015a); however, since this effort is still underway and no decisions have been issued, the BLM would continue to follow management direction, RDFs, and best management practices (BMP) from the 2015 document for this proposal.

the 2019 CX grazing permit. The reissued permit and related Secretarial Order were vacated and remanded to the Department by the U.S. District Court for the District of Oregon in late 2019.

Pursuant to an order from the Secretary, the BLM advertised a Notice of Available Forage within the Hammond, Hardie Summer, Mud Creek, and Hammond FFR Allotments. In 2020, following the receipt of four forage applications, the previous permittee withdrew its 2014 administrative appeal, after which the Secretary ordered the BLM to continue the adjudication process for the available forage within the four allotments. Since there were conflicting applications, BLM requested additional information from all applicants to address the factors identified in 43 CFR 4130.1-2. Three applicants provided the supplemental information, and one applicant withdrew their application. The BLM also received multiple letters from interested members of the public concerning the Notice of Available Forage and providing opinions on how the forage should be apportioned (i.e., how the BLM should resolve the conflicting applications). Apportioning forage to applicant(s) follows the process outlined in 43 CFR 4130.1-2, and BLM applied the regulatory criteria to the competing applications. No forage will be apportioned to any of the applicants through this process or within the ROD for this EIS. Apportioning of forage will occur in a separate decision after the ROD is finalized, ensuring that forage is only apportioned if a decision is made allowing the BLM to issue one or more livestock grazing authorizations. In addition, the apportioning of forage to a specific permittee(s) will not be analyzed in this EIS because any permittee would be required to follow the same terms and conditions if grazing is a selected action in the associated ROD, and effects of a grazing permit would be the same (as analyzed within this EIS) no matter which applicant may be apportioned forage.

1.5 Consistency with Other Authorities

The alternatives have been designed to conform to the following documents that direct and provide the framework for BLM-managed lands within BLM Burns District. Where proposed actions in Alternative 3 are not in conformance, those are identified within Chapter 3 of this Draft EIS. This list contains only the most relevant direction to this Draft EIS; however, unless specifically identified, the alternatives also conform to all other Federal laws, regulations, and policy that are applicable, even if not specifically identified.

- AMU RMP/ROD, dated August 2005 (Bureau of Land Management 2005b), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a).
- Steens Mountain CMPA RMP/ROD, dated August 2005 (Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a).
- Taylor Grazing Act (43 U.S.C. §§ 315–315r).
- National Environmental Policy Act (NEPA) (42 U.S.C. §§ 4321–4347).
- National Environmental Policy Act Handbook (Bureau of Land Management 2008a).

- Council on Environmental Quality, NEPA Implementing Regulations (40 CFR Parts 1500–1508), 2020¹⁵.
- Federal Land Policy and Management Act (FLPMA) (43 U.S.C. §§ 1701–1787).
- The Wilderness Act (16 U.S.C. 1131-1136), as amended.
- Steens Mountain Cooperative Management and Protection Act of 2000 (16 U.S.C. §§ 460nnn–460nnn-122).
- Public Rangelands Improvement Act (43 U.S.C. §§ 1901–1908).
- National Historic Preservation Act (16 U.S.C. §§ 470, et seq.).
- Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the States of Oregon and Washington, August 12, 1997 (Bureau of Land Management 1997a).
- Integrated Invasive Plant Management for the Burns District Revised Environmental Assessment (DOI-BLM-OR-B000-2011-0041-EA) (Bureau of Land Management 2015b; Bureau of Land Management 2015c).
- Greater Sage-Grouse Land Use Plan Implementation Guide, 2016 (Bureau of Land Management 2016a).
- Washington Office (WO) Instruction Memorandum (IM) 2016-139, Policy for Resource Management Plan Effectiveness Monitoring for Renewable Resources with Additional Guidance for Plans Implementing the Greater Sage-Grouse Conservation Strategy (Bureau of Land Management 2016b).
- WO IM 2018-22, Process for Evaluation Greater Sage-Grouse Land Use Plan Adaptive Management Hard and Soft Triggers (Bureau of Land Management 2017a).
- WO IM 2016-145, Tracking and Reporting Surface Disturbance and Reclamation (Bureau of Land Management 2016c).
- BLM Manual 6330 – Management of Wilderness Study Areas (Bureau of Land Management 2012a).
- BLM Manual 6340 – Management of Designated Wilderness Areas (Bureau of Land Management 2012b).
- BLM Manual 9015 – Integrated Weed Management (Bureau of Land Management 1992).
- Oregon Revised Statute 537.141 - Uses of Water not Requiring Water Right Application, Permit or Certificate.

1.6 Consultation, Coordination, and Identified Issues

Based on both public and internal scoping comments, the following is a list of issues¹⁶ that the BLM analyzes in detail in Chapter 3 of this Draft EIS. Issues raised during scoping and considered but not be analyzed in detail, can be found in Appendix C: Issues Considered but Eliminated from Detailed Analysis.

¹⁵ The BLM is aware of the November 12, 2024 decision in *Marin Audubon Society v. Federal Aviation Administration*, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the Council on Environmental Quality (CEQ) regulations implementing NEPA are not judicially enforceable or binding on this agency action, the BLM has nonetheless elected to follow those regulations at 40 CFR Parts 1500–1508, in addition to the DOI’s procedures/regulations implementing NEPA at 43 CFR Part 46, to meet the agency’s obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

¹⁶ An “issue” is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue: 1) has a cause-and-effect relationship with the proposed action or alternatives; 2) is within the scope of the analysis; 3) has not been decided by law, regulation, or previous decision; and 4) is amenable to scientific analysis rather than conjecture (BLM 2008).

The BLM identified issues for analysis during public scoping; BLM IDT meetings; consultation, cooperation, and coordination with applicants for available forage; and through contact with other agencies and Native American Tribes (for additional details on consultation, coordination, and public involvement, see Chapter 4). The Harney County Court and Steens Landowners Working Group also submitted letters to the BLM Burns District, prior to the scoping and comment period, identifying fine fuel accumulation issues. Adjacent landowners and grazing permittees also identified concerns about fine fuel accumulation in these allotments, due to the increased catastrophic wildfire risk associated with fuel loading. These individuals and groups expressed a desire for the BLM to consider proactive actions reducing fire ignition risk and fire spread, along with reducing fire intensity and increasing human safety should wildfire occur. The BLM also brought forward issues identified in the court's Opinion and Order in *WWP v. Bernhardt*, 428 F. Supp. 3d 327 (D. Or. 2019).

1.6.1 Issues for Analysis

1.6.1.1 Biological Soil Crusts (BSC)

- How would proposed livestock grazing and developments impact BSCs?

1.6.1.2 Big Game and Other Wildlife Species

- How would each alternative provide for mule deer habitat?
- How would the level, timing, and location of proposed livestock use impact big game habitat?
- How would proposed fences and other infrastructure impact wildlife?

1.6.1.3 Climate Change and Emissions

- What would the emissions from proposed livestock grazing be annually and for the entire 10-year permit period?
- How would proposed livestock grazing impact carbon storage?
- What is the social cost of greenhouse gas emissions?

1.6.1.4 Cultural Resources

- How would proposed livestock grazing and developments impact cultural resources including National Register of Historic Places (NRHP) listed, eligible, or unevaluated archaeological or historical sites?

***1.6.1.5 Grazing Management*¹⁷**

- How would proposed season of use and developments affect grazing management and livestock distribution?

¹⁷ This issue is tied to topics addressed under the Vegetation and Socioeconomic sections.

- How would grazing management be affected by the different levels of permitted active use AUMs and NR grazing?
- What is the carrying capacity of the allotments under each alternative and how is that calculated?
- How would proposed crossing permits impact forage allocations?
- How would proposed livestock grazing affect the ability of sagebrush (important cover and forage for GRSG and other sagebrush-obligate species) to reestablish on a burned site?
- Would proposed livestock grazing influence juniper expansion?

1.6.1.6 GRSG and Sagebrush Obligate Migratory Birds

- How would the level, timing, and location of proposed livestock grazing, and developments, affect areas of sagebrush remaining after the 2006 fire within the Mud Creek and Hardie Summer Allotments, and how would that affect GRSG and habitat recovery?
- How would proposed livestock grazing in Mud Creek and Hardie Summer Allotments affect GRSG habitat, specifically concealment cover (residual grass height) and forb availability during nesting and brood rearing seasons?
- What is the current state of GRSG populations and how would proposed grazing impact GRSG populations, both locally and regionally?
- How would the alternatives aim to maintain and restore GRSG connectivity corridors between leks within the Bridge Creek population, other leks within the Steens Priority Area for Conservation (PAC), and leks adjacent to the PAC?
- How would the presence of predators, particularly corvids (mainly ravens), be affected by the alternatives, and what impact would that have on GRSG?
- How would proposed livestock grazing be managed to minimize potential for degradation in quantity and quality of riparian and meadow habitat for GRSG?
- How would the alternatives impact West Nile Virus (WNV) risk?
- How would the level, timing, and location of proposed livestock use impact grassland and sagebrush obligate migratory birds?

1.6.1.7 Lands with Wilderness Characteristics

- How would proposed livestock grazing and developments impact wilderness characteristics within the Bridge Creek Lands with Wilderness Characteristics (LWC) unit?

1.6.1.8 Recreation

- How would proposed livestock grazing and developments affect dispersed recreation?

1.6.1.9 Riparian/Water Quality /Fisheries

- How would proposed livestock grazing (specifically AUMs and season of use) impact redband trout and aquatic/riparian systems, vegetation (including willows), water quality (including temperature, defecation, and pollution), water levels, and aquatic habitat along creeks, and at springs, seeps, and wet meadows, within the allotments?
- How would proposed livestock grazing affect the riparian vegetation that has grown while grazing has not been authorized and there has been little to no livestock use, including impacts on the current recovery of willows on creeks within the Hardie Summer Allotment?
- How would proposed livestock grazing affect BLM's ability to be in compliance with State water quality standards, until the total maximum daily loads and/or water quality restoration plans are prepared for the planning area?

1.6.1.10 Socioeconomics

- How would issuing grazing permits and implementing proposed developments affect the local economy?
- How would proposed livestock grazing and developments affect lifestyles in local ranching communities?

1.6.1.11 Traditional Native American Practices

- How would the alternatives impact Traditional Native American Practices, including those of spiritual (religious) and cultural practices, such as gathering of chokecherries or other traditional plants in the area?

1.6.1.12 Vegetation, Annual Grasses, and Fuels

- How would the level of proposed livestock use affect the health and vigor of native vegetation and crested wheatgrass seedings, thereby affecting future levels of forage made available for livestock grazing?
- How would the level and timing of proposed livestock use change the spread or dominance of annual invasive grasses, and how would this affect future levels of forage available for livestock grazing?
- How would the level and timing of proposed livestock use affect fine fuel accumulation, risk of fire, and fire severity within the allotments?

1.6.1.13 Visual Resource Management (VRM)

- How would the proposed developments affect visual resources?

1.6.1.14 Wilderness

- How would issuing new grazing permits affect wilderness and wilderness character within the BCA?

1.6.1.15 Wilderness Study Areas

- How would the proposed livestock grazing management, including season of use and AUM levels, impact wilderness characteristics in the Bridge Creek WSA and meet the non-impairment standard or an exception to the standard?
- How would the proposed developments, including the proposed pasture boundary fences within the Bridge Creek WSA, impact wilderness characteristics and meet the non-impairment standard or an exception to the standard?
- How would the proposed supplemental alfalfa hay feeding, within the Bridge Creek WSA, impact wilderness characteristics?

1.6.2 *Issues Considered but Eliminated from Detailed Analysis*

1.6.2.1 ACEC

- How would the level and timing of proposed livestock use, and developments, affect the relevant and important values of the ACEC?

1.6.2.2 Environmental Justice

- How would proposed developments impact environmental justice populations?

1.6.2.3 Geology and Minerals

- How would the proposed developments and livestock grazing impact geology and minerals?

1.6.2.4 Grazing Management

- What grazing districts are these allotments a part of and how would grazing districts be impacted?
- What allotments and/or pastures would be formalized as “chiefly valuable” for livestock grazing under the Taylor Grazing Act?
- How would improved distribution homogenize grazing effects and increase ecological stress?
- What thresholds and responses would be in place under each alternative?

567 **1.6.2.5 GRSG**

- 568
- 569 • How would the alternatives, especially proposed livestock grazing, impact GRSG stress
- 570 levels?
- 571 • How would the alternatives comply with a potential GRSG listing under the Endangered
- 572 Species Act (ESA)?
- 573 • How would proposed livestock grazing management affect the percentage of sagebrush
- 574 stands in GRSG habitat that are in advanced structural stages with sagebrush cover
- 575 between 5–15 percent (Sagebrush Stand Class 3)?
- 576

577 **1.6.2.6 Lands and Realty**

- 578
- 579 • How would proposed developments and livestock grazing impact the BLM’s ability to
- 580 issue rights-of-way (ROWs) or complete other lands and realty actions?
- 581

582 **1.6.2.7 Lands with Wilderness Characteristics**

- 583
- 584 • How would the alternatives affect wilderness characteristics on LWC, outside of the
- 585 Bridge Creek LWC, WSAs, and designated wilderness?
- 586

587 **1.6.2.8 Malheur National Wildlife Refuge**

- 588
- 589 • How would the Malheur National Wildlife Refuge be impacted by the alternatives?
- 590

591 **1.6.2.9 Noxious Weeds and Invasive Plants**

- 592
- 593 • How would the alternatives affect the potential for introduction and establishment of
- 594 noxious weeds and invasive plants?
- 595

596 **1.6.2.10 Recreation**

- 597
- 598 • How would the alternatives affect the public’s ability to use BLM-managed lands for
- 599 recreational opportunities?
- 600

601 **1.6.2.11 Riparian/Water Quality/Fisheries**

- 602
- 603 • How would proposed livestock grazing impact public drinking water supplies?
- 604 • How would the alternatives comply with Senator Ron Wyden’s proposed River
- 605 Democracy Act, where he proposes the designation of Mud, Bridge, McCoy, and
- 606 Krumbo Creeks?
- 607 • What would be the effect of proposed water developments on water quantity and
- 608 availability?

1.6.2.12 Soils

- How would the proposed livestock grazing and development construction, and proposed maintenance, impact soils?

1.6.2.13 Special Status Species – Flora

- How would the alternatives impact or affect special status species (SSS) flora found within the BCA?

1.6.2.14 Steens Mountain CMPA

- How would the alternatives comply with the Steens Act and impact the values protected under the CMPA?

1.6.2.15 Threatened and Endangered Species

- How would the proposed livestock grazing and developments impact threatened and endangered (T&E) species and their critical habitat?

1.6.2.16 Transportation and Roads

- How would the alternatives affect the condition of existing roads within the allotments?

1.6.2.17 Vegetation

- How would juniper spread affect forage quality and quantity?
- How would recovery following future fires be affected by proposed livestock grazing?
- How would the proposed livestock grazing management address drought and site resiliency?

1.6.2.18 Wilderness

- How would proposed grazing in these allotments affect the “No Livestock Grazing” area of the Steens Mountain Wilderness?

1.6.2.19 Wildlife

- How would the alternative actions impact wildlife SSS (other than GRSG) habitats and life cycles?
- How would the alternatives impact frogs and snails?
- How would proposed grazing impact insect populations, including pollinators?
- How would proposed livestock grazing impact big horn sheep through disease, specifically *Mannheimia haemolytica* originating in cattle?

- 653 • How would proposed grazing conflict with predators, specifically the grey wolf?
- 654 • How would the alternatives impact pygmy rabbits?
- 655 • How would the alternatives affect pronghorn migration patterns?
- 656 • How would the alternatives affect migratory birds?

1

2 DESCRIPTION OF ALTERNATIVES

This AMP Draft EIS analyzes possible management actions developed through IDT recommendations, comments from other Federal and State agencies, organizations, and the public, and in coordination with the applicants for available forage, to meet the purpose and need for action (Section 1.2) and aid in accomplishing allotment resource objectives (Appendix B – Resource Objectives).

The effects of Alternatives 1 through 5 are fully analyzed in Chapter 3 of this Draft EIS. Following the public review period for this document, a ROD may be issued to proceed with any one of the alternatives analyzed, or with a combination of portions of multiple alternatives.

2.1 Goals, Objectives, and Actions Common to Alternatives

The items in this section refer to Alternatives 2–4, except where the text specifically mentions it does not apply to the alternative.

2.1.1 Goals and Objectives for the BCA

Goals are broad statements of a desired outcome that is usually not quantifiable and may not have established timeframes for achievement. Objectives are a description of a desired outcome for a resource. An objective can be quantified and measured and, where possible, can have established timeframes for achievement. Goals and objectives only apply to BLM-managed lands within the BCA. These goals and objectives do not apply to Alternative 1 or Alternative 5: No Action.

2.1.1.1 Upland Vegetation Goals and Objectives

- Goal: Manage vegetation to achieve and maintain healthy watersheds. Objective: Maintain or increase the relative frequency of deep-rooted perennial grasses, big sagebrush, and forbs species that provide food and nesting cover for GRSG in the allotments over the next 10 years.
- Goal: Increase the resistance of GRSG habitat to invasive annual grasses and the resiliency of GRSG habitat to disturbances, such as fire, to reduce habitat loss and fragmentation. Objective: Reduce the existing presence of invasive annual grasses within the BCA over the next 10 years.

2.1.1.2 Riparian Areas Goals and Objectives

- Goal: Maintain or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and associated structure, function, process, and products. Objective: Achieve or maintain a rating of proper functioning condition (PFC) for perennial streams within the BCA over the next 10 years. Objective: Maintain

or improve ecological status and site potential of riparian and wetland vegetation communities within the BCA over the next 10 years.

2.1.2 *Monitoring*

Monitoring described in this section applies to all grazing alternatives unless specifically provided for below. Monitoring activities would only apply to BLM-managed land within the BCA and would occur, to some extent, under all alternatives. Livestock grazing specific monitoring would not occur if the No Grazing Alternative were selected; however, long-term vegetation, riparian, and water quality monitoring would continue to occur. Throughout the 10-year grazing permit term, following a record of decision on this document, both short-term indicators (measurements) and long-term indicators of communities would be monitored. If livestock grazing occurs, short-term indicators would also be used to provide information necessary to help determine whether the current season's livestock grazing is meeting grazing use criteria and adjust future grazing, while long-term indicators provide data to assess the current condition and trend condition and trajectory of vegetative communities and/or stream characteristics (Bureau of Land Management 2011a). For both uplands and riparian areas, short-term indicators must be used in combination with long-term indicators to identify cause and effect relationships and assess progress towards meeting goals and objectives (Bureau of Land Management 2011a; Bureau of Land Management 2017b). The short-term indicators need to be compared to trend over time for validation; both implementation monitoring and effectiveness monitoring are important. Using short-term indicators, such as stubble height, without any long-term monitoring, is unreliable and inaccurate as they are not resource objectives (Clary and Leininger 2000; University of Idaho Stubble Height Review Team 2004; The Stubble Height Review Team 2006), as is taking action based on a single evaluation, especially when the result is near a management standard or threshold. Short-term indicators should be paired with long-term indicators to reduce the potential for measurement error (Krebs 1989; Ramsey et al. 1992; Roper et al. 2002). In summary, BLM uses short-term monitoring, in combination with long-term trend monitoring, to adaptively manage livestock grazing (see Adaptive Management section below).

Monitoring, by BLM staff¹⁸ in coordination with the permittee(s), would take place within the allotments. All monitoring within the AMU and Steens CMPA would follow the direction provided in the AMU Monitoring Plan (Bureau of Land Management 2008b), or subsequent plan, and the 2005 AMU and Steens CMPA RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a), as appropriate. See Map D – BCA Monitoring Plot Locations for location of current monitoring.

¹⁸ While monitoring will occur on the allotments, the extent and timeliness of it will depend on internal BLM factors such as funding and workforce and may not occur exactly when planned. In any case, permittees are responsible for removing livestock prior to exceeding utilization levels.

2.1.2.1 Upland Vegetation Monitoring

2.1.2.1.1 *Short-Term Monitoring*

- Key Species Method on a landscape (pasture) scale for pasture utilization (Utilization Studies and Residual Measurements, TR 1734-3; Cooperative Extension Service 1999). The target utilization levels for key forage plant species are no more than 50 percent utilization¹⁹ on key native upland perennial species and 60 percent utilization on desirable nonnative species, such as crested wheatgrass (AMU and Steens CMPA RMPs, p. 54; (Bureau of Land Management 2005b; Bureau of Land Management 2005a)). These utilization levels would apply to all alternatives, unless otherwise specified within the alternative description. Utilization monitoring is performed along a route transect by vehicle, foot, and/or horseback. Utilization routes are in areas livestock are able to access, with utilization points occurring at a set interval specific to the route. At each utilization point, an estimate of utilization is made; since these points are on an interval, they may fall in areas of higher-than-normal use (near water or salt), or in areas of lower-than-normal use (further from water or salt). All utilization points are then averaged across the pasture and overall utilization is calculated on a pasture average basis. Utilization would be collected annually at the end of each grazing period as labor, access, and funding allow. If livestock grazing exceeds utilization thresholds, allowable AUMs would be reduced the following year.²⁰
- Photo monitoring provides visual records of utilization levels that can be used before, during, and after grazing. At each photo point, landscape photos would be taken in each cardinal direction. A minimum of two photo monitoring points would be established in the interior of each grazed pasture. This monitoring would occur at least following grazing for the first four years following the issuance of a grazing permit. After the first four years, photo monitoring would occur at least every 5–10 years, though may occur more often as needed.
- Visual Obstruction Reading (VOR) would be completed following the Robel Pole Protocol, Version 1.0 (Bureau of Land Management 2016d), in the Lower Field of Mud

¹⁹ BLM Burns District measures utilization percentage using an ocular method, not a weight method. Jansen and others (Jansen et al. 2022), Figure 3 demonstrates that utilization readings using the Landscape Appearance (ocular) Method are consistently higher (and more accurate across broad ranges of grazing intensities) when compared to utilization data collected using Paired Plots and the Height-Weight methods, where plots are physically clipped and measured. The BCA AMP and RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a) propose using Landscape Appearance as the predominant method for collecting livestock utilization data, based on Jansen and others (Jansen et al. 2022) and professional judgement from Burns Range Management Specialists, as it is a conservative measure of utilization when compared to a method collected by weight. Clipping and weighing is not appropriate to use for extrapolation to a large area with variable vegetation. In most areas, the variability in production between samples requires a large number of samples to detect reasonable levels of change (Cooperative Extension Service 1999b). Additional limitations to the Double-Weight sampling technique can be found on page 102 in Technical Reference 1734-4. In addition, collecting site-specific data through clipping and weighing on large tracts of land, such as the BCA would be infeasible due to cost and labor limitations.

²⁰ Annual grazing would be authorized with the goal to ensure livestock grazing is removed prior to exceeding threshold limits. However, on occasion other factors (drought, cool temperatures, etc.) may result in decreased production causing livestock grazing, as planned during the pre-grazing season, to exceed these thresholds. Ultimately, it is the permittee's responsibility to remove livestock prior to a threshold being crossed. However, annual monitoring would attempt to ensure thresholds are not crossed. There may be factors that would result in monitoring being delayed and the threshold being crossed. While the crossing of the threshold is expected to be a rare occasion, the BLM feels that it is important to have a response in place if it does occur. This would both provide additional motivation to the permittee to ensure thresholds are not crossed and ensure that any crossing of thresholds would not result in long-term damage to ecological functions.

Creek if livestock grazing occurs within this pasture prior to June 30. This monitoring would occur annually for the first four years of grazing and would help document cover remaining for wildlife following livestock use. If the results are under 7 inches while livestock are still present, then livestock would be removed from the area. Following livestock grazing, if VOR is less than (shorter than) 7 inches, grazing the following year would be reduced and the set utilization level would be decreased by 5 percent. Following livestock grazing, if results are over (more than) 7 inches following grazing, then the next year grazing would increase, and the utilization level may be increased by 5 percent if professional judgement deems an increase could be made without the VOR reading decreasing below the 7-inch mark. The increase in utilization would not exceed the utilization thresholds of 50 percent on natives and 60 percent on desirable non-natives. Permitted livestock grazing AUMs would not exceed permitted levels. These adjustments would continue annually until this monitoring provides support for a set utilization and AUM level within this pasture that would indicate that cover requirements for GRSG are being met while allowing livestock use consistent with meeting cover requirements.

- Use supervision/compliance monitoring is completed by the BLM and occurs to ensure permittees are in compliance with the terms and conditions of their permits (livestock only present if permitted, in the right locations, etc.). These forms also allow for observations about vegetation, livestock, wildlife, developments, and public land visitors to be made, allowing for a thorough overview of the pasture and potential issues, which can help guide future actions.
- Actual use reporting is due from permittees within 15 days of end of season livestock removal from BLM-managed land. The BLM requires actual use to be submitted on an allotment or pasture basis. The Actual Use Form (4130-5) is used by permittees to document how many head of livestock they turned out and gathered from a pasture and on what dates. The BLM then uses this form to calculate the number of AUMs used within that pasture and within the allotment. The BLM uses this information, combined with other relevant information, to plan for the next year's livestock grazing.

2.1.2.1.2 Long-Term Monitoring and Upland Assessment

- Pace 180° (Bureau of Land Management 1985: 44; Johnson and Sharp 2012) would be used to assess trend in upland condition. This method is a step-transect that allows measurements of occurrence of key forbs, shrubs, and perennial grass species composition, as well as basal cover calculations. As part of this monitoring, photos are taken, and a Soil Surface Factor (SSF) form to assess soil stability and an Observed Apparent Trend (OAT) form to assess trend in condition are completed. A modified Pace 180° method would be completed to include line-point intercept readings and allow a better calculation for vegetative cover. These plots would be read in years 1, 3, and 5 after grazing is reinstated. After year 5, this monitoring would be read approximately every 5 to 10 years.

- 159 • Terrestrial Assessment, Inventory, and Monitoring (AIM) in this area is part of a larger

160 district-scale AIM project that was designed to conform to the GRSG Monitoring

161 Framework , p. D-1).²¹ The original AIM project was initiated in 2015 and completed in

162 2020, though new plots continue to be added to address specific needs. The second phase

163 of this project is the revisitation of plots, which is expected to occur between 2025 and

164 2030. Habitat Assessment Framework (HAF) analysis, which considers GRSG ARMPA

165 habitat objectives (Bureau of Land Management 2015a), uses AIM data that has been

166 collected at the mid-, fine-, and site-scales to complete HAF suitability determinations for

167 the Steens-South Pueblos fine-scale analysis area and BLM HAF summary report. The

168 BLM would continue to complete HAF requirements as required in the GRSG AMRPA

169 (Bureau of Land Management 2015a).

170
- 171 • Remote sensing has been completed within these allotments, providing estimates of

172 functional group composition, bare ground, annual grasses, and juniper cover. If funding

173 is available, remote sensing may be completed again in five to ten years, which would

174 allow for this data to be used in determining trend.

175
- 176 • Interpreting Indicators of Rangeland Health (IIRH; Pellant et al. 2020) assessments are

177 typically completed on dominant ecological sites within an assessment boundary, often a

178 pasture or allotment. The IIRH assesses the site compared to what would be expected on

179 the site for the 17 indicators of rangeland health. The 17 indicators of rangeland health

180 document the status of three interrelated attributes, which are soil/site stability,

181 hydrologic function, and biotic integrity. The three attributes together help land managers

182 determine to evaluate the ecological function of the assessment site, are extrapolated to

183 the larger area, and provide early warnings of potential problems and/or opportunities

184 where areas are potentially at risk of degradation, or where resource problems may exist

185 at the time of the assessment. This information from the applicable indicators is recorded

186 on the evaluation forms and a “preponderance of evidence” approach is utilized to

187 determine the category for each attribute’s departure (none to slight, slight to moderate,

188 moderate, moderate to extreme, or extreme to total departure) from the reference

189 condition identified in the associated ecological site description (ESD). This information

190 is then utilized as one part of the larger LHA that is used to determine if S&Gs are being

191 achieved. As part of the IIRH, a plant list is compiled, abundance information is

192 recorded, and photos of the assessment area are taken. The IIRH protocol can be found in

193 TR 1734-6 Version 5 (Pellant et al. 2020).

194

195 While the above defines current methods of monitoring and assessment used by the BLM, the

196 Steens CMPA RMP/ROD makes it clear that the “list of potential monitoring methods is neither

197 all-inclusive nor exclusive of new monitoring techniques or methodologies. Monitoring efforts

198 would be implemented based upon accepted BLM technical references and accepted science

199 research” ; RMP-21, RMP-25, RMP-52, RMP-55, RMP-63). Other areas of the Steens

200 RMP/ROD also clearly state that “monitoring methods...may include but are not limited to...”

²¹ The Burns District AIM/HAF project was designed to be statistically valid with a minimum of 70 percent confidence at the district level.

methods identified in the RMP ; RMP-27, RMP-32), and methods should be changed, removed, or added as appropriate based on resource concerns, technical references, and current science.

2.1.2.2 Riparian Area Monitoring

2.1.2.2.1 Short-term Monitoring

- Multiple indicator monitoring (MIM) (TR 1737-23, : At the end of each grazing season for the first five years, short-term indicators (measurements of the current grazing season use) of stubble height, streambank alteration, and woody browse would be collected on Little Bridge, Little Fir, and Big Fir Creeks in the Hardie Summer Allotment and Krumbo Creek in the Hammond Allotment. On year five, short-term and additional long-term MIM indicators would be collected. MIM data collected would be assessed to determine whether livestock grazing management is aiding in moving toward or achieving riparian objectives. If objectives are being achieved, the BLM would complete short-term MIM monitoring as needed.
- Use supervision/compliance: Use supervision would occur during MIM data collection and on an annual basis as staff time and funding allows. Riparian areas of perennial streams that are accessible to livestock would be checked to ensure livestock are present only in areas when and where permitted. Notes and observations would be collected on the compliance form related to condition of the creek, livestock, wildlife, public land visitors, etc. This information would be used, in addition to other monitoring, in planning grazing the next year.
- Photo monitoring provides visual records of utilization levels that can be used before, during, and after grazing. At each photo point, landscape photos would be taken in each cardinal direction. A minimum of two photo monitoring points would be established along each creek in the grazed pasture. This monitoring would occur after grazing for at least the first four years grazing is resumed (if selected). After the first four years, photo monitoring would occur at least every 5–10 years, though may occur more often, as needed.

2.1.2.2.2 Long-term Monitoring and Riparian Assessment

- MIM (Bureau of Land Management 2011a): Long-term indicator measurements would be conducted on Little Bridge, Little Fir, and Big Fir Creeks in the Hardie Summer Allotment and Bridge²² and Krumbo Creeks in Hammond Allotment approximately every five years. This data, in combination with short-term indicator data, would be used to determine if management actions are making progress toward achieving long-term goals and riparian objectives.

²² Bridge Creek MIM monitoring would be collected in a representative area within the reach between the water gap and Malheur Refuge Boundary.

- Photo points: Photos provide visual records of long-term streambank and riparian vegetative condition and trend (Bureau of Land Management 2011a). These would be collected once every 2–3 years. Photos would be taken at existing photo point locations along Krumbo, Webb Spring, and Bridge Creeks in Hammond Allotment, and along Little Bridge, Little Fir, and Big Fir Creeks in Hardie Summer Allotment. Other riparian photo points would be established, as necessary. Photo locations would be georeferenced so repeat photos could be taken. Photos would generally be taken during use supervision monitoring or end of season.
- Water temperature data would be collected using temperature probes placed in perennial streams. This data would be gathered approximately every five years and would include two to three consecutive years of data collection.
- Aquatic AIM data would be re-collected approximately every five years and would follow the AIM National Aquatic Monitoring Framework: Lotic Field Protocol for Wadeable Systems (Technical Reference 1735-2, Bureau of Land Management 2020). Aquatic AIM data was collected in 2019 on Krumbo, Bridge, Big Fir, Little Fir, and Mud Creeks.
- Remote sensing data would be collected²³ within riparian areas to document indicators such as sinuosity and riparian and upland vegetation. Remote sensing would use a model to provide information along entire perennial creeks (instead of just at monitored areas) to use as a baseline for future comparison. Once baseline data has been collected, repeat remote sensing analysis would be completed every five to ten years.
- Proper functioning condition (PFC) assessments (TR 1737-15, Bureau of Land Management 2015d): PFC assessments have been conducted on the following creeks: Krumbo, Webb Spring, Mud, Bridge, Big Fir, Little Fir, Fence, Lake, and Little Bridge. The PFC assessment synthesizes information that is foundational to determining the overall health of a riparian area. PFC assessments generally lack the sensitivity to detect incremental changes in riparian condition but can provide early warning of problems and point to opportunities by helping to identify key management issues, focus monitoring activities to maximize efficiency, and prioritize restoration actions on the “at-risk” systems or reaches of highest resource value. PFC assessments would be updated every 5–10 years, as needed following management changes, or when quantitative data indicates a change in condition.

2.1.3 Adaptive Management and Flexibility

Adaptive management is a system of management practices based on clearly identified objectives (identified in relevant RMPs and this document) and monitoring to determine if management actions are meeting desired objectives and, if not, facilitating management changes that would best ensure objectives are met. Adaptive management recognizes knowledge about

²³ Dependent upon funding and contracting abilities.

natural resource systems is sometimes uncertain and, in this context, adaptive management affords an opportunity for improved understanding. Due to the uncertainties inherent in managing for sustainable ecosystems, some changes in management may be authorized, which include (but are not limited to) *adjusting the rotation, timing, and annual season of use of grazing and livestock numbers*, within the constraints of the grazing permit, based on numerous factors including (but not limited to) the following—

- A finding that one or more standards are not being achieved and livestock are a causal factor;²⁴
- The previous year's monitoring results considering the weather conditions (temperature and precipitation);
- The current year's forecasted weather conditions;
- Persistent drought causing reduced forage production and a lack of available water in areas originally scheduled to be used;
- Occurrence of wildfire; and
- To balance utilization levels.

Rangeland monitoring as described above is a key component of adaptive management. As monitoring data indicates changes in grazing management are needed to meet resource objectives, changes are implemented in coordination with the grazing permittee(s). Flexibility in grazing management would be authorized and changes in rotations would only be allowed as long as they continue to meet resource objectives. Flexibility is dependent upon the demonstrated stewardship and cooperation of the permittee(s) and occurs within the confines of the grazing permits. Additional flexibility may occur within the terms and conditions of the grazing authorization.

Thresholds, or use indicators, and responses take time to develop and validate because short-term indicators of grazing use may or may not reflect the meeting of long-term management objectives (University of Idaho Stubble Height Review Team 2004; The Stubble Height Review Team 2006). General thresholds and responses related to grazing management in these allotments would include those described in Table 2-1 and would be applied as described in the monitoring section above. These thresholds may adjust over time through adaptive management based on short- and long-term monitoring and assessment of objectives. Adaptive management would not occur under Alternative 1 or Alternative 5: No Grazing.

²⁴ Currently, as with the previous LHA assessments, livestock is not a causal factor.

Table 2-1: Thresholds and Responses²⁵

ACTIVITY	THRESHOLD/USE INDICATORS	RESPONSE
Wildfire	Over 25% of acres in pasture is burnt and severity is high enough to remove existing deep-rooted perennial vegetation and require seeding.	Remove livestock grazing from burned area, or temporarily fence ²⁶ burned area, to exclude livestock grazing for two growing seasons. BLM retains discretion to close areas of any size due to fire depending on resource concerns.
Upland Grazing	50% utilization level on key native upland perennial species.	If livestock are still present when monitoring shows the utilization threshold is met, permittee would be required to remove livestock in a timely manner. Adjust livestock timing and/or duration of use for the following season. Reduce AUMs the following year if utilization is over 50%. ²⁷ If utilization is under 50%, consider increasing AUMs (within total permitted AUMs) or authorizing non-renewable grazing.
	60% utilization level on desirable non-native species (e.g., crested wheatgrass).	If livestock are still present when monitoring shows the utilization threshold is met, permittee would be required to remove livestock in a timely manner. Adjust livestock timing and/or duration of use for the following season. Reduce AUMs the following year if utilization is over 60%. If utilization is under 60%, consider increasing AUMs (within total permitted AUMs) or authorizing non-renewable grazing.
	Under Alternative 2, the Mud Creek Allotment - Lower Pasture utilization threshold would be set at 35% in first season of livestock grazing. This utilization threshold would be adjustable based on VOR monitoring in future years.	If livestock are still present when monitoring shows the utilization threshold is met, permittee would be required to remove livestock in a timely manner. Adjust livestock timing and/or duration of use for the following season. If VOR after grazing is less than 7", reduce utilization by 5%. If VOR after grazing is greater than 7", increase utilization by 5% or maintain utilization levels if close to the 7" threshold. Utilization cannot exceed the standard utilization maximums for upland grazing mentioned above.
Riparian Grazing	Streambank alteration of 25% or less. ²⁸	When assessing annual use indicators and criteria and determining responses, BLM would follow the Process for Assessing Grazing Use Criteria (Appendix D).
	Average stubble height on all key species of 6". ²⁹	
	Woody browse on willow species with a use class of "Light" (2–40%) ³⁰ or less.	

²⁵ Thresholds and responses apply to all alternatives unless an alternative specifically describes a different threshold or response. Ultimately, it is the permittee's responsibility to remove livestock prior to utilization thresholds being met, and this obligation exists whether or not BLM staff are present to monitor.

²⁶ An exclusion fence would not be constructed under this analysis. Construction of any fence would require additional NEPA compliance and decision.

²⁷ This should not occur often as BLM works with the permittee to monitor and livestock should be removed prior to hitting this threshold. This response is only in case, for unseen reasons, this does not occur.

²⁸ Goss and Roper (2018) suggest a conservative starting point for this metric of 25%. The percentage of streambank alteration is measured within a 0.25-meter frame placed approximately every 5 meters for 40 readings per side of the bank. MIM streambank alteration data collected in 2019 along Little Bridge, Little Fir, and Big Fir Creeks indicate streambank alteration did not rise above 6.25% (Bureau of Land Management 2019a).

²⁹ "Implementing more conservative standards such as a 15-cm [6 inch] standard for stubble height seems prudent until there is sufficient site-specific data to justify more liberal standards" (Clary and Leininger 2000; Goss and Roper 2018). Clary and Leininger (2000) recommend a 10–15 cm (4–6 inch) riparian stubble height.

³⁰ Use classes are described in MIM TR 1737-23 (Bureau of Land Management 2011a: 38). The "30% of current year's growth" for woody vegetation recommended in Appendix J (J-5) of the U.S. Forest Service's PACFISH Recommended Livestock Grazing Guidelines Revision (1995) fits in and therefore supports the "light" use class prescribed here. MIM woody browse data collected in 2019 along Little Bridge, Little Fir, and Big Fir Creeks indicate woody browse did not rise above 11% or the "Slight" (0–20%) use class (Bureau of Land Management 2019a).

2.1.4 Billing

Actual use (after-the-fact) billing would be authorized as part of this AMP because of the variability in forage production from year to year and the unreliability of water sources. Annual grazing would be authorized with a letter of authorization prior to turnout. Accurate records would be kept by the permittee(s), and an actual use grazing report would be submitted to BLM within 15 days after the authorized use is completed within the BCA allotments. Advance billing may be required at the discretion of the BLM. If the terms and conditions of actual use billing are not met, actual use billing would no longer be allowed and advanced billing would occur for that permittee. This would not occur under Alternative 1 or Alternative 5: No Action.

2.1.5 Percentage of Public Land Calculations

The percentage of public land (% PL) is determined by the proportion of livestock forage available on public lands within the allotment compared to the total amount available from both public lands and those owned or controlled by the permittee (43 CFR 4130 3-2 (g)). Percentage of public land would be calculated using ecological site mapping and ecological site description (ESD) estimates of grass and grass-like production in a normal precipitation year. Within the BCA, for each pasture, the number of acres in each ecological site would first be determined. These acres would then be divided into public lands and lands owned or controlled by the permittee. To determine the proportion of livestock forage, the number of acres of public lands and of lands controlled by the permittee, in each ecological site and each pasture, would be multiplied by the grass and grass-like production estimates (lbs./acre) from the associated ESD. This would result in production estimated for public lands and for lands controlled by the permittee. The sum of these two values would result in total production for that ESD within the pasture. To calculate % PL for that pasture, the sum of production on public lands, for all ecological sites, would be divided by total production, for all ecological sites, within the pasture.³¹ These calculations would be made after the determination of preference is made within these allotments, as the calculations would change depending on which applicant, or combination of applicants, is selected. While this value is used in calculations on the grazing authorization, it would not result in more AUMs being authorized on BLM-managed lands than what is described under each alternative. However, as % PL values decrease from 100% PL, livestock head number would increase. This would not occur under Alternative 5: No Action.

2.1.6 Crossing Permits

Crossing permits, utilizing active trailing, which is defined as livestock being pushed by a horseback rider or person on foot,³² and not allowed to drift, would be authorized to occur across the BLM-managed land within the Hammond, Mud Creek, Hardie Summer, and Hammond FFR Allotments. A crossing permit does not authorize trailing across any private lands within the

³¹ Using ESDs for this calculation allows the BLM to utilize the best available data for production on BLM- and permittee-controlled lands. The BLM understands that these production estimates may be outdated, especially in areas where fire has occurred. However, it is expected that the production patterns, based on ecological sites and site potential, would be similar and can still be used to calculate % PL. This number would be updated if better production data becomes available, and when control of land or adjustment of pasture boundaries occurs.

³² The use of motorized equipment to push livestock would not be authorized in this area except in situations where the motorized equipment remains on existing roads. The CMPA is closed to all off-road vehicle use by the public.

trailing pasture. Trailing may occur by both the authorized permittee for the allotment, or an adjacent permittee (not the authorized permittee) of the allotment. If trailing occurs by an adjacent permittee, it is their responsibility to coordinate movements with the allotment permittee to minimize conflict as much as possible. If trailing livestock get mixed in with permitted livestock, it is the trailing operators' responsibility to sort livestock and ensure all of their livestock get removed from the pasture. Crossing permits would be authorized under 43 CFR 4130.6-3 and issued through the BLM Rangeland Administration System.

Trailing would be authorized mainly in the uplands (outside of riparian corridors), though crossing of riparian corridors would be permitted when needed. Trailing operators may take breaks while trailing, to allow livestock to water and allow cows and calves to find one another (pair up) before moving again. Trailing would occur along roads to the extent possible and must avoid trailing through known GRSG leks. If trailing is over four miles, the trailing operator may overnight in the trailing pasture at available water. Each trailing occurrence should last no more than two days. No more than ten days total of trailing/crossing would be authorized within any pasture per year. This would occur under all alternatives.

2.1.7 Salt, Mineral, and Protein Supplements

The BLM would continue to authorize supplementation of salt, minerals, and protein in block, dry, and liquid form in all grazing alternatives, with restrictions listed in required design features (RDF) (Section 2.2) and in permit terms and conditions. This would occur under all grazing alternatives.

2.2 Project Design Elements, Required Design Features, and Best Management Practices

All developments would follow the applicable required design features (RDF) from the 2015 GRSG ARMPA (Bureau of Land Management 2015a) within GRSG habitat, as well as general project design elements (PDE). Due to site-specific circumstances, some RDFs, PDEs, and BMPs may not apply to some projects (e.g., if a resource is not present on a given site) or may require variations (e.g., a larger or smaller protective area). This would occur under all grazing alternatives that include developments.

2.2.1 Project Design Elements

PDEs were developed to aid in meeting project goals and objectives. These features are nonexclusive and are subject to minor modification based on site-specific terrain characteristics (topography and vegetation). Developments would follow the PDEs outlined below. The locations of all proposed developments are estimated locations. Exact, on-the-ground locations of any proposed developments would be determined by the BLM prior to constructing the proposed developments. All developments would occur within 0.25 mile of the current proposed location. Any developments that would occur in WSAs would be required to meet an exception to the non-impairment standard and would be fully analyzed through NEPA analysis.

- The Industrial Fire Precaution Levels (IFPL) would be followed during construction.
- Proposed development sites would be surveyed for cultural values prior to implementation. Where cultural sites are found, National Register of Historic Places (NRHP) eligibility would be evaluated, and the location of the development would be moved to avoid and prevent damage to the site. If sites are determined to be NRHP eligible and the location of the proposed development moved to avoid the site, sites would still be assessed for threats, and, if needed, measures to protect cultural materials would be determined. Site protection plans would be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and the appropriate American Indian tribes, as necessary. Mitigation measures could include protective fencing, surface collection and mapping of artifacts, subsurface testing, and complete data recovery (full-scale excavation). Additional NEPA analysis and decision may be necessary, depending on the extent of the mitigation action.
- Proposed development sites would be surveyed for BLM-designated special status plant species and Federally listed T&E plants, and designated critical habitat, prior to implementation. Special status and T&E plant sites would be avoided.
- Proposed development sites would be surveyed for noxious weed populations and invasive species prior to implementation. Weed populations identified in or adjacent to the proposed projects would be treated using the most appropriate methods, in accordance with the decision for the Integrated Invasive Plant Management for the Burns District Revised Environmental Assessment , or subsequent decision.
- Fences would be constructed to BLM specifications for a 4-strand, barbed-wire fence. Post spacing would be up to 22 feet and the maximum fence height would be 42 inches. The bottom wire would be smooth and at least 18 inches from the ground. As many as two metal or wood stays would be used in each section of fence. Posts would be standard metal posts and solid green in color. Green steel braces and stretch panels may be used instead of wood braces and rock cribs when they would not affect the structural integrity of the fence. Spot removal of rocks or vegetation would only occur when necessary, during construction. Pickups or utility terrain vehicles (UTV) would be used in fence construction; off-road travel would occur to haul materials. Anti-strike markers would be used as described in the GRSG ARMPA (Bureau of Land Management 2015a: 2.3.3.2 Required Design Features). The grazing permittee would be responsible for all fence maintenance.
- Areas disturbed during development construction would be seeded with native species, or desirable nonnative species (such as crested wheatgrass), where the site is outside of wilderness, WSA, and LWC and at immediate risk of annual grass invasion, to increase the rate of recovery. Only native species would be seeded within the wilderness, WSA, or LWC portions of the allotments. Seeding would be completed using an all-terrain vehicle to broadcast seed and pull chains to cover the seed, or by hand with a whirlybird, depending on the size of the disturbed area. Any seeding within WSA or LWC areas

would occur by handheld or portable bag seeders. Reseeding would occur if monitoring suggested it was not successful. Seeding would occur in the fall or winter.

- Wildlife accessibility to water would be ensured and escape ramps would be installed in all new and existing water troughs.
- New troughs would be painted a BLM standard environmental color to reduce visual contrasts. Bare metal troughs would not be allowed.
- Fuel storage cannot exceed 1,320 gallons, and spills from containers greater than 45 gallons must be cleaned up by the responsible party and are reportable by State and Federal laws without a spill prevention control and countermeasure plan submitted to the Environmental Protection Agency (EPA).

2.2.2 *Required Design Features*

These RDFs are required for certain activities in GRSG habitat. RDFs establish the minimum specifications for certain activities to help mitigate adverse impacts. Because of site-specific circumstances, some RDFs may not apply or may require slight variations. See GRSG ARMPA (Bureau of Land Management 2015a: C, p. C-1) for more details.

- Restrict the construction of fences and tall structures to the minimum number and amount needed (Bureau of Land Management 2015a: C, Common to All RDF 3, p. C-1).
- Remove, modify, or mark fences identified as high risk for collisions, generally within 1.2 miles of occupied or pending leks (Bureau of Land Management 2015a: 2-20, MD LG 9). Refer to the model by Bryan Stevens (Stevens 2011) to identify fences that pose a threat to GRSG. Remove any unneeded or unused fences and mark needed fences with anti-strike markers if they pose a threat to the GRSG. Remove or mark fences within 1.2 miles of newly discovered leks that were not included in the model. Update the model when new leks are found Priority Habitat Management Area (PHMA only) (Bureau of Land Management 2015a: C: Common to All, RDF 5, p. C-2).
- Power wash all vehicles and equipment involved in land and resource management activities prior to allowing them to enter the project area to minimize the introduction and spread of invasive plant species (Bureau of Land Management 2015a: C: Common to All, RDF 11, p. C-2).
- Use native plant species, locally sourced where available, recognizing that use of nonnative species may be necessary, depending on the availability of native seed and prevailing site conditions (Bureau of Land Management 2015a: C: Common to All, RDF 12, p. C-2).
- There will be no disruptive activities two hours before sunset to two hours after sunrise from March 1 through June 30 within 1.0 mile of the perimeter of occupied leks, unless

brief occupancy is essential for routine ranch activities (e.g., herding or trailing livestock into or out of an area at the beginning or end of the grazing season). Disruptive activities are those that are likely to alter GRSG behavior or displace birds such that reproductive success is negatively affected or an individual's physiological ability to cope with environmental stress is compromised. Examples of disruptive activities are noise, human foot or vehicle traffic, or other human presence (Bureau of Land Management 2015a: C: Common to All, RDF 19, p. C-3).

- Do not place salt or mineral supplements within 1.2 miles of the perimeter of an occupied lek (Bureau of Land Management 2015a: C: Livestock Grazing, RDF 1, p. C-6).
- Do not concentrate livestock in nesting habitat or leks from March 1 through June 30. The timing and location of livestock turnout and trailing should not contribute to livestock concentrations on leks during the GRSG breeding season (Bureau of Land Management 2015a: C: Livestock Grazing, RDF 2, C-6).
- Fence wetlands (e.g., springs, seeps, wet meadows, and riparian areas) to maintain or foster progress toward PFC and to facilitate management of GRSG habitat objectives. Where constructing fences or exclosures to improve riparian or upland management, incorporate fence marking or other Best Management Practices/RDFs as appropriate (Bureau of Land Management 2015a: C: Livestock Grazing, RDF 5, p. C-6).
- Construct new livestock facilities, such as livestock troughs, fences, corrals, handling facilities, and "dusting bags," at least 1.2 miles from leks or other important areas of GRSG habitat (i.e., wintering and brood-rearing areas) to avoid concentrating livestock, collision hazards to flying birds, or avian predator perches (Bureau of Land Management 2015a: C: Livestock Grazing, RDF 7, p. C-7).

2.2.3 *Best Management Practices from 2015 GRSG ARMPA*

The following BMPs are additional management actions and practices. They were developed from the National Technical Team Report and other sources. The BMPs are applicable to PHMA and General Habitat Management Area (GHMA) unless otherwise indicated.

- Use ecological site descriptions (ESD) to determine appropriate seed mixes. Seed mixes should include a diversity of forbs that maximize blooming times when pollinators are most active and include nectar and pollen-producing plants (2015a: C: Best Management Practices, Post-Fire and Restoration Seeding BMP 1, p. C-9).
- When using nonnative grasses, do not mix crested wheatgrass (*Agropyron cristatum* or *A. desertorum*) with native perennial grass species. If crested wheatgrass is needed to compete with invasive annual grasses, use a nonnative grass mix (2015a: C: Best Management Practices, Post-Fire and Restoration Seeding BMP 3, p. C-9).

- Restrict off-trail vehicle use, where authorized, to areas more than two miles from leks during the breeding season, unless travel is essential for routine ranch activities, such as repairing fence, “doctoring” livestock, and finding lost livestock (2015a: C: Best Management Practices, Livestock Grazing, p. C–11).

2.3 Alternative 1: Issue Grazing Permits with Terms and Conditions Identical to the Previously Issued Permit with No New Developments

This alternative would issue one or more grazing permits on all four allotments for ten years with the same terms and conditions that were on the 2004 grazing authorization. This would continue grazing management as it was authorized on the 2004 grazing authorization, which expired on February 28, 2014.

2.3.1 Permit Issuance

The BLM would issue one or more 10-year livestock grazing permits for Hammond, Mud Creek, Hardie Summer, and Hammond FFR Allotments. Mandatory terms and conditions are shown in Table 2-2.

Table 2-2: Alternative 1 Mandatory Terms & Conditions

Allotment	Cattle #	Season of Use	% PL	AUMs
Hammond	68	4/1–10/30	99	471
Mud Creek	390	5/16–6/30	100	590
Hardie Summer	408	7/1–9/30	33	407
Hammond FFR	32	4/1–4/30	100	32

Other terms and conditions applicable to all allotments on the permit would include:³³

- The area manager must give prior approval for any maintenance or construction of range development, or any surface-disturbing work, done in the portion of your allotment that is in a wilderness study area (WSA) or wilderness area.³⁴
- Actual numbers and season of use on Hammond FFR may vary at the discretion of the operator provided AUMs are not exceeded. Public land in this fenced federal range will be managed to maintain or improve resource conditions.
- The payment of your grazing fees is due on or before the due date specified in the grazing bill. If your payment is not received within 15 days after the due date, you will be charged a late fee assessment of \$25.00 or 10% of the grazing bill, whichever is greater, not to exceed \$250.00. Failure to make payment within 30 days after the due date may result in trespass action.

³³ These are verbatim other terms and conditions that would be placed on the permit. As such, they include the word “will.” The use of the word “will” here does not imply any pre-decisional selection of this alternative.

³⁴ No new developments are proposed under this alternative.

- Title 43 CFR 4130.3-2(d) states that an actual use record shall be submitted within 15 days after completion of annual grazing use.
- No salt will be permitted within one quarter of a mile from livestock water sources and riparian meadows.
- Permittees are required to maintain all developments as directed in Oregon State Criteria for Maintaining Range Improvements as of December 15, 1982.
- Any forage authorized in excess of your permitted use or outside of adjudicated season or number is nonrenewable and does not establish a priority for future forage allocation (43 CFR 4110.3-1(a)).
- This permit/lease is subject to modification, if necessary, to achieve compliance with the standards for rangeland health and guidelines for livestock grazing management (43 CFR 4180).

2.3.2 Livestock Grazing Management

Livestock grazing management would follow the general grazing rotation that was used between 2004-2014³⁵ shown in Tables 2-3 through 2-5. Grazing treatments (i.e., early, graze, and defer) are described in Appendix E: Grazing Treatment Descriptions.

Table 2-3: Alternative 1 Proposed General Grazing Rotation Hammond Allotment

Allotment	Pasture	Year 1	Year 2	Year 3	Year 4
Hammond	N. Dutch Oven Seeding #1	Early	Early/Graze ³⁶	Rest	Early
	Krumbo Creek #2	Early	Early	Early	Rest
	Kern Reservoir #3	Rest	Rest	Rest	Graze
	Webb Springs #4	Graze	Rest	Graze	Rest
	Knox Springs #5	Graze	Graze/Defer	Graze/Defer	Graze/Defer
	Larkspur Reservoir #6	Graze	Graze	Rest	Graze
	Baca Lake #7	Graze	Defer	Graze	Early
	Knox Pond #8	Rest	Rest	Rest	Graze
	Landing Strip #9	Rest	Early	Graze	Early
	S. Dutch Oven Seeding #10	Early	Rest	Early	Rest
	Hole in the Ground #11	Rest	Early	Rest	Early
	Artesian #12	Rest	Graze	Rest	Early

Table 2-4: Alternative 1 Proposed General Grazing Rotation Mud Creek Allotment

Allotment	Pasture	Year 1	Year 2
Mud Creek	Lower Field #1	Graze	Rest
	Upper Field #2	Rest	Graze

³⁵ The proposed general grazing rotation under this alternative was developed by analyzing actual use records and documenting the most common time of use and rotations. As grazing varied from year to year, and did not follow a specific rotation, this is the best estimate of what happened during this time frame but would not exactly match all years of previous grazing.

³⁶ Proposed general grazing that spans multiple grazing treatments is shown by including both of those treatments within the table (e.g., Early/Graze). This occurs when proposed grazing would start during one treatment and end during another. Grazing treatment descriptions can be found in Appendix E.

Table 2-5: Alternative 1 Proposed General Grazing Rotation Hardie Summer Allotment

Allotment	Pasture	Year 1	Year 2	Year 3
Hardie Summer	Cabin #1	Defer	Graze/Defer	Defer
	North #2	Defer	Defer	Defer
	Bridge Creek #3	Graze/Defer	Defer	Defer
	Sylvies #5	Defer	Defer	Defer

Allotment boundaries would remain the same (see Appendix A: Map C – Current Grazing Allotments & Developments). Developments, such as fences and developed water sources, would be limited to what is already existing on the landscape on BLM-managed land (Appendix F: List of Existing Developments).

None of the measures/actions described in Sections 2.1.1–2.1.3, or 2.1.7 are included under Alternative 1 and no AMPs would be implemented. Authorized AUMs would be maintained at existing permitted levels. No non-renewable (NR) AUMs would be authorized. No developments would be constructed or removed. Existing developments (Appendix F) would continue to be maintained following existing policy and existing decisions, and as described below in Alternative 2 (Section 2.4.4.4.). Allotment and pasture boundaries would remain the same. The BLM would not authorize supplemental feeding of hay in any of the allotments.

2.4 Alternative 2: Issue Grazing Permit(s) with Site Specific Terms and Conditions, Developments, and Changes to Allotment / Pasture Boundaries (Agency Developed)

This alternative was developed by the BLM IDT based on scoping and in coordination with requests from applicants for grazing preference within the BCA. The alternative is designed to provide periodic growing season rest to all areas of the allotments. In addition to AMP components discussed under Section 2.1 Goals, Objectives, and Actions Common to all Grazing Alternatives, management discussed below would be incorporated as part of the new Bridge Creek AMP, which would encompass all four allotments (Hammond, Hardie Summer, Mud Creek, and Hammond FFR). While the entire AMP would become a term and condition of the grazing permit(s), only the components that are within the permittee's management ability would be the permittee's responsibility; specifically, the management and movement of livestock are the permittee's responsibility.

2.4.1 Permit Issuance

The BLM would issue one or more 10-year livestock grazing permit(s) for Hammond, Mud Creek, Hardie Summer, and Hammond FFR Allotments.³⁷

Under this alternative, the BLM would authorize the season of use for each allotment, implement livestock grazing systems that ensure periodic growing season rest in all pastures, and allow flexibility to meet resource needs, such as early use of annual grasses. Mandatory terms and conditions are shown in Table 2-6. This alternative would result in an increase of AUMs

³⁷ Allotment boundary changes are proposed under this alternative. Table 2-18 (in Section 2.8 Comparison of Alternatives) shows what pastures would be within each allotment under this alternative. Table 1-2 shows which pastures are currently within each allotment.

permitted within the Hammond Allotment, above what was previously permitted (seen in Alternative 1).

Table 2-6: Alternative 2 Proposed Mandatory Terms & Conditions

ALLOTMENT	CATTLE #	SEASON OF USE	% PL ³⁸	AUMS
Hammond	134	3/1–2/28	100	1,625 ³⁹
Mud Creek	49	3/1–2/28	100	590
Hardie Summer	81	7/1–11/15	100	364 ⁴⁰
Hammond FFR	439	3/1–2/28	100	368 ⁴¹

Other terms and conditions applicable to all allotments on the permits would include:⁴²

- The AMP, as provided for in 43 CFR 4120.2(a)(1–4)(b), is a term and condition of your permit.
- Mandatory terms and conditions shown on a grazing permit are only for public lands. When there is privately controlled land within an allotment, these only apply to the publicly managed lands, and do not limit use of private lands in any way. If the private landowner chooses to graze their private lands within the allotments, outside the terms and conditions for the public land, it is their responsibility to ensure livestock remain on the privately controlled land. Any livestock on publicly managed land outside of what has been authorized may be considered unauthorized grazing use and be subject to trespass action under 43 CFR 4150.
- Actual livestock number may vary dependent on length of annual grazing, as long as AUMs are not exceeded within a given grazing year.⁴³
- The BLM may adjust the annual period of use within each pasture, within the bounds of the season of use on the grazing permit and AMP.

³⁸ Until the operator to which a grazing authorization would be issued is identified, % PL cannot be calculated because it is calculated based on the forage production of lands owned or controlled by the permittee. Once forage is allocated, % PL would be calculated for each allotment, this number would be updated, along with the cattle number, as appropriate to ensure AUMs remain the same, and a term and condition identifying % PL per pasture (for billing purposes) would be added to the grazing permit.

³⁹ The BLM is proposing to increase AUMs within crested wheatgrass seedings only. Based on previous carrying capacity calculations, the number of AUMs available for grazing was determined to be 1,971 AUMs. The number seen in Table 18 (in Section 2.8 Comparison of Alternatives) is less than 1,971 due to the adjustment of pasture boundaries. The 2005 Steens CMPA RMP/ROD (Bureau of Land Management 2005a: RMP-47) states “Interim and long-term grazing management and stocking levels are adjusted in accordance with results of monitoring studies, allotment evaluations, and rangeland health assessments”.

⁴⁰ This increase in AUMs is tied to the adjustment of allotment and pasture boundaries described in the Pasture/Allotment Boundary Adjustment Section below. This is an administrative adjustment, and it does not result in more AUMs being permitted on the land than what has previously occurred within the current allotment. This decrease of 44 AUMs is due to the BLM-managed land that is proposed to be moved out of the Hardie Summer Allotment and into the Hammond FFR.

⁴¹ This increase in AUMs is tied to the adjustment of allotment and pasture boundaries described in the Pasture/Allotment Boundary Adjustment Section below. This is an administrative adjustment, and it does not result in more AUMs being permitted on the land than what has previously occurred within the current allotment. Of this increase in AUMs, 44 come from the BLM-managed land that is proposed to be moved into the FFR from the Hardie Summer Allotment. The remainder are associated with pastures currently within the Hammond Allotment that are proposed to be moved into the Hammond FFR. Within these pastures, there is an increase in AUMs on the land, based on the carrying capacity calculated in the 2007 Hammond Allotment.

⁴² These are verbatim other terms and conditions that would be placed on the permit. As such, they include the word “will.” The use of the word “will” here does not imply any pre-decisional selection of this alternative. Footnotes in this section, such as this one, are for explanation purposes and would not be included on the grazing permit.

⁴³ Non-renewable AUMs would be authorized separately and would be in addition to the active use AUMs shown on the grazing permit.

- 663

664 • The BLM, in its sole discretion, may allow up to a two-week period of flexibility in the

665 permitted season of use; this flexibility may occur both before and after the permitted

666 season of use. This would be a nonrenewable extension of the authorized season of use

667 requiring prior approval. There is no guarantee that BLM will authorize this flexibility in

668 any given year. Total active use AUMs annually authorized will not exceed the amount

669 permitted.⁴⁴

670
- 671 • Actual use billing is authorized per the AMP. Permittee will submit an actual use record

672 within 15 days after completion of annually authorized grazing per 4130.3-2(d).

673
- 674 • There will be a 50 percent utilization (as measured using the Ocular Landscape

675 Appearance/Key Species Method) threshold on upland native key species and a 60

676 percent utilization threshold on upland desirable nonnative key species. The response of

677 reaching this threshold will be the timely removal of livestock. While the BLM will be

678 responsible for monitoring, in coordination with the permittee, the permittee remains

679 responsible for removing livestock to ensure thresholds are not exceeded, whether or not

680 BLM has conducted monitoring. Permittee exceedances of utilization will result in

681 decreased AUMs in the subsequent year.

682
- 683 • Within the Lower Pasture of Mud Creek, utilization would begin at a 35 percent

684 utilization threshold in the first year of grazing following issuance of a grazing permit.

685 The BLM would adjust this utilization, up or down, based on monitoring, as described in

686 Section 2.1.3 Adaptive Management and Flexibility.

687
- 688 • Permittee will not place any salt or supplements (block, dry, or liquid) within 0.25 mile of

689 a water source or riparian area, or within 1.2 miles of the perimeter of an occupied or

690 pending lek. Permittee may place salt or supplements (block, dry, or liquid) outside of

691 these areas. Utilizing hay as a supplement is not authorized under this term and condition

692 and requires separate approval from BLM on an annual basis.

693
- 694 • The permittee is required to maintain all developments unless there is an agreement in

695 place documenting a development as a BLM responsibility. Prior to being issued this

696 grazing permit, the permittee will sign an Assignment of Range Improvements Form

697 4120-8,⁴⁵ which identifies developments for which the permittee is responsible. Fences

698 that separate two BLM allotments are the responsibility of both permittees unless an

699 agreement is in place⁴⁶ showing specific maintenance responsibility areas. Each permittee

700 is responsible for ensuring the boundary fence is maintained prior to turning out their

701 livestock. Maintenance activities that involve ground-disturbing activities need to be

702 approved by the BLM prior to beginning work to allow BLM to ensure all NEPA and

703 policy requirements are met.

⁴⁴ Non-renewable AUMs would be authorized separately and would be in addition to the active use AUMs shown on the grazing permit.

⁴⁵ The current List of Range Developments for allotments within the BCA is in Appendix F.

⁴⁶ This agreement may be between permittees only or between the BLM and all permittees, which is preferred as it increases communication and coordination between all entities.

- Permittee may use active trailing, which is actively managed to avoid livestock lingering and resource concerns, through rested pastures. Upon request, the BLM may authorize the permittee to use active trailing across any of the allotments to access any other allotment on the permit. Any active trailing within the permitted allotments must be documented by the permittee on the actual use form.
- The permittee will be allowed to continue to utilize open roads on BLM-managed land within the allotments, and adjacent to the allotments, in order to implement the grazing permit.
- Permittee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands (43 CFR 4130 3-2(h)).
- If the BLM determines that S&Gs are not being achieved, and livestock grazing is a causal factor, the associated areas would be rested until “significant progress” (H-4180, (Bureau of Land Management 2001a)) is made toward achieving appropriate ecological objectives, as identified in ecological site descriptions, IIRH, and S&G/LHA’s.

Other allotment specific terms and conditions would include:

- The BLM may authorize increased AUMs on the Hammond Allotment over a 5-year period. During that period, an additional 226 AUMs would become available each year, with full implementation occurring in 2029.⁴⁷ This increase will only occur as long as the allotment continues to meet applicable S&Gs, or livestock is not a causal factor if S&Gs are not achieved. The 226 additional AUMs are within the range of historical use, including both permitted and nonrenewable AUMs. If S&Gs continue to be achieved, or livestock is not a causal factor in not achieving them, the BLM could continue authorizing these AUMs and a future AMP may analyze permanently adding this increase onto the grazing permit.
- Due to Bridge Creek WSA being within the Knox Spring Pasture, AUMs authorized within this pasture will not exceed the carrying capacity for this pasture,⁴⁸ which is 356 AUMs. This level of authorized AUMs does not exceed those allowed during the 1976 grazing fee year and is a grandfathered use in the WSA.
- Within the Krumbo Creek #2 Pasture of the Hammond Allotment, only trailing/crossing use would be allowed to occur, following the terms and conditions outlined in Section 2.1.6 Crossing Permits, until S&Gs show “significant progress” (H-4180, (Bureau of Land Management 2001a)) toward being achieved, and the reintroduction of grazing as described in Table 2-7 would not impact continued progress.

⁴⁷ This assumes implementation begins in 2024.

⁴⁸ This increase in AUMs is based on the 2007 Hammond Allotment Evaluation (Bureau of Land Management 2007a) estimates of carrying capacity and previous monitoring.

2.4.2 Livestock Grazing Management

Livestock grazing management is designed to provide periodic growing season rest for plant species. Use periods may vary annually (as determined in an annual authorization with prior BLM approval) in order to provide for recommended rest periods as described in the proposed grazing systems shown in Tables 2-7 through 2-9, while still providing flexibility and adaptive management. Livestock numbers may vary annually as outlined under the Adaptive Management and Flexibility section (Chapter 2.1. Actions Common to All Alternatives); however, total permitted AUMs would not exceed those permitted on each allotment.⁴⁹ Grazing treatments (i.e., early, graze, and defer; see Appendix E: Grazing Treatment Descriptions) are used in the proposed grazing systems to act as guidelines. This allows for modification based on yearly variable weather conditions. This variation results in key forage species entering vegetative states on differing dates, annually.

While three of the four allotments would show an authorized season of use from March 1 to February 28 (a full year), that does not mean livestock would be authorized to graze within those allotments the entire year, rather that the BLM can utilize adaptive management, flexibility, and improved grazing rotations, adjusting grazing as needed throughout the year and life of the grazing permit. For annual livestock grazing, the BLM would determine specific livestock use dates for the allotments, based on the vegetative stages of key forage species, prescribed grazing treatments, and other factors impacting the allotment and/or permittee. These grazing systems would allow for periodic growing season rest. Adaptive management may result in the grazing systems being modified within the terms and conditions of the grazing permits, as long as periodic growing season rest occurs. Prior to authorizing annual grazing (including annual livestock numbers, season of use, and AUMs within individual pastures), BLM would consider monitoring data and current weather conditions, such as drought. This may result in changes to stocking levels and timing of grazing to best meet resource objectives. Any modifications to the proposed grazing system would conform to the utilization threshold of 50 percent for native key forage species and 60 percent for desirable nonnative key forage species. Any adaptations in grazing systems require prior BLM approval.

Table 2-7: Alternative 2 Proposed General Grazing Rotation Hammond Allotment

Allotment	Pasture	Year 1	Year 2	Year 3	Year 4 ⁵⁰
Hammond	Landing Strip #9	Early	Early	Early	Defer
	Krumbo Creek #2	Graze	Rest	Graze	Rest
	N. Dutch Oven Seeding #1	Early	Rest	Early	Rest
	Hole in the Ground #11	Graze	Rest	Graze	Graze
	Artesian #12	Graze	Graze	Graze	Rest
	Knox Springs #5	Defer	Defer	Defer	Defer
	Larkspur Reservoir #6	Defer	Defer	Rest	Defer
	Webb Springs #4	Rest	Graze	Rest	Graze
	S. Dutch Oven Seeding #10	Rest	Early	Rest	Early

⁴⁹ This excludes potential NR AUMs, which would follow specific terms and conditions, described below.

⁵⁰ After year 4, the grazing rotation would start back at year 1.

Within the Krumbo Creek #2 Pasture of the Hammond Allotment, only trailing/crossing use would be allowed to occur, following the terms and conditions outlined in Section 2.1.6 Crossing Permits, until riparian related S&Gs show significant progress toward being achieved, and the reintroduction of grazing as described in Table 2-7 would not impact continued progress.

Table 2-8: Alternative 2 Proposed General Grazing Rotation Mud Creek Allotment

Allotment	Pasture	Year 1	Year 2	Year 3	Year 4
Mud Creek	Lower Field #1	Graze/Defer	Graze/Defer	Graze/Defer	Defer
	Upper Field #2	Graze/Defer	Graze/Defer	Defer	Graze/Defer

Within the Lower Pasture of Mud Creek, utilization would begin at a 35 percent utilization threshold in the first year of grazing following issuance of a grazing permit. The BLM would adjust this utilization, up or down, based on monitoring, as described in Section 2.1.3 Adaptive Management and Flexibility.

Table 2-9: Alternative 2 Proposed General Grazing Rotation Hardie Summer Allotment

Allotment	Pasture	Year 1	Year 2	Year 3
Hardie Summer	Bridge Creek #3	Graze/Defer	Rest	Graze/Defer
	Cabin #1	Defer	Graze/Defer	Rest
	Little Fir Creek ⁵¹	Rest	Defer	Rest
	Thompson	Rest	Defer	Defer

Hammond FFR is a “C” allotment with a low percentage of public lands (25.5 percent up from 16.9 percent under Alternative 1; based on acres) to private lands (74.5 percent down from 83.1 percent under Alternative 1), even after proposed boundary adjustments. As such, the BLM would authorize the permittee to use the BLM-managed land, in coordination with any private land they control. The use of BLM-managed land is typically minimal as it tends to be located in small pieces, often on steep hillsides, and with minimal draw for livestock. Use of BLM-managed land within the FFR would continue to meet applicable objectives, and any authorized grazing use upon the public lands would conform to meeting the utilization threshold of 50 percent on native key forage species and 60 percent on desirable non-native key forage species, as well as following other thresholds and responses as described in Section 2.1.3 Adaptive Management and Flexibility. Pastures that are moved to the FFR would not receive less monitoring than currently occurs but would be more properly classified as “C” pastures due to their low percentage of BLM-managed land. Only BLM-managed land must be managed consistent with the BLM grazing permit; additional use on private land would occur at the discretion of the private landowner.

The BLM would not authorize supplemental feeding of hay in any of the allotments.

2.4.3 Non-Renewable (NR) Grazing

The BLM would authorize NR AUMs within the Hammond, Mud Creek, and Hardie Summer Allotments upon request of the permittee and where utilization after permitted use is less than 35

⁵¹ Trailing through this pasture can occur even in rested years. Trailing would be active, though watering may occur in the creek when water is present.

percent. BLM would not authorize NR grazing within the Lower Pasture of the Mud Creek Allotment, Krumbo Creek Pasture of Hammond Allotment, or the Hammond FFR. The objective of NR grazing would be to utilize biological thinning by livestock to address the additional grass and fine fuels that build up in years of above average production while providing additional forage for the permittee. BLM may authorize NR grazing on an annual basis under 43 CFR 4110.3-1(a) and 4130.6-2. BLM's prior approval would be required for any authorized NR grazing, and BLM would bill the permittee for the NR AUMs at the standard rate along with the permittee's actual use. The permittee would be responsible for timely and accurately reporting actual and NR use. The following terms and conditions would apply to NR grazing:

- The BLM would only authorize NR grazing following use of all permitted AUMs within the allotment, or portion of the allotment, the permittee is authorized to use.
- The BLM would only allow NR grazing when perennial bunch grasses are dormant, generally between July 15–February 28.
- The BLM would only authorize NR grazing in pastures where utilization levels following permitted use are 35 percent or less.
- The BLM would only authorize NR grazing up to the 60 percent utilization threshold for crested wheatgrass and the 50 percent utilization threshold for natives.⁵² Utilization calculations would include both permitted use and wildlife use. When pasture utilization reaches the utilization threshold, the permittee would be required to remove livestock in a timely manner. While the BLM would be responsible for monitoring, in coordination with the permittee, the permittee would remain responsible for removing livestock to ensure thresholds are not exceeded, whether or not BLM has conducted monitoring. Permittee exceedances during NR use would result in the permittee not being allowed to utilize NR the subsequent year.
- NR grazing would not be authorized in more than one-half of the pastures within an allotment in any given year.
- The permittee(s) must report NR grazing on the actual use form and mark it as NR grazing. The permittee(s) would pay for these AUMs at the standard rate.
- The BLM would not authorize any NR grazing within the Steens Mountain Wilderness.

⁵² Utilization is used as a threshold for NR grazing because the number of AUMs available for removal prior to utilization reaching the 50 percent utilization threshold varies year to year due to fluctuating production. Allowing NR grazing to adapt to current year conditions allows better flexibility to meet resource objectives and ensures overuse does not occur.

2.4.4 *Proposed Developments*⁵³

All proposed developments would follow RDFs, BMPs, and PDEs as described in Section 2.2.

2.4.4.1 *Water Gap Modification*

At the Bridge Creek water gap, the existing fence and topography have been found to be ineffective at fully keeping livestock from entering the Bridge Creek drainage. Therefore, an extension of the existing fences, 0.02-mile-long, would be added to connect the two fences on the west side of the water gap. On the east side of the water gap, a new fence, 0.18-mile-long, would be constructed across the creek to fully prevent livestock from travelling along the Bridge Creek drainage. These fences would both be constructed in the Bridge Creek WSA. See Appendix A: Map E – Alternative 2 Proposed Grazing Allotments & Developments.

2.4.4.2 *Fence Removal*

Within the Hammond Allotment's Krumbo Creek #2 Pasture all interior fences, approximately 5.3 miles, would be removed. These fences are no longer functional or needed. Within the Hardie Summer Allotment's Cabin Pasture #1 all BLM interior fences, approximately 2.85 miles, would be removed. See Appendix A: Map E – Alternative 2 Proposed Grazing Allotments & Developments.

On the boundary of the current Hardie Summer Allotment's Sylvies Pasture⁵⁴ and Frazier Field Allotment's Old Frazier Field Pasture, two portions of the boundary fence would be relocated to the BLM-private property boundary. The first portion would be in T. 32 S., R. 32.75 E., sec. 33 NENE. This would result in the removal of approximately 0.35 mile of fence. The second portion would be in T. 32 S., R. 32.75 E., sec. 33 NWSE and would remove approximately 0.14 mile of fence that is currently located within the Steens Mountain Wilderness.

2.4.4.3 *Fence Construction and Boundary Adjustment*

Within the Hardie Summer Allotment, approximately 4.91 miles of fence would be constructed. One new fence, approximately 1.56 miles long, would be constructed along the rim north of Little Fir Creek. Where possible, the contour of the rim would be used instead of constructing a fence, which might reduce the amount of fence needed. This fence would extend east from the north-south fence of the Hammond FFR's Mud Creek Pasture to the public land-private land boundary. Another new fence would be constructed at this point. That fence would go north following the land ownership boundary, until it reaches the existing fence. From the eastern end of the proposed Little Fir Creek fence, a new fence would also extend south, following the land ownership boundary, until it connects to the existing fence on the Cabin Pasture boundary; this section of fence (going north and south from the junction with the proposed Fir Creek fence)

⁵³ Proposed developments may be completed by the BLM, permittee, or in cooperation with each other and may be done using BLM, permittee, or contracted labor. Any developments needed to implement proposed grazing would be completed prior to grazing being authorized. Any developments completed or paid for, in full or part, by the permittee would include a signed Cooperative Range Improvement Agreement, Form 4120-6, between the BLM and permittee prior to work occurring.

⁵⁴ Under Alternative 2, the Sylvies Pasture would become part of the Hammond FFR.

would be approximately 1.35 miles long (see Appendix A: Map E). This fence would be located outside of WSA and LWC areas.

Another new fence would be constructed along the public land – private property boundary in section 27. This fence would extend the existing fence between the Hardie Summer Allotment and the Hammond FFR's Mud Creek Pasture south. The proposed fence would turn east halfway through section 27, continuing to follow the land ownership boundary. The proposed fence would then turn north, still following the land ownership boundary, until it ties into an existing fence. This proposed fence would be approximately 2.0 miles long. None of this fence would be within, or on the boundary, of a WSA or LWC. This fence would border the Fir Grove Area of Critical Environmental Concern (ACEC); however, no trees would be removed during construction or utilized as part of the fence. See Appendix A: Map E – Alternative 2 Proposed Grazing Allotments & Developments.

On the boundary of the Hardie Summer Allotment's Sylvies Pasture and Frazier Field Allotment's Old Frazier Field Pasture two portions of the boundary fence would be relocated to the BLM-private property boundary. The first portion would be relocated in T. 32 S., R. 32.75 E., sec. 33 NENE and sec. 34 NW. This relocation would result in the construction of approximately 0.84 mile of new fence. The net increase in fence due to this relocation would be approximately 0.5 mile. The second portion would be reconstructed in T. 32 S., R 32.75 E., sec. 33 SE and would follow the BLM Steens Mountain Wilderness and private property boundary and would result in approximately 0.36 mile of new fence being constructed. This would be a net increase of approximately 0.22 mile of new fence being constructed adjacent to the Steens Mountain Wilderness. An agreement with the adjacent landowner would be required prior to implementation, as this fence would be located outside of the Steens Mountain Wilderness.

As fences are constructed and removed, BLM would adjust allotment and pasture boundaries as described below. When possible, the new fences would follow the land administration boundary; however, they would follow landscape contours rather than property boundaries, where practical. Fences would not be placed on private property unless a cooperative range improvement agreement could be reached by both the private landowner and the BLM. All proposed fences are located outside of WSA and the LWC unit. Fences would be placed within one-quarter mile of the location identified in Appendix A: Map E – Alternative 2 Proposed Grazing Allotments & Developments.

In addition to changing fences, the BLM would move some pastures, and their associated AUMs, to different allotments. The Knox Pond, Baca Lake, and Kern Reservoir Pastures would all be removed from Hammond Allotment and added to the Hammond FFR Allotment.⁵⁵ In the Hardie Summer Allotment, the North and Sylvies Pastures would also be moved into the Hammond FFR.⁵⁶ In addition, the private land within the Hardie Summer Cabin Pasture would be fenced out of the allotment (as described above) and moved into the Hammond FFR. Dust Bowl #1

⁵⁵ As these pastures currently include part of the Hammond Allotment crested wheatgrass seedings, the portion of AUMs associated with these pastures, due to the increase in AUMs under this alternative, would also be moved into the Hammond FFR.

⁵⁶ This would also result in the 44 AUMs associated with these pastures being moved into the Hammond FFR.

Pasture in the Hammond FFR would be completely removed from any BLM allotment as there is almost no BLM-managed land (0.072 acre) currently within that pasture.

These changes account for the AUM increase between Alternative 1 and this alternative in the Hammond FFR from 32 to 368 AUMs and the decrease in AUMs in the Hardie Summer Allotment from 407 to 364 AUMs. In addition, the 39 acres of Steens Mountain Wilderness currently located in the Hardie Summer Allotment's Sylvies Pasture would be moved into the Frazier Field Allotment's Old Frazier Field Pasture, which already contains additional acres of designated wilderness. An additional 84.6 acres of BLM-managed land with no special designation would also be moved into the Frazier Field Allotment's Old Frazier Pasture. Due to the small amount of acreage being moved, there would be no transfer of AUMs between the two allotments. See Appendix A: Map E – Alternative 2 Proposed Grazing Allotments & Developments for the proposed allotment and pasture boundaries.

2.4.4.4 Range Development Maintenance

Maintenance of all developments would occur as needed to ensure the continued functioning of water developments and seedings. Water development (reservoir/waterhole/spring) maintenance may include (but is not limited to) repairing dams, adding bentonite, and removing sedimentation. Pipeline maintenance may include replacement of buried pipeline and troughs. Fence maintenance may include reconstruction of braces, rock jacks, rock cribs, and gates, as well as wire and post replacement. Equipment used for maintenance may include large-tracked vehicles such as an excavator, or rubber-tired vehicles such as a backhoe. Seeding maintenance may include reseeding of crested wheatgrass and brush beating. All maintenance activities would occur within the original construction footprint of the development. Unless otherwise stated, the permittee is responsible for range development maintenance. Removal of vegetation would be the minimal amount required to maintain the developments. See Appendix A: Map C – Current Grazing Allotments & Developments for specific locations of existing developments.

2.5 Alternative 3: Issue Grazing Permit(s) with Site Specific Terms and Conditions, Developments, Changes to Allotment /Pasture Boundaries, and Maximum Flexibility

This alternative was developed in coordination with an applicant for grazing preference within the BCA. This alternative would conform to all Guidelines by providing periodic growing season rest to all areas of the allotments through annual authorization. In addition to AMP components discussed under Section 2.1 Goals, Objectives, and Actions Common to all Grazing Alternatives, with the exception of Section 2.1.6 Crossing Permits, which would not be followed under this alternative, management discussed below would be incorporated as part of the new Bridge Creek AMP, which would encompass all four existing allotments (Hammond, Mud Creek, Hardie Summer, and Hammond FFR) and the proposed Hardie Summer FFR. While the entire AMP would become a term and condition of the grazing permit, only the components that are within the permittee's management ability would be the permittee's responsibility; specifically, the management and movement of livestock are the permittee's responsibility.

2.5.1 Permit Issuance

The BLM would authorize one or more 10-year livestock grazing permits for Hammond, Mud Creek, Hardie Summer, and Hammond FFR and the proposed Hardie Summer FFR.⁵⁷ Under this alternative, the BLM would modify the season of use associated with each allotment to allow for implementation of livestock grazing systems that ensure periodic growing season rest in all pastures, determined through annual authorizations, and allow flexibility to meet resource needs such as early use of annual grasses. This alternative would result in an increase of AUMs permitted within all allotments, above what was previously permitted (seen in Alternative 1). Mandatory terms and conditions are shown in Table 2-10.

Table 2-10: Alternative 3 Proposed Mandatory Terms & Conditions

Allotment	Cattle #	Season of Use	% PL ⁵⁸	AUMs
Hammond	225	3/1–2/28	100	2,700 ⁵⁹
Mud Creek	90	3/1–2/28	100	1,000
Hardie Summer	90	6/1–12/31	100	408
Hardie Summer FFR (New)	90	6/1–12/31	100	261
Hammond FFR	439	3/1–2/28	100	316

The BLM would apply most of the other terms and conditions described in Alternative 2 to all allotments on the permit(s) issued under this alternative. However, the other term and condition that states “Permittee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands (43 CFR 4130 3-2(h)),” and the one that states “The increase in AUMs on the Hammond Allotment will occur over a 5-year period (226 AUMs added each year with full implementation occurring in 2025) focusing in the pastures with a predominantly crested wheatgrass forage base...,” would not be included under this alternative. There would be no implementation period for the increase in AUMs under this alternative. Full use of all AUMs would be allowed in the first year of grazing.

2.5.2 Livestock Grazing Management

The BLM would authorize livestock grazing management with periodic growing season rest for plant species. Use periods may vary annually (determined in an annual authorization and not using a general grazing rotation) to provide for periodic growing season rest, while addressing the needs of the permittee. Livestock numbers may vary annually as outlined under “Adaptive Management” (Chapter 2.1. Goals, Objectives, and Actions Common to all Grazing Alternatives); however, total permitted AUMs would not exceed those permitted for each allotment.⁶⁰ This allows the BLM to modify grazing based on the large variability of weather conditions and water from year to year. This variation results in key forage species entering

⁵⁷ Allotment boundary changes are proposed under this alternative. Table 18 (in Section 2.8. Comparison of Alternatives) shows what pastures would be within each allotment under this alternative, as well as which pastures are currently within each allotment.

⁵⁸ Until the operator to which a grazing authorization would be issued is identified, % PL cannot be calculated because it is calculated based on the forage production of lands owned or controlled by the permittee. Once forage is allocated, % PL would be calculated for each allotment, this number would be updated, as would Cattle #, to ensure AUMs remain the same, and a term and condition identifying % PL per pasture (for billing purposes) would be added to the grazing permit.

⁵⁹ The number of AUMs available for livestock grazing, calculated in the 2007 Hammond Allotment Evaluation (Bureau of Land Management 2007a), was 2,700 AUMs for the entire Hammond Allotment.

⁶⁰ This excludes potential NR AUMs, which would follow specific terms and conditions, described below.

vegetative states on differing dates, annually. Specific livestock use dates and annual rotations for pastures within the allotments would be determined on an annual basis. Prior to authorizing annual grazing (including annual livestock numbers, season of use, and AUMs within individual pastures), BLM would take into consideration monitoring data and current weather conditions, such as drought. This may result in changes to stocking levels and timing of grazing to best meet objectives. Any grazing would conform to the utilization threshold of 50 percent for native key forage species and 60 percent for desirable nonnative key forage species. There would be no general grazing rotation authorized for any allotments under this alternative, with grazing being determined annually based on conditions and permittee requests.

Hammond FFR is a “C” allotment with a low percentage of public lands (30.3 percent, up from 16.9 percent under Alternative 1; based on acres) to private land (69.7 percent, down from 83.1 percent in Alternative 1). The proposed Hardie Summer FFR would also be classified as a “C” allotment due to the low percentage of public lands (38 percent) to private land (62 percent). As such, the BLM would authorize the permittee to use the BLM-managed land in coordination with any private land they may control. The use of BLM-managed land is typically minimal as it tends to be located in small pieces, often on steep hillsides, and with minimal draw for livestock. Use of BLM-managed land within the FFRs would continue to meet applicable objectives, and any BLM authorized grazing use upon the public lands would conform to meeting the utilization thresholds of 50 percent on native key forage species and 60 percent on desirable non-native key forage species. Only BLM-managed land must be managed in a way consistent with the BLM grazing permit; additional use on private land would occur at the discretion of the private landowner.

2.5.3 Non-Renewable (NR) Grazing

The BLM would authorize NR grazing in a way similar to that proposed under Alternative 2. The only differences are that under this alternative the BLM would authorize NR grazing within the Mud Creek Allotment’s Lower Pasture and Hammond Allotment’s Krumbo Creek Pasture, and it would also be authorized in any pasture that had not reached the utilization thresholds of 50 percent on native grass species and 60 percent on desirable non-native species.

2.5.4 Proposed Developments⁶¹

All proposed developments would follow RDFs, BMPs, and PDEs as described in Section 2.2.

2.5.4.1 Water Gap Modification

At the Bridge Creek water gap, any existing fences would be removed, allowing livestock access along the Bridge Creek drainage. Approximately 0.31 mile of fence would be removed.

⁶¹ Proposed developments may be completed by the BLM, permittee, or in cooperation with each other and may be done using BLM, permittee, or contracted labor. Any developments needed to implement proposed grazing would be completed prior to grazing being authorized. Any developments completed or paid for, in full or part, by the permittee would include a signed Cooperative Range Improvement Agreement, Form 4120-6, between the BLM and permittee prior to work occurring.

2.5.4.2 Fence Removal

See Appendix A: Map F – Alternative 3 Proposed Grazing Allotments & Developments for the locations of proposed fence removal. Within the Hardie Summer Allotment's Cabin Pasture #1 fence removal would occur as described under Alternative 2. In addition to what is described under Alternative 2, the fence removal would extend further south, following the boundary between sections 22 and 23. From the southern end of the fence, the fence running east would be removed until it reaches the boundary of the Hammond FFR's North Pasture. Approximately 3.7 miles of fence would be removed from the Hardie Summer Allotment.

Within the Mud Creek Allotment, the northwestern fence (two sections) that currently makes up the boundary between the Mud Creek Allotment's Lower Field and Hammond Allotment's Knox Spring Pasture would be removed, approximately 1.53 total miles. This boundary would be moved northwest of Bridge Creek, along the canyon rim, where current gap fences would prevent livestock from moving across the boundary. No fence removal would occur in Hammond Allotment.

2.5.4.3 Fence Construction and Boundary Adjustment

Fence construction and boundary adjustments can be seen on Appendix A: Map F – Alternative 3 Proposed Grazing Allotments & Developments. Within the Hardie Summer Allotment, fence construction would be similar to that proposed under Alternative 2. However, less fence would be constructed in the Hardie Summer Allotment under this alternative. Under Alternative 3, only the Little Fir Creek fence and the eastern public land - private land boundary would be fenced. This alternative would not include fencing around private land in section 27. Total new fence within Hardie Summer Allotment under this alternative would be approximately 2.91 miles.

Also, within the Hardie Summer Allotment, the pasture previously named the Bridge Creek Pasture would be renamed the Witzel Pasture. With construction of the Fir Creek fence, the BLM would separate out a portion of the existing Cabin Pasture from the rest of that pasture. The area created from the proposed Little Fir Creek fence north to the Witzel Pasture boundary would be called the Thompson Pasture. These two pastures (Witzel and Thompson) would make up the Hardie Summer Allotment.

The BLM would move the remaining pastures of the current Hardie Summer Allotment (North, Cabin, and Sylvies) to a new allotment, the Hardie Summer FFR. The Cabin Pasture would be changed to the Olafson Pasture.

Within the Mud Creek Allotment, the BLM would move the northern boundary of the allotment to the north side of Bridge Creek and extend it to the north side of Little Bridge Creek drainage. This would also move the Krumbo Mountain Allotment southern boundary north to the same location. This boundary would follow the rim of the canyon and the BLM would add 1,656 acres into the Mud Creek Allotment while removing the same number of acres from the Krumbo Mountain Allotment. This adjustment would require gap fences, approximately 0.54-mile total, to be constructed north of Little Bridge Creek, within the Bridge Creek WSA. In addition to

adjusting the northern Mud Creek Allotment boundary, approximately 2.88 miles of fence would be constructed south of the southern rim of the Bridge Creek Canyon to where it connects with the current eastern boundary of the allotment. These would consist of gap fences. These gap fences and boundary adjustments would result in the creation of a new Mud Creek Allotment pasture called the Canyon Pasture, and fences would ensure livestock cannot move from Lower Field into the Bridge Creek Canyon Pasture, or vice versa. This would connect the Witzel Pasture of Hardie Summer Allotment to the Hammond Allotment, via the Mud Creek Allotment's Canyon Pasture. The fences would be constructed entirely within the Bridge Creek WSA.

Also, within the Mud Creek Allotment, the BLM would create a new pasture, South Granddad, in the southwestern portion of the Lower Field Pasture. The western and southern boundary of this pasture would be the existing allotment boundary, the eastern boundary would be the existing boundary between the Lower and Upper Pastures. Approximately 1.0 mile of fence would be constructed to create the northern boundary of this pasture. This fence construction would be completely outside of the Bridge Creek WSA.

Granddad Reservoir, within Mud Creek Allotment, is currently enclosed to allow access from either Upper or Lower Pastures. This enclosure would be modified to allow livestock to access Granddad Reservoir from the proposed South Granddad Pasture as well. With this modification, the enclosure would be approximately 6.2 acres in size, and would require approximately 0.3 mile of new fence to be constructed. Maintenance of the enclosure would occur as needed. This enclosure would be entirely outside of WSA.

Within the Hammond Allotment, Baca Lake, Kern Reservoir, and Knox Pond Pastures would be removed from the Hammond Allotment and become part of the Hammond FFR, as described in Alternative 2.

2.5.4.4 Range Development Maintenance

Maintenance would occur as described under Alternative 2.

2.5.4.5 Spring and Pipeline Development

Spring and pipeline development can be seen on Appendix A: Map F – Alternative 3 Proposed Grazing Allotments & Developments. Within the Hardie Summer Allotment, Big Spring, located on private land, would be developed by the landowner, utilizing a spring box to collect water to support a 2-mile-long pipeline. This pipeline would run from the spring to the northeast within the Thompson Pasture, crossing the pasture and connecting to private property in the current Hammond FFR's Mud Creek Pasture. A spur line, approximately 0.64 mile long would extend into the Witzel Pasture. The pipeline would be buried where possible. Three troughs of galvanized steel, measuring approximately 4 feet by 12 feet, would be installed on public lands; one of these troughs would be located at Sunshine Reservoir, which is currently considered not reliable. Troughs may also be round tire troughs but would have a similar footprint to the

galvanized troughs. Float valves would be installed on each trough. This development would be located outside of WSA and LWC areas.

2.5.4.6 Livestock Handling Structure Reconstruction

Historically, livestock handling structures were present at Granddad Reservoir. However, these historic structures fell into disrepair and were removed. Under this alternative, these structures would be reconstructed by the permittee. These facilities would include a set of corrals and a loading ramp. These structures would be placed outside of the riparian area associated with Granddad Reservoir and would be no more than two acres in size. Corrals may be constructed using metal or wood. Temporary panels may also be used. Corrals may have water troughs placed within them.

2.5.4.7 Supplemental Feeding

Within the Hammond Allotment, the BLM would authorize supplemental hay feeding, as needed, to use as a protein supplement. This hay-based protein supplementation would include the use of alfalfa. Supplemental feeding would not be permitted within 0.25 mile of a water source or riparian area, or within 1.2 miles of the perimeter of an occupied or pending lek. Supplemental feeding of hay would have to occur in previously disturbed areas such as salt and mineral locations. Any hay used for supplemental feeding would have to be certified weed free hay. Any supplemental feeding on public land would have to be approved annually by the authorized officer. The BLM currently authorizes livestock supplementation of salt, minerals, and protein in block, dry, and liquid form, but does not currently authorize hay-based supplementation.

2.6 Alternative 4: Reduced AUMs, Season of Use, Utilization, and Thresholds

Under this alternative, the BLM would permit AUMs at one-half of what is analyzed in Alternative 1. In addition to this, the permitted season of use would be more restrictive, with no grazing being allowed between March 1 and July 31 to avoid GRSG nesting and brood rearing, and red band trout spawning. Within the Mud Creek and Hardie Summer Allotments, grazing would not occur in any area where appropriate ecological objectives, as identified in the 2023 LH Determination (Bureau of Land Management 2023b), or any subsequent BLM determination, are not achieved. Where livestock grazing is authorized, it would not occur in any two consecutive years, in any pasture.

Under Alternative 4, all components listed under Section 2.1 Goals, Objectives, and Actions Common to all Grazing Alternatives would occur, with some changes to thresholds. Specifically, upland grazing utilization would be reduced to 30 percent on key herbaceous species (native and desirable non-native species); streambank alteration would be reduced to 20 percent alteration or less; and residual stubble height would be limited to 7 inches or taller on both upland and riparian species. No NR grazing would be authorized under this alternative, and no new developments would be constructed. The BLM would not authorize supplemental feeding of hay in any of the allotments.

2.6.1 Permit Issuance

Mandatory terms and conditions are shown in Table 2-11.

Table 2-11: Alternative 4 Mandatory Terms & Conditions

Allotment	Cattle #	Season of Use	% PL ⁶²	AUMs
Hammond	34	8/1–2/28	100	235
Mud Creek	59	8/1–12/30	100	295
Hardie Summer	51	8/1–11/30	100	203
Hammond FFR	2	8/1–2/28	100	16

Other terms and conditions applicable to all allotments on the permits would include:⁶³

- The AMP, as provided for in 43 CFR 4120.2(a)(1–4)(b), is a term and condition of your permit.
- Mandatory terms and conditions shown on a grazing permit are only for public lands. When there is privately controlled land within an allotment, these only apply to the publicly managed lands and do not limit use of private lands in any way. If the private landowner chooses to graze their private lands within the allotments, outside the terms and conditions for the public land, it is their responsibility to ensure livestock remain on the privately controlled land. Any livestock on publicly managed land outside of what has been authorized may be considered unauthorized grazing use and be subject to trespass action under 43 CFR 4150.
- Actual livestock number may vary dependent on length of annual grazing, as long as AUMs are not exceeded within a given grazing year.
- The BLM may adjust the annual period of use within each pasture, within the bounds of the season of use on the grazing permit and AMP.
- The BLM, in its sole discretion, may allow up to a two-week period of flexibility in the permitted season of use; this flexibility may occur both before and after the permitted season of use. This would be a nonrenewable extension of the authorized season of use requiring prior approval. There is no guarantee that BLM will authorize this flexibility in any given year. Total active use AUMs annually authorized will not exceed the amount permitted.
- Actual use billing is authorized per the AMP. Permittee will submit an actual use record within 15 days after completion of annually authorized grazing per 4130.3-2(d).

⁶² Until the operator to which a grazing authorization would be issued is identified, % PL cannot be calculated because it is calculated based on the forage production of lands owned or controlled by the permittee. Once forage is allocated, % PL would be calculated for each allotment, this number would be updated, as would Cattle #, to ensure AUMs remain the same, and a term and condition identifying % PL per pasture (for billing purposes) would be added to the grazing permit.

⁶³ These are verbatim other terms and conditions that would be placed on the permit. As such, they include the word “will.” The use of the word “will” here does not imply any pre-decisional selection of this alternative.

- There will be a 30 percent utilization (as measured using the Ocular Landscape Appearance/Key Species Method) threshold on upland key species (native and desirable nonnative). The response of reaching this threshold will be the timely removal of livestock. While the BLM will be responsible for monitoring, in coordination with the permittee, the permittee remains responsible for removing livestock to ensure thresholds are not exceeded, whether or not BLM has conducted monitoring. Permittee exceedances of utilization will result in decreased AUMs in the subsequent year.
- Permittee will not place any salt or supplements (block, dry, or liquid) within 0.25 mile of a water source or riparian area, or within 1.2 miles of the perimeter of an occupied or pending lek. Permittee may place salt or supplements (block, dry, or liquid) outside of these areas. Utilizing hay as a supplement is not authorized under this term and condition.
- The permittee is required to maintain all developments unless there is an agreement in place documenting a development as a BLM responsibility. Prior to being issued this grazing permit, the permittee will sign an Assignment of Range Improvements Form 4120-8,⁶⁴ which identifies developments for which the permittee is responsible. Fences that separate two BLM allotments are the responsibility of both permittees unless an agreement is in place⁶⁵ showing specific maintenance responsibility areas. Each permittee is responsible for ensuring the boundary fence is maintained prior to turning out their livestock. Maintenance activities that involve ground-disturbing activities need to be approved by the BLM prior to beginning work.
- Permittee may use active trailing, which is actively managed to avoid livestock lingering and resource concerns, through rested pastures. Upon request, the BLM may authorize the permittee to use active trailing across any of the allotments to access any other allotment on the permit. Any active trailing within the permitted allotments must be documented by the permittee on the actual use form.
- The permittee will be allowed to continue to utilize roads on BLM-managed land within the allotments, and adjacent to the allotments, in order to implement the grazing permit.
- Permittee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands (43 CFR 4130 3-2(h)).
- If the BLM determines that S&Gs are not being achieved within the Hammond Allotment or Hammond FFR, with livestock as a causal factor, the associated areas would be rested until “significant progress” (H-4180, (Bureau of Land Management 2001a)) is made toward achieving appropriate ecological objectives, as identified in ecological site descriptions, IIRH, and S&G/LHA’s. Within the Hardie Summer and Mud Creek Allotments, the area not achieving appropriate ecological objectives would be rested from

⁶⁴ The current List of Range Improvements for allotments within the BCA is in Appendix F.

⁶⁵ This agreement may be between permittees only, or between the BLM and all permittees, which is preferred as it increases communication and coordination between all entities.

livestock grazing until objectives are achieved, no matter what the causal factor is. In pastures that are partially achieving appropriate ecological objectives, only the area not achieving would be required to be rested; tools such as herding and supplementation could be used to graze the portion of the pastures that are achieving ecological objectives.

2.6.2 Livestock Grazing Management

Livestock grazing management would follow the general proposed grazing rotation in Tables 2-12 through 2-14, assuming grazing is authorized in all areas. Grazing treatments (i.e., winter, graze, and defer) are described in Appendix E: Grazing Treatment Descriptions. Under this alternative the utilization threshold would be set at 30 percent across all allotments. Rest required in areas not achieving ecological objectives, as described permit terms and conditions, is not shown below.

Table 2-12: Alternative 4 Grazing Rotation Hammond Allotment

Allotment	Pasture	Year 1	Year 2
Hammond	N. Dutch Oven Seeding #1	Defer/Winter	Winter
	Krumbo Creek #2	Defer/Winter	Winter
	Kern Reservoir #3	Defer/Winter	Winter
	Landing Strip #9	Defer/Winter	Winter
	Knox Springs #5	Defer/Winter	Winter
	Larkspur Reservoir #6	Defer/Winter	Winter
	Baca Lake #7	Rest	Defer/Winter
	Artesian #12	Rest	Defer/Winter
	Knox Pond #8	Rest	Defer/Winter
	Webb Springs #4	Rest	Defer/Winter
	S. Dutch Oven Seeding #10	Rest	Defer/Winter
	Hole in the Ground #11	Rest	Defer/Winter

Table 2-13: Alternative 4 Grazing Rotation Mud Creek Allotment

Allotment	Pasture	Year 1	Year 2
Mud Creek	Lower Field #1	Defer/Winter	Rest
	Upper Field #2	Rest	Defer/Winter

Table 2-14: Alternative 4 Grazing Rotation Hardie Summer Allotment

Allotment	Pasture	Year 1	Year 2
Hardie Summer	Cabin #1	Defer/Winter	Rest
	North #2	Rest	Defer/Winter
	Bridge Creek #3	Defer/Winter	Rest
	Sylvies #5	Rest	Defer/Winter

2.7 Alternative 5: No Action – No Grazing Permits Issued

In this alternative, the BLM would not issue a 10-year grazing permit(s) for the Mud Creek Allotment or the BLM-controlled portions of the Hammond, Hardie Summer, and Hammond FFR Allotments. Under this alternative, permitted livestock grazing would not be permitted on BLM-managed land within all four allotments. The associated 1,503 AUMs of active grazing preference identified in the 2005 Andrews and Steens RMPs and RODs (Bureau of Land

Management 2005b; Bureau of Land Management 2005a) would not be placed on a grazing permit. Under this alternative, no new developments would be authorized or constructed, unless needed for another resource, and analyzed as appropriate to meet NEPA requirements. Existing developments within the allotment would only be maintained as needed for other resources, following appropriate NEPA analysis.

2.8 Comparison of Alternatives

Table 2-15 provides a comparison of Active Use AUMs authorized under each alternative, and Table 2-16 compares the permitted season of uses. Table 2-17 provides a comparison of proposed developments under Alternatives 2 and 3. Table 2-18 provides a comparison for the public and private acreages that would occur under each alternative due to pasture and allotment boundary adjustments.

**Table 2-15: Permitted Active Use AUMs under each Alternative
No Grazing is Authorized under Alternative 5**

Allotment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Hammond	471	1,625	2,700	236
Mud Creek	590	590	1,000	295
Hardie Summer	407	364	408	204
Hardie Summer FFR	NA	NA	261	NA
Hammond FFR	32	368	316	16
Total	1,500	2,947	4,685	751

**Table 2-16: Permitted Season of Use under each Alternative
No Grazing is Authorized under Alternative 5**

Allotment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Hammond	4/1–10/30	3/1–2/28	3/1–2/28	8/1–2/28
Mud Creek	5/16–6/30	3/1–2/28	3/1–2/28	8/1–12/30
Hardie Summer	7/1–9/30	7/1–11/15	6/1–12/31	8/1–11/30
Hardie Summer FFR	NA	NA	6/1–12/31	NA
Hammond FFR	4/1–4/30	3/1–2/28	3/1–2/28	8/1–2/28

**Table 2-17: Proposed Developments under each Alternative
No Developments are Proposed under Alternatives 1, 4, or 5**

Proposed Development	Alternative 2	Alternative 3
Fences – New (Miles)	6.5	7.6
Fences – Removal (Miles)	8.7	5.6
Corrals – New (Acres)	0	2
Water Pipeline – New (Miles)	0	2.7
Troughs – New (Number)	0	3

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Table 2-18:⁶⁶ Acres by Pasture for each Alternative and Ownership

Allotment	Pasture	Alternative 1		Alternative 2		Alternative 3	
		Public	Private	Public	Private	Public	Private
Hammond	N. Dutch Oven Seeding	1,158	213	1,158	213	1,158	213
	Krumbo Creek	2,048	28	2,048	28	2,048	28
	Kern Reservoir	942	1,197				
	Webb Springs	1,549	0	1,549	0	1,549	0
	Knox Springs	2,557	0	2,557	0	2,284	0
	Larkspur Reservoir	1,156	0	1,156	0	1,156	0
	Baca Lake	69	328				
	Knox Pond	28	190				
	Landing Strip	238	0	238	0	238	0
	S. Dutch Oven Seeding	709	10	709	10	709	10
	Hole in the Ground	479	0	479	0	479	0
	Artesian	701	0	701	0	701	0
	Allotment Total	11,634	1,966	10,595	251	10,322	251
Mud Creek	Lower Field	4,082	0	4,082	0	3,559	0
	Upper Field	4,060	0	4,060	0	4,060	0
	South Granddad (new)					544	0
	Canyon (new)					1,909	0
	Allotment Total	8,142	0	8,142	0	10,072	0
Hardie Summer	Cabin (Olafson)	2,490	825	1,376	263		
	North	421	1,723				
	Bridge Creek (Witzel)	2,551	17	2,551	17	2,551	17
	Sylvies	514	1,182				
	Little Fir Creek (new)			224	58		
	Thompson (new)			1,154	3	1,154	3
	Allotment Total	5,976	3,747	5,305	341	3,705	20
Hardie Summer FFR (New)	North					67	1,723
	Cabin (Olafson)					1,689	822
	Sylvies					514	1,182
	Allotment Total					2,270	3,727
Hammond FFR	Dust Bowl	9	2,660				
	Krumbo Springs	277	1,246	277	1,246	277	1,246
	Webb Springs	655	656	655	656	655	656
	Mud Creek	332	1,679	420	1,679	332	1,679
	Sylvies			390	1,182		
	North			67	1,723		
	Private (new)			2	502		
	Baca Lake			69	328	69	328
	Knox Pond			28	190	28	190
	Kern Reservoir			942	1,197	942	1,197
	Allotment Total	1,273	6,241	2,850	8,703	2,303	5,296

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⁶⁶ Alternative 4 would be the same as alternative 1 as there would be no new range development or pasture boundary changes that would modify pasture size or ownership. Alternative 5: No Action - No Livestock Grazing is also not shown and would have the same acres as alternative 1 since existing fences and pasture boundaries would remain in place and there would be no changes in pasture size or ownership.

2.9 Alternatives Considered but Eliminated from Further Analysis

2.9.1 *Constructing Riparian Exclosures using Elk Fence and Closing all Riparian Areas and Areas of High Wildlife Value to Livestock Grazing*

One commenter suggested elk grazing was damaging streambanks and riparian vegetation, and that the EIS should include an alternative with fence construction to exclude elk grazing in these areas. The purpose and need for action (Section 1.2) is to modify livestock grazing (not elk grazing) in order to address requests for additional forage and concerns about vegetation health. The proposed exclosure fence would not respond to the purpose and need; therefore, the action is not considered in detail in the alternatives.

2.9.2 *Restoring the Crested Wheatgrass Seedings and Annual Grass Dominated Areas to Native Rangeland*

Several commentors suggested an alternative that focuses on restoration within the BCA. This alternative would include converting the crested wheatgrass seedings back to native species, as well as converting areas infested with annual grasses, or other noxious weeds, to native species. The area would be further restored by removing interior fences (except those bordering private) and water developments, closing roads, rehabilitating springs, and planting willows. The goal of this alternative would be to return all lands to the native states.

The only part of the purpose (Section 1.2) mentioning crested wheatgrass is, “Adjust available active use AUMs in the Hammond Allotment to address the higher production of crested wheatgrass that has occurred within the allotment, and the availability of additional forage, while still staying within a determined utilization threshold.” Restoring the non-native crested wheatgrass stands to native plants would not address this or any other aspect of the purpose. In addition, the return of crested wheatgrass to native vegetation is a difficult process. Attempts at seeding natives into ecological sites with similar soil, topography, elevation, and weather that are dominant within the Hammond Allotment have had very low success. A study on the neighboring Malheur National Wildlife Refuge in 2010 showed that planting natives (shrubs, forbs and grasses) into areas dominated by crested wheatgrass requires suppression of crested wheatgrass, may require multiple techniques and multiple years of treatment prior to seeding with natives, and may need the seeding to be repeated (Fansler and Mangold 2011). Their efforts to suppress crested wheatgrass, including herbicide at different application rates (low and heavy) and mechanical discing (one and two passes), resulted in an increase in crested wheatgrass density, and the restoration of native species was not improved (Fansler and Mangold 2011). This local work suggests that restoration of native species into areas currently occupied by crested wheatgrass seedings is not only challenging, but a long-term process. In addition, there are multiple factors at play, many of which are environmental and out of human control, such as seasonal and annual precipitation, that determine whether seedings are successful (Monsen et al. 2004). Currently, work is being done across the Great Basin to improve seeding technologies to improve the outcomes of native seeding projects but has not yet produced a strategy for consistent success. Removing the crested wheatgrass to prepare the areas for seeding activities is a significant disturbance that would open up the site for further invasion by cheatgrass, and

possibly medusahead rye grass and ventenata, both of which are present in the BCA, if the native seeding was not successful. Lower elevation Wyoming sagebrush sites, such as those within the Hammond Allotment, have low resilience and resistance to disturbance (Chambers et al. 2014) and, as a result, have been a low priority for restoration activities within the resource area. Any efforts that may be taken to return crested wheatgrass seedings to native vegetation would be analyzed under a separate NEPA process. Therefore, the action is not considered in detail in the alternatives.

2.9.3 Increasing Sagebrush Abundance within Crested Wheatgrass and Burned Areas

One scoping letter suggested improving GRS habitat by increasing sagebrush in crested wheatgrass seedings and in burned areas. Seeding or planting sagebrush in these areas is outside the scope of the EIS, since the purpose stated in Section 1.2 is clearly focused on livestock grazing actions, not seeding, planting, or other restoration activities. Therefore, seeding or planting sagebrush is not included in this EIS. On August 16, 2023, the BLM released a Determination of NEPA Adequacy (DNA) for Mud Creek Restoration (Bureau of Land Management 2024b Sep 25; Bureau of Land Management 2023c). This DNA includes restoration activities in the Mud Creek Allotment, including seeding and planting of sagebrush. Parts of the included restoration activities were analyzed in the 2007 North Steens Ecosystem Restoration Project EIS and ROD (Bureau of Land Management 2007d; Bureau of Land Management 2007e) and the 2006 South End Complex Emergency Stabilization Plan Environmental Assessment (Bureau of Land Management 2006a), all of which specifically covered the Mud Creek Allotment. On May 19, 2023, the BLM conducted scoping for a number of DNAs tied to projects across the BLM Burns District, including the Adjacent (Non-WSA) North Steens Ecosystem Restoration DNA (Bureau of Land Management 2024c Sep 25), which includes ecosystem restoration treatments including juniper treatments, reseeding, and planting of riparian woody species within the Hammond Allotment's Krumbo Creek Pasture. The DNA and related decision for this project were signed on May 15, 2024 (Bureau of Land Management 2024a), and received no appeals. Both DNAs allow for restoration work to occur without requiring additional NEPA analysis.

2.9.4 Rehabilitating Burned Areas from Annual Grasses to Native Grass with Sagebrush

Rehabilitating previously burned areas currently dominated by annual grass back to a native grass site is not included in the purpose of this EIS; therefore, the EIS does not include actions specific to this purpose. On August 16, 2023, the BLM released a DNA for Mud Creek Restoration (Bureau of Land Management 2023c), and on May 15, 2024, the BLM released a DNA covering restoration work within the Hammond Allotment's Krumbo Creek Pasture (Bureau of Land Management 2024a). Both DNAs include restoration activities in the Mud Creek Allotment, including seeding, shrub seedling planting, juniper treatments, and noxious weed treatments. Parts of the included restoration activities were analyzed in the 2015 Integrated Invasive Plant Management for the Burns District Revised Environmental Assessment and Decision Record (DR) (Bureau of Land Management 2015b; Bureau of Land Management 2015c), 2007 North Steens Ecosystem Restoration Project EIS and ROD (Bureau of Land Management 2007d; Bureau of Land Management 2007e), and the 2006 South End Complex

Emergency Stabilization Plan Environmental Assessment (Bureau of Land Management 2006a), all of which specifically covered the Mud Creek Allotment and is immediately adjacent to the Krumbo Creek Pasture of the Hammond Allotment.

2.9.5 Move Sylvies #5 Pasture Fences on Private Property

One commentor suggested moving the Sylvies #5 Pasture Fence. Under this alternative BLM would move one of the fences on the south side of the Hardie Summer Allotment's Sylvies Pasture, currently on private property, to another location on private property that would be less susceptible to snow damage and would therefore prevent livestock access to the no livestock grazing area. The no livestock grazing area is outside of the Sylvies Pasture and overlaps with the Steens Mountain Wilderness where it is adjacent to the Sylvies Pasture (Appendix A: Map B - Land Status & Special Management Areas). A second boundary fence on the western side of the pasture would be relocated east to private property, so the wilderness that is currently within the pasture would be fenced out of the pasture.

Currently, there is a fence present around the majority of the Sylvies Pasture. Maintenance of the existing fences would be required by the permittee under any grazing alternative. On the Steens Mountain, fences often require increased maintenance due to snow loading. While this fence does need to be maintained, the permittee and landowners would coordinate any fence adjustments where the fences are entirely on private property. The adjustment to exclude the 38 acres of wilderness within this allotment by constructing a fence on private property could be done at any time. The BLM does not limit the ability of private landowners to build fences on their private land. Part of the purpose for this EIS (Section 1.2.2) is to adjust pasture and allotment boundaries, where possible, in order to move pastures that are dominated by private property into the Hammond FFR. Moving the Sylvies #5 fences onto private property would not meet that purpose, nor any of the other purposes; therefore, this alternative is not fully analyzed.

2.9.6 Reduce AUMs, Stocking Levels, and the Area Where Livestock Grazing is Allowed

The EIS includes one alternative that would reduce AUMs to one-half the level previously authorized in the allotments (Alternative 4), and one alternative that would eliminate livestock grazing entirely in all four allotments (Alternative 5). Under Alternative 4, the stocking level would also be reduced by 50 percent from what was previously permitted within this area. Under Alternative 2, Little Fir Creek would be rested two out of three years, and all pastures would receive periodic growing season rest. Alternative 5 would completely remove grazing and reduce the area to be grazed by livestock. However, through this analysis, the authorized officer can pull actions from more than one alternative. Therefore, it would be possible for the authorized officer to decide to remove grazing from a portion of the allotments, and/or reduce AUMs and stocking levels in some areas, but not others, allowing for a variety of options available. Therefore, the components of this alternative are already analyzed.

2.9.7 *Graze Only After Seed Set*

This alternative would authorize grazing only after seed set has occurred and plants have completed their life cycle and become dormant. This is already a component of Alternative 4 as grasses typically set seed prior to August 1. Therefore, this alternative is not fully analyzed in detail.

2.9.8 *Approve Voluntary Grazing Permit Relinquishment*

One scoping comment asked BLM to approve permittee's voluntary relinquishment of livestock grazing permits. This alternative was considered but not analyzed in detail because it would not meet the purpose and need, and there is currently no grazing permit that has been, or could be, voluntarily relinquished. If a grazing permit is relinquished in the future, BLM's policy allows approval of such voluntary permit relinquishment.

2.9.9 *Land Exchange and Elimination of FFR*

This alternative would include a land exchange between the BLM and private landowners. Land exchanges must be initiated by the applicant. This alternative would not be considered until an official application from the proponent was received initiating the application process under 43 CFR 2000. To initiate land exchange proposals, the private landowner must provide the BLM with a detailed description and/or map of both the private and the Federal land parcels of interest. BLM policy requires that lands acquired through exchange must be consistent with the Bureau mission and applicable land use plans. After initial agreement on lands to be included in the exchange, the BLM would analyze, in more detail, the parcels of interest in a feasibility analysis (FA). The FA is an internal process that provides for disclosure of anything that would preclude conclusion of the proposed exchange. The FA includes a general narrative, legal description of parcels proposed for the exchange, preliminary title review, anticipated land use, preliminary review of resources, valuation analysis, identification of potential issues and conflicts, and estimated timeframes. The FA is reviewed by BLM Headquarters (HQ) and if concurrence is given a formal exchange proposal is prepared. In this phase, the BLM conducts detailed environmental documentation including mineral potential report, cultural resource inventory, wildlife, botany, and threatened/endangered species (T&E) reports, contaminant inventory, environmental site assessment, certification of inspection and possession, and NEPA documentation. The formal proposal is reviewed by BLM HQ and the Department of Interior. During this phase, the proponent and BLM reach agreement on the relative value of the Federal and non-federal lands and equalizing value, if required. If the BLM receives a notice of concurrence from HQ and the Regional Solicitors' Office, BLM publishes a notice of decision (NOD) on the exchange. This decision may be protested by interested parties. If a protest is filed, the BLM analyzes the protests and responds, similar to a grazing decision process. The BLM protest response is appealable to the Interior Board of Land Appeals (IBLA). Once this process is complete the remaining steps are administrative and end with closing.

At this time, the proponent has initiated a proposed land exchange, providing the BLM with detailed maps of both private and Federal lands of interest. The BLM Burns District is currently reviewing the detailed maps and plans to begin analyzing the parcels in a feasibility analysis (FA) following the review. However, this alternative does not meet the purpose and need of this EIS and is therefore not fully considered within this document.

2.9.10 Annual Authorization of Grazing

This alternative proposes that grazing be issued through temporary annual authorizations only and would not result in a 10-year grazing permit being issued. The annual authorization would include terms and conditions that would allow for changes in drought years. This alternative would not meet the purpose and need of this EIS because the external request was to consider issuing a 10-year grazing permit. In addition, the BLM already includes issuing annual grazing authorizations within the terms and conditions of a 10-year grazing permit, in all grazing alternatives. Therefore, this alternative is not fully analyzed within this EIS.

2.9.11 Issue Livestock Grazing Permits for More Than 10 Years

This alternative would include issuing a grazing permit for a period of more than 10 years. This alternative would not comply with grazing regulation language in Sec. 4130.2 that states “Grazing permits or leases. (d) The term of grazing permits or leases authorizing livestock grazing on the public lands and other lands under the administration of the Bureau of Land Management **shall** (*emphasis added*) be 10 years unless -- (1) The land is being considered for disposal; (2) The land will be devoted to a public purpose which precludes grazing prior to the end of 10 years; (3) The term of the base property lease is less than 10 years, in which case the term of the Federal permit or lease shall coincide with the term of the base property lease; or (4) the authorized officer determines that a permit or lease for less than 10 years is in the best interest of sound land management.” None of these exceptions allow for a grazing permit of more than ten years. In addition, this alternative would not respond to the purpose and need of the EIS, which is to consider external requests to issue a 10-year grazing permit. Therefore, this alternative is not considered in detail.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter details the affected environment that is the baseline, existing condition, and trend of issue-related elements of the human environment (i.e., the biological, physical, social, and economic elements of the environment) that may be affected by implementing the actions proposed in each alternative discussed in Chapter 2. This section also includes reasonably foreseeable environmental trends and planned actions in the area. Without this baseline data there can be no effective comparison of alternatives. The intent of this chapter is to give enough information for the reader to compare the present with the predicted future condition resulting from enactment of the activities proposed in each alternative and for the decision maker to make an informed decision.

This chapter also details the environmental effects section, which identifies the known and predicted effects of the actions proposed in each alternative that are related to the issues identified in Chapter 2. Effects analysis includes changes to the environment that result from reasonably foreseeable future actions (RFFA) and have a reasonably close causal relationship to the proposed alternatives. The RFFAs for the BCA, and adjacent areas, are fire, continued livestock grazing, weed treatments (including invasive annual grass treatments), road maintenance, recreation activities, restoration seeding, restoration shrub plantings, and juniper treatments, such as those analyzed in the North Steens Ecosystem Restoration Project EIS (Bureau of Land Management 2007d) and reviewed in the Mud Creek Restoration DNA (Bureau of Land Management 2023c) and Adjacent (Non-WSA) North Steens Ecosystem Restoration DNA (Bureau of Land Management 2024a). The RFFAs identified here do not always apply to each of the resource issues and are only analyzed in the effects analysis for a resource issue if it is applicable to that resource issue. The temporal scale for RFFAs is twenty or more years.

3.2 Biological Soil Crusts (BSC)

3.2.1 BSC Affected Environment

In rangelands, BSCs (mainly cyanobacteria, lichens, and mosses) are viewed from functional, structural, and compositional perspectives. They reduce wind and water erosion, fix atmospheric nitrogen, and contribute to soil organic matter (Eldridge and Greene 1994). They function as living mulch by retaining soil moisture and discouraging growth of undesirable species. BSCs in North America are diverse and are most evident in arid and semi-arid ecoregions (Belnap et al. 2001). Wherever vascular plant cover is sparse enough for light to reach the soil surface, it would be colonized by some form of biological soil crust organisms (Belnap et al. 2001; Belnap 2005). However, relative lichen and moss cover increases with elevation and effective precipitation until vascular plant cover precludes (shades) their growth (Belnap et al. 2001). The positive relationship between BSC cover and available soil surfaces has been amply demonstrated (Rogers 1972; Harper and Marble 1988; West 1990; Eldridge 1993: 19; Johansen 1993). The most predominant crust components in the Great Basin are mosses and lichens (Belnap et al.

2001), and this was confirmed for the BCA allotments by data collected on 24 AIM and landscape monitoring framework (LMF) plots in the project area between 2014 and 2022.

Two main BSC patterns discussed in BLM TR-1730-2 (Belnap et al. 2001) have been observed in the project area, first being that crust abundance changed over the elevation gradient in the BCA allotments, and the second that crust cover was inversely related to vascular plant cover. In general, when all crust types are combined (cyanobacteria, moss, and lichen), their cover is greatest at lower elevation sites of less than 3,280 feet (1,000 meters) when compared to mid-elevation sites from 3,280 to 8,200 feet (1,000 to 2,500 meters) (Hansen et al. 1999). The elevation of the project area ranges from 4,200 to 7,200 feet in elevation (1,280 to 2,200 meters), making the entire BCA a mid-elevation range for BSCs. According to the cited literature, mid-elevation sites have a lower expectation for BSC abundance than lower elevation sites. Within the mid-elevation sites, the two main patterns were consistent spatially as the plot locations ascend in elevation from the Hammond to Mud Creek to Hardie Summer Allotments. As reported in other sections of this analysis, increased elevation equates to higher precipitation, more productive soils, and ultimately higher cover of vascular plants. According to the plot data the Hammond Allotment and lower elevation portion of the Mud Creek Allotment had the most abundant and consistent detection of mosses and lichens, even with multiple plots having been burned since 1980 (some repeatedly) and in areas seeded to crested wheatgrass. The Hardie Summer Allotment consistently had the highest native species vascular cover and least moss and lichen abundance. Furthermore, the Hardie Summer Allotment has the least complicated disturbance history of the past 50-60 years and mostly has not burned or been seeded, nor does the allotment have many infestations of invasive annual grasses that would generally influence BSC cover to be less.

BSCs can be slow growing and how BSCs interact with overlapping environmental factors and disturbances is difficult to quantify, due to many complex interactions that are difficult to separate in scientific studies. This leads to limited data on how BSCs are directly impacted in the BCA by grazing or developments. West (1990) recognizes that grazing impacts on BSCs may be different across regions. Concostrina-Zubiri and others (2014), found that mean lichen cover did not show changes with increased livestock grazing; however, species richness differed along disturbance gradients, with more richness in less disturbed areas. The duration (time) each year of disturbance is short assuming a pasture is grazed annually, ranging from weeks to months, but the intensity of use can be high as livestock congregate around the water developments to drink during that period. Timeframes are short-term (1–10 years), mid-term (11–25 years), and long-term (25+ years). These timeframes are based on a combination of the life of a grazing permit (10 years) and the timeframe for recovery. Recovery of BSCs from a complete removal situation, is about 20 years for gelatinous lichen, 25 years for early colonizer lichens/mosses, and more than 25 years for mid-late successional species (Belnap et al. 2001).

According to relationships between BSCs and site characteristics discussed in BLM TR-1730-2 (Belnap et al. 2001) BSC vulnerability to damage should be lower, on average, in the BCA allotments. This is because the site stability is high due to finer soil texture (more clays and clay-loams), areas with high gravel and rock cover (clay pan sites), relatively shallow soils, and the dense plant spacing. Recoverability of BSCs after disturbance in the BCA is considered high in

90 general because of the higher precipitation and elevation sites. Crusts crushed in place (by
91 vehicles or foot/hoof traffic) recover faster when compared to when crusts are completely
92 removed, such as with fire or removal of topsoil. Established vascular plants help stabilize soils,
93 provide microsites, and reduce wind speeds at the soil surface, providing conditions beneficial to
94 further development and diversification of BSCs. Therefore, the assumption is that management
95 that promotes attainment of Standards for Rangeland Health, specific to upland watershed
96 health/site stability (Standard 1) and ecological processes/biotic integrity (Standard 3), would
97 also maintain or promote BSCs where they would typically occur. Lack of soil erosion, and the
98 presence of healthy vegetative communities assessed in the BCA in 2018 and 2022, shows that
99 for most areas within the project area soil processes are functioning (Bureau of Land
100 Management 2023a).

101
102 The fundamentals of rangeland health stated in livestock grazing regulations at 43 CFR 4180
103 include the goal to ensure watersheds are in, or are making significant progress toward, properly
104 functioning physical condition. BSCs are part of the BCA watershed but the precise magnitude
105 of their influence on ecological processes is unknown. The expected amount (abundance and
106 cover) or reference condition of BSCs in the BCA allotments is difficult to determine. Amongst
107 many variables, the project area, as a whole, spans higher elevations and has high vascular plant
108 cover, where fewer BSCs are expected. This is why it is important to manage for functioning
109 plant communities that can maintain or enhance soils and conditions for BSCs where they would
110 typically exist.

111
112 Direct effects by livestock grazing to BSCs is by trampling, where livestock hooves may
113 compress the surface of BSCs. Livestock grazing (as well as native wildlife) and off-trail
114 recreation activities like hiking, horseback riding, mountain biking, and motorized use have
115 similar impact surface compressing effects to BSCs. However, with grazing the crushed material
116 is usually left in place and shortens the recovery time when compared to BSC removal (i.e., for
117 road or development construction). Repeated crushing or traffic extends recovery time of BSCs
118 within an area. Livestock grazing utilization thresholds on desirable vegetation limit the intensity
119 of grazing use on grasses, and thereby limit livestock trampling on BSCs where they exist within
120 a pasture. Utilization thresholds are in place to ensure the continued vigor and productivity of
121 desirable deep-rooted vascular vegetation, which indirectly supports soil health and BSC
122 communities up to the point high vascular plant cover impedes BSCs. Livestock grazing
123 intensity is generally not consistent (homogeneous) across the BCA because of factors that
124 influence livestock distribution, such as location of forage species, topography and/or slope,
125 supplement placement, fencing and water distribution. That means there are often areas that
126 would have less utilization than the threshold within a pasture or allotment. As a result, the
127 associated hoof impact with livestock use can result in a spatially inconsistent (heterogenous)
128 disturbance to BSCs where they exist. These relationships can be described generally but are
129 currently difficult to quantify since there is only baseline plot data available for BSCs. The
130 continued monitoring proposed for all grazing alternatives would build knowledge on the
131 presence or absence, and cover amounts, of BSCs under future management. The assumption is
132 that grazing management that promotes healthy and productive rangelands where vascular plants
133 are dominated by desirable deep-rooted perennial bunchgrasses would also facilitate soil
134 function, persistence, and health of BSCs. Effects from livestock grazing are anticipated to be

neutral in the short and mid-term because of limits to grazing by the utilization thresholds. Furthermore, soil aggregate stability data from the AIM and LMF plots showed stable soils on 23 of 24 plots while the same utilization levels as proposed in Alternatives 1, 2, and 3 occurred.

Water developments are infrastructure to support livestock grazing activities but have different effects to soils due to the intensity of their use and are separated in this effects analysis accordingly. In an extensive rangeland scenario livestock tend to come to watering sites in a group, meaning they congregate around water developments to drink. As a result, these areas are where BSCs may be reduced or lost in the short to long term or even permanently. Currently, there are a total of 54 water developments within the BCA, on BLM-administered land, that have been evaluated for livestock use and reliability of water. This is a mix of reservoir, ponds, and pipelines with multiple troughs as part of a system. Of these watering points, there are 37 that are considered a reliable water source for either all or most years. The remaining 17 have had water less than half the evaluated time (1988–2020). The unreliable water sources would likely be changed to reliable after reconstruction, or with maintenance. Currently, they are included in the analysis calculations as a disturbed area, to be conservative in estimates and to account for future use, although currently unreliable sites are receiving little to no use due to lack of water. Precise acreage associated with potential loss of BSCs varies by size and type of water development (reservoir, pond, trough), original construction footprint, and amount of use by livestock depending on the spatial distribution of available water. Within the BCA allotments, the current estimated areas with soil and BSC disturbance associated with water developments is approximately 270 acres (5 acres/development); this is approximately 1.02 percent of the BLM-managed acres within the BCA (26,378 acres). This is considered the area BSCs are reduced from their potential, and functions as the baseline from which alternatives are compared. This number was determined by estimating the areas around water developments in the BCA where grass and/or shrubs appear to have been reduced or removed adjacent to the development, using 2017 OSIP 1-foot imagery in geospatial information system (GIS), and averaging them. The range of disturbed or reduced vegetation areas around the water sources was 0.5–10 acres. For the purposes of this analysis, five acres per development, regardless of water development type or reliability, was used to show maximum potential impact.

Additionally, livestock create trails leading to and from the water developments where BSCs are reduced. Trails generally have the most intense and obvious use closest to the water development, and the use diffuses the farther away livestock travel to graze. Cattle naturally tend to trail one animal after another (head to tail), so the trailing widths are based on the width of one adult animal. Industry average for cattle widths (based on working facility designs) is 16 inches width and thus used for trailing width calculations. For the purposes of this analysis a 1.5-mile trail is used as the assumed distance livestock are willing to go from water or would move their grazing activities to access water (Ganskopp 2001). To estimate the maximum extent of soil disturbance by trailing, an approximately 16-inches-wide trail over 1.5 miles would result in approximately 0.24 acres of soil disturbance and short- to long-term loss of BSCs per trail. Actual disturbance per water development would vary, because of landscape position and topography, many developments have only one trail in and one out (two total). A conservative estimate is that there would be four access trails per development (about one from each cardinal direction), up to 1.5 miles long, which would equate to 0.96 acres soil disturbance per

development. Since there are 54 water developments in the BCA it is estimated that there is a total of 51.84 acres of soil disturbance because of trailing related to water developments. This is an estimated 0.19 percent of the BCA on BLM-managed acres. Combined with the maximum potential impact from the water developments and area adjacent, there is an estimated 321.84 acres of current soil disturbance impacting BSCs, which is approximately 1.22 percent of the BCA on BLM-managed land.

Livestock may or may not trail along fences, depending on topography or difficulty of walking on the terrain, location and distribution of reliable water, and spatial distribution of high-quality forage. The same assumption of a 16-inches-wide trail is used to account for the maximum extent of impact to BSCs because of soil disturbance from trailing. This equates to a maximum extent of 0.16 acres of disturbance per mile of fence if trailing is considered on one side of the fence, and 0.32 acres per mile if considering trailing on both sides. Currently there are approximately 82.5 miles of fence in the BCA allotments; therefore, the existing condition is assumed and estimated at 26.4 acres of trailing impact to BSCs due to trailing along fences. This estimate assumes trailing on both sides of the fence and may overestimate current impacts to BSCs from fences. This does not consider where trailing may occur on roads adjacent to fencing or other co-located disturbed areas.

Since BSCs are not present on every inch of the allotment and the figures used have been purposely conservative (to estimate maximum impact), the calculations above and in the alternative-by-alternative analysis are expected to be overestimates.

3.2.2 BSC Environmental Consequences

For the purposes of this analysis, the direct, indirect, and cumulative effects area is within the allotment boundaries.

3.2.2.1 BSC Issue 1: How would proposed livestock grazing and developments impact BSCs?

3.2.2.1.1 BSCI Alternative 1

Under Alternative 1, the grazing permits would be issued with the same terms and conditions to the previously issued permits, and no new developments would be added to the project area. The BLM would not authorize non-renewable AUMs in the Hammond Allotment under this alternative (nor would they be added to the permitted use), which had been an additional 1,500 AUMs per year (approximate average over 20 years 1992–2012). Livestock use under Alternative 1 specific to the Hammond Allotment would be less livestock use than what has occurred in the past. Directly, the reduction in use in the Hammond Allotment (roughly 25 percent of the use occurring before) would likely have some lesser effect on BSCs in the short to midterm because there would be less overlap between BSCs and livestock in space. However, because those pastures are mostly crested wheatgrass there may be an indirect effect to associated fine fuel accumulation and continuity, which would be a concern if the allotment burns. With 25 percent of the previous grazing, increased levels of fine fuels would occupy the

interspaces between plants, which would allow for a more continuous burn pattern and possibly be detrimental to BSCs for the short to long-term.

For the remainder of the BCA allotments, is anticipated that disturbance and recovery rate of BSCs would be consistent with the past livestock grazing management (between 1984 and 2014) and disturbance to soils and BSCs would be neutral from grazing activities. Livestock would continue to have approximately the same grazing use and distribution patterns, based on slope and topographical features, existing fences or physical barriers, water developments, and the type and amount of forage. The distribution of BSCs would continue to be more abundant in the lower elevation pastures and less so in the higher elevation pastures (Hardie Summer Allotment), where precipitation, productivity, and vascular plant cover is higher. Areas where there has been more concentrated use by livestock, around water developments, trailing to water or along fences, and around salt, mineral, or protein supplements, are expected to continue the baseline condition described above in terms of maximum extent and impact to BSCs. If there are areas that have increased in BSCs following the non-renewal of the grazing permit in 2014, these areas may be negatively impacted with grazing, resulting in BSC levels returning to levels similar to that were present between 1984 and 2014. Grazing at the level proposed in Alternative 1, which would be less than what occurred from 1984–2014 due to no NR grazing being authorized and no permanent increase in AUMs, would have slightly less negative impact on BSCs and may result in a slightly higher presence in the BCA compared to previous grazing. However, as grazing impacts to BSCs are difficult to separate out from other factors, the exact effect of grazing at this level cannot be determined.

Because no new developments are proposed under Alternative 1, it is not anticipated to have activities that would additionally impact BSCs beyond the impacts seen between 1984 and 2014. Rather, areas of livestock concentration, and the largest areas of impact to BSCs, would continue to be on previously impacted sites.

3.2.2.1.2 BSC1 Alternative 2

Alternative 2 focuses on providing growing season rest to all areas of the allotments, expanding the grazing season of use, increasing AUMs in the Hammond Allotment, implementing site specific utilization threshold adjustments in Lower Pasture of the Mud Creek Allotment, authorization of NR AUMs with terms and conditions, and allotment boundary adjustments, along with fence removal and construction.

Direct effects of proposed management, specifically providing growing season rest and additional pasture rotation options under Alternative 2, would be incrementally beneficial to BSCs over the long term. The benefit to the BSCs would be from additional management options for maintaining and/or improving the vascular plant community. Expanding the grazing season of use would allow for grazing schedules and rotations that promote desirable deep-rooted perennial bunchgrasses by allowing them to complete their lifecycle without grazing pressure (see Vegetation section for livestock impacts to desirable grasses). Perennial vascular plants can help aid in the survival of crustal elements, clumped perennial vegetation can help with increasing surface moisture and decreasing temperatures and winds at the soil surface (Belnap et

al. 2001). An expanded season of use allows for grazing during a timeframe that disfavors invasive annual grasses by grazing them when they are more palatable to cattle (see Vegetation section for livestock impacts to invasive annual grasses). Indirectly, BSCs would be promoted by livestock effects from grazing and trampling invasive annual grasses in the interspaces, which reduces the amount (grazing removing biomass), structure, and continuity of fine fuels that would otherwise burn continuously and reduce BSCs, should a fire occur.

AUMs in the Hammond Allotment would be increased over a 5-year period (in the crested wheatgrass seeding pastures) to permanently adjust permitted AUMs to carrying capacity of the crested wheatgrass seedings. In the short term, the direct and indirect effects over the five years of implementation would be the same as what occurred between 1984 and 2014 because the permanent increase in AUMs would be similar to what was previously authorized as NR AUMs. In addition, the same utilization thresholds that limit the use on desirable deep-rooted perennial grasses regardless of the AUMs authorized would be in place. If utilization thresholds are reached before full AUMs are used, the livestock would be moved to the next pasture, allotment, or off for the season, which would protect BSCs from impacts of improper grazing.

The Lower Pasture of Mud Creek would begin grazing at a 35 percent utilization threshold with increase/decreases based on post-season livestock grazing monitoring results. The consideration for the lower utilization threshold with increases over time is to examine effects to wildlife species, such as GRSG. The direct effect to BSCs would be slightly less use by livestock and less interaction between grazing animals and the BSCs, where they exist; however, this would likely be immeasurable.

Within the rest of the BCA the direct effect to BSCs would be slightly more due to resumption of grazing compared to the baseline condition, and comparable to what occurred between 1984 and 2014, as utilization thresholds would be the same to ensure continued health and function of the perennial vascular plant community.

NR grazing could be authorized where grazing utilization at the end of the grazing period is less than 35 percent. NR grazing would be authorized from 35 percent utilization up to 50 percent utilization on native species (60 percent on crested wheatgrass), only when bunchgrasses are dormant. No more than half of the pastures within an allotment would be authorized NR grazing in a year. As grazing up to this use could occur in a regular year, impacts would be the same as described above.

Indirect effects to BSCs would be difficult to measure; however, there would be an additional amount of change to fine fuel abundance, structure, and continuity that would decrease normal fire heat, and spread and increase the likelihood of a mosaic burn pattern, which would limit BSC damage and death.

Alternative 2 proposes removal of unnecessary fences, and construction of fences for improved livestock management or to adjust allotment boundaries. In the Hammond Allotment, 0.2 mile of fence would be constructed to improve a water gap on Bridge Creek. The location is largely rock armored, so there are no anticipated effects to BSC because of the new fence. Also, in the

Hammond Allotment there would be 5.1 miles less fence by removing internal fences in Krumbo Creek Pasture. Livestock trailing impacts that occurred along the fence to be removed would be diminished by frost heaving over time and would be revegetated mid to long-term. Because they are internal fences, this is an estimated 1.6 acres of disturbed soil that could recover over time and show an increase in BSCs.

The Hardie Summer Allotment, which is the highest elevation, is the most covered allotment in terms of vascular plant cover, and data suggests there is the least amount and variety of past disturbance from activities other than grazing. Plot data in the allotment confirmed there is not much cover or abundance of BSCs within the allotment. Direct and indirect effects to what BSCs exist in the allotment are difficult to determine based on current data. In Hardie Summer five fences are proposed, four of which are to align with BLM/private property boundaries and the last to adjust the Hardie Summer and Frazier Field boundary. All of the fences could have livestock trailing on both sides of the fence where there are no physical barriers (i.e., rimrock); however, only one side is considered for the calculations because the other side of the fence sections are largely on private lands. The proposed new fences may result in an additional 0.98 acre of soil disturbance from livestock trailing. Also, in the Hardie Summer Allotment there are 3.34 miles of fence removal proposed, both sides of which are accessible for trailing currently; once removed, an estimated 0.53 acre would be available for BSC recovery over the mid- to long-term. No new water developments were proposed under this alternative. Maintenance and reconstruction of current developments would continue, and direct and indirect effects would be similar to the baseline as the activities would take place within the original construction footprint.

Table 3-1: Alternative 2 Fence Construction and Removal Comparison by Allotment

Allotment	New Fence Miles	Fence Removal Miles	Net Change
Hammond	0.2	5.3	-5.1 (less fence)
Mud Creek	No change	No change	No change
Hardie Summer	6.11	3.34	2.77 (more fence)

3.2.2.1.3 BSC1 Alternative 3

This alternative would authorize additional AUMs in Hammond, Mud Creek, and Hardie Summer Allotments. Selected pastures that are primarily private land in the Hammond and Hardie Summer Allotments would be added to the current Hammond FFR or into the new Hardie Summer FFR. NR AUMs would also be authorized. Proposed developments include water gap modification, fence removal, fence construction/boundary adjustment, water developments, livestock handling facilities reconstruction, and supplemental feeding (hay).

Direct effects of management (growing season rest and expanded grazing season) under Alternative 3 would be the same as under Alternative 2. In summary, the direct effects would be beneficial to BSCs in the short- through long-term by maintaining or improving the vascular plant community where grazing would continue similar to what occurred in 1984-2014. In areas that were not previously grazed, such as within the Bridge Creek Canyon, BSCs would be negatively impacted and could be reduced below what occurred under previous grazing. However, the drainage is either rock armored or has high vascular plant cover, and it is uncertain

what extent BSCs are present or would be affected by this management change. Directly, there would be more exposure between livestock hooves and potential BSCs because of this proposal; utilization thresholds would be in place to limit the intensity of livestock use in the newly proposed pasture. Indirectly, BSCs would be promoted by livestock effects from grazing and trampling invasive annual grasses, which reduces the amount (grazing removing biomass), structure, and continuity (making spaces in the thatch by grazing or walking) of fine fuels that otherwise would burn continuously and would reduce BSCs should a fire occur. Grazing intensity, measured and limited by utilization thresholds on desirable vegetation, and the effects to BSCs would be greater under this alternative than under Alternatives 1 and 2, based on the increase in area open to grazing and the increase in AUMs.

Under Alternative 3, an immediate increase (not a phased in approach) of additional AUMs, when compared to Alternatives 1 and 2, would be authorized in the Hammond Allotment (2,700 AUMs up from 1,625 AUMs), Mud Creek Allotment (1,000 AUMs up from 590 AUMs), Hardie Summer Allotment (408 AUMs up from 364 AUMs), and the Hammond and Hardie Summer FFRs, as adjusted (577 AUMs up from 368 AUMs). This amount of use is not consistent with past management (1984-2014) and has been untested. The utilization threshold is in place and would limit the actual amount of time spent in each pasture (once threshold is met the livestock would be moved to the next pasture, allotment, or out of the BCA). Because of implementation of periodic growing season rest for deep-rooted perennial bunchgrasses, some pastures would not be grazed during the growing season; however, rest would not occur on a rotating basis and would be determined annually based on conditions. To offset rested pastures there would likely be more animals in each grazed pasture that occurs under Alternatives 1 or 2. This would equate to more overlap between animal hooves in time and space with BSCs, particularly in the Hammond and Mud Creek Allotments. In the short-term the direct effect could be increased trampling of BSCs compared to Alternatives 1 and 2. The indirect effects to BSCs would be the same as Alternatives 1 and 2 because of the utilization threshold.

Under Alternative 3, NR AUMs would be authorized. The differences between this Alternative and Alternative 2 is that Alternative 3 would allow NR AUMs within Mud Creek Allotment and NR AUMs could be authorized in any BCA pasture, in any year, where the utilization thresholds have not been reached. Use of NR AUMs may be less likely under Alternative 3 because the authorized AUMs are higher than Alternative 2, which would result in higher utilization levels; however, as NR use would be allowed every year and, in every pasture, NR use could be higher in years of high herbaceous production where the permitted AUMs could be utilized in fewer pastures or with utilization less than the thresholds. The direct effect to BSCs would be consistent with the baseline condition, which would allow for a 50 percent utilization threshold (or 60 percent on crested wheatgrass) to ensure continued health and function of the perennial vascular plant community. Indirect effects to BSCs would be similar to Alternative 2, but more as impacts could occur across all allotments and pastures, potentially every grazing season.

Boundary adjustments or pasture naming changes are mostly administrative and not anticipated to have indirect effects to BSCs. The fences that would be used to create new pastures or physically adjust the boundaries could influence BSCs and are discussed below.

In the Hammond Allotment, the fence removal proposed under Alternative 3 would result in 0.31 mile less fence and potential livestock trailing on one side, thereby approximately 0.05 acre would receive less concentrated use and BSCs could recover in this area over the long-term. However, this fence removal would allow livestock access the Bridge Creek canyon (new Canyon Pasture), which may increase impacts to BSCs beyond those in Alternatives 1 and 2, as grazing did not occur in Bridge Creek canyon under the previous grazing authorization.

Under Alternative 3, removal and construction of boundary fencing would result in a net 3.19 miles of additional fence in the Mud Creek Allotment. All of which would be accessed by BLM authorized livestock (including neighboring allotments) from either side and potentially trailed along, equating to approximately 1.02 acres of new disturbance to soil and BSCs. The Hardie Summer Allotment proposed fence changes would result in 0.79 mile less fence, equating to about 0.25 acre of previous trailing disturbance that would be available for recovery of BSCs.

Table 3-2: Alternative 3 Fence Construction and Removal Comparison by Allotment

Allotment	New Fence Miles	Fence Removal Miles	Net Change
Hammond	0	0.31 (water gap)	-0.31 (less fence)
Mud Creek	4.72	1.53	3.19 (more fence)
Hardie Summer	2.91	3.7	-0.79 (less fence)

Under Alternative 3, Big Spring is proposed for development; the spring is on private land, but the pipeline (main pipe with one spur) and three troughs would be located on BLM-managed lands. Since the Hardie Summer Allotment is the highest elevation allotment in the BCA, with the highest vascular plant cover, it has the least likelihood to have an abundance of BSCs under any conditions. Therefore, the precise effect to BSCs from the proposed water development and its components would be expected to be smaller than if it occurred in a lower elevation pasture. Calculations provided are likely overestimates. There would be approximately 2.7 miles of new pipeline that could impact BSCs where they exist; however, reserving the topsoil for reapplication over the disturbed ground from trenching pipe in, and seeding with desirable plant species, may improve the chance for BSCs that exist on the site to recover over time. The siting of three troughs could have variable impacts to BSCs. One trough would be located within the footprint of an existing reservoir that was included in the baseline calculations described above; therefore, the disturbance and impacts to BSCs has already been accounted for. The other two troughs would create an area of new disturbance to soils and could reduce or remove BSCs where they may exist. This impact would be long-term because of the concentrated use by livestock. Based on the same assumptions as the baseline, the two newly located troughs would account for an additional 11.92 acres of disturbance (this includes construction area disturbance, repeated year on year watering disturbance from livestock congregation around the development and trailing to/from the troughs).

Under Alternative 3, a livestock handling structure reconstruction is proposed near Granddad Reservoir. Associated with the corrals would be a loading ramp and, potentially, water troughs. The maximum extent of the livestock handling structure area would be two acres. Because these would be areas of concentrated and repeated use, it is anticipated that the entirety of the 2 acres would have decreased or permanent loss of BSCs. However, because these structures were present historically and the area was previously disturbed, the current presence of BSCs may

already be limited. However, if any BSCs had returned to the site over time, they would likely be reduced back to the levels present when the previous facility was in use.

Maintenance and reconstruction of current developments would continue; direct and indirect effects to BSCs would be similar to the baseline as the activities would take place within the original construction footprints. Additional BSCs would not be removed.

Supplemental feeding of hay would be authorized on previously disturbed areas such as where salt, mineral, or protein supplements (tub, block, liquid) are placed. As such, the direct effects to BSCs from livestock compressing crust surfaces, while utilizing hay supplementation across the BCA allotments, would be minimized to areas already disturbed and that have fewer BSCs because of previous, year-on-year concentrated, repeated use. Indirect effects would be the influence of the supplemental feeding to livestock distribution, which would be limited by utilization thresholds.

3.2.2.1.4 BSC1 Alternative 4

Under Alternative 4, half of Alternative 1 AUMs would be authorized. The season of use for grazing would be between August 1 and February 28. No grazing would be allowed in any pasture two years in a row. The utilization threshold would be limited to 30 percent on native and non-native deep-rooted perennial bunchgrasses. No NR grazing or supplemental feeding (hay) would be authorized, and no new developments are proposed. Therefore, under Alternative 4 there would be less interaction between livestock and BSCs where they exist in time and space when compared to Alternatives 1, 2, and 3. It is anticipated that under Alternative 4 fewer BSCs would be impacted by livestock grazing directly in the short- to mid-term, particularly in the Hammond and Mud Creek Allotments. There would likely be fewer animals present at any one time, in any given pasture, and the utilization threshold would also limit use more than in Alternatives 1, 2, and 3. The precise difference in amount of BSCs impact from grazing between the 30 percent and 50 percent (or 60 percent) utilization thresholds would be difficult to quantify due to multiple variables (elevation, vegetation, other disturbances). Rest in each pasture every other year would allow any BSCs that were impacted during the grazing season a full season to recover, which may prevent their loss. Deep-rooted perennial bunchgrasses would receive growing season rest every year, which would be indirectly beneficial to BSCs, as previously described, up to the point the vascular plant cover precludes BSCs, for instance in the Hardie Summer Allotment. Indirectly, the reduced AUMs and utilization thresholds may allow areas to accumulate more fine fuels, especially in areas with invasive annual grasses. If these areas burn, they may burn more continuously and with more heat than in Alternatives 1 through 3, which would negatively impact BSCs, possibly removing them completely, and limit BSC recovery as discussed previously. In the areas of Mud Creek and Hardie Summer Allotments that are not achieving appropriate ecological objectives as identified in the LH Determination (Bureau of Land Management 2023b), or subsequent determination, the areas would not have livestock grazing, and there would be no direct impacts to BSCs from livestock⁶⁷. Additional foliar cover in the absence of grazing would be higher and accumulate over time, which could preclude

⁶⁷ See Table 1-3 for a summary of current causal factors.

BSCs, reducing the area they would typically exist. Indirectly, foliar cover from all vascular plants would contribute to continuous fine fuel accumulation, which would alter fire behavior (hotter) and burn patterns (that are less mosaic), which would disfavor BSC recovery should a fire occur. This risk would be higher in areas where there are invasive annual grasses, or areas that have not recovered from previous disturbances. However, where ecological objectives are not achieved due to a causal factor other than livestock grazing, those causal factors would continue to impact ecological conditions.

Under Alternative 4 developments would continue to exist on the landscape and be areas of concentrated use. Overall, they would receive less use because there would be fewer livestock (individuals) in the pastures and reduced utilization threshold for perennial grasses. However, congregation and repeated use by livestock at these sites would still occur, limiting BSCs in those areas. Trails into developments and along fences may also receive less use for the same reasons. The difference between Alternatives 1 through 3 and Alternative 4, in terms of magnitude, would be difficult to measure. However, the assumption is that this alternative would have less impact to BSCs where they would typically exist.

3.2.2.1.5 BSCI Alternative 5

Under Alternative 5 there would not be any authorized livestock grazing in any of the BCA allotments. There would be no new water or fence developments, and existing developments would only be maintained as needed for other resources.

Alternative 5 would mean there would be no direct interactions between livestock and BSCs. BSCs would not be disturbed by authorized grazing (compressing their surface) and would be allowed to recover unimpeded by livestock based on site characteristics and other disturbances. Vascular plant cover would impact BSCs both directly and indirectly. Additional foliar cover in the absence of grazing would be higher and accumulate over time, which could preclude BSCs, reducing the area they would typically exist. Indirectly, foliar cover from all vascular plants would contribute to continuous fine fuel accumulation, which would alter fire behavior (hotter) and burn patterns (that are less mosaic), which would disfavor BSC recovery should a fire occur. This risk would be higher in areas where there are invasive annual grasses, or areas that have not recovered from previous disturbances.

Unless used by other resources, developments would not be used or maintained, and may be removed or remain on the landscape. Depending on the amount of use in either scenario, the original construction footprint and areas livestock used (around the water development or fence, or as trailing to access the development) would slowly colonize with BSCs where they would typically exist. This would be a function of frost heaving slowly breaking up compacted soils and allowing BSCs to potentially colonize inward from existing BSCs on the edge of the disturbed areas. This would occur in the long term. The precise timing and amount of recovery of BSCs would depend on the site characteristics and other overlapping disturbances as previously described.

3.2.2.2 BSC Cumulative Effects

The scope of analysis for cumulative effects is the project area, as activities outside the project area would not have an impact on BSCs. Fence lines and geographic features around the project area eliminate impacts from grazing adjacent to the project area.

The RFFAs for the BCA that would have an impact on BSCs are livestock grazing, fire, weed treatments (including invasive annual grass treatments), juniper treatments, restoration seeding, and restoration shrub planting (such as those analyzed in the North Steens Ecosystem Restoration Project EIS (Bureau of Land Management 2007d) and reviewed in the Mud Creek Restoration DNA (Bureau of Land Management 2023c) and Adjacent (Non-WSA) North Steens Ecosystem Restoration DNA (Bureau of Land Management 2024a) , road maintenance, and recreation activities.

The legacy historical effects and overlapping of contemporary uses results in limited understanding of how best to apply practices to conserve and restore BSCs (Bowker 2007; Young et al. 2019). What is known is that disturbance that removes or kills crustal organisms results in greater impact and slower recovery than disturbance that leaves crushed crust material in place (Belnap et al. 2001).

Past management for this analysis refers to the timeframe after proper grazing management was formalized in management plans that considered the season of use for vascular plant health (Bureau of Land Management 1984). Historical grazing refers to livestock grazing when it was unregulated or unrestricted (particularly the 1880s through 1934). Historical documents from 1902 (Griffith 1902) described the poor conditions of rangelands region-wide and it is assumed that widespread damage or removal of BSCs, where they existed, likely occurred during that period.

In the BCA, past and historical livestock grazing has been the predominant use since the late 1800s, with data showing that use in the Steens Mountain area was extreme, largely reducing vegetation, with a large amount of BSC trampling from both cattle and domestic sheep. It is expected that this historic grazing removed a vast amount of BSCs from the areas where they would be expected to exist. Past grazing decreased livestock use and identified grazing management strategies that allowed vegetation to recover, as well as reducing direct effects of trampling on BSCs, allowing them to reestablish in many areas that they are expected to be in. Proposed grazing under all grazing alternatives is designed to allow BSCs to continue to establish in areas where they should exist.

The cumulative effects of fire, when combined with livestock, to BSC in the area varies greatly due to the burn intensity and behavior of the fires that have occurred. According to TR-1730-2 (Belnap et al. 2001) historical fire patterns helped create mosaics of successional stages of both vascular plants and BSCs. Root and others (2017) found that fire resulted in a decrease in abundance of BSCs that could last decades. Fifty to one hundred years is often cited as average return interval for fire in shrub-steppe and is adequate to restore BSCs (Belnap et al. 2001). Hilty and others (2004) found that the cover and composition of BSCs within the sagebrush steppe are

reduced through fire. Generally, crusts' structural matrix was left intact following low intensity fire but is killed during high intensity fire leaving long-term effects (Belnap et al. 2001).

Fire in the Hammond Allotment (in the 1980s and 2006), and in the Mud Creek Allotment in 2006, impacted BSCs in the burned area to some level. Monitoring completed 7 to 16 years after the Grandd Fire found no clear or strong pattern between recently burned plots and those plots that had not burned. Based on a literature review it is posited that past grazing management likely influenced the intensity of the fires and thereby lessened the impact to BSCs in those areas. Davies and others (2016) found that areas grazed pre-fire had more BSCs post-fire than areas not grazed, likely because fire was more severe in ungrazed areas (due to accumulated plant material) and cheatgrass increased in those areas post-fire, both of which negatively influence BSCs. In the Davies study (2016), moss and lichen were overall higher on unburned plots when compared to plots that burned; this was particularly true of lichen cover. Based on those results, mosses appear to recover more quickly after fire than lichens. Further, in the same study, when the plots in burned sites had over 36 percent invasive annual grass cover, lichens were removed from the site, and mosses were 2-3 times more abundant. Davies and Bates (2010a) found that BSCs do not constitute a large portion of cover in either mountain or Wyoming big sagebrush plant communities in the northern Great Basin. It is thought that this was due in large part to frequent fires pre-settlement, historically occurring every 30-100 years in these areas. Root and others (2020) found that where livestock reduced BSCs, more annual grasses were found. However, O'Connor and Germino (2021) found that the Root and others' (2020) conclusion neglected to consider the effects of wildfire on the study plots in recent decades.

To summarize, cumulative effects of fire and grazing combined are not anticipated to create an additional loss of BSCs given appropriate post-fire grazing management under Alternatives 1-4, proposed management that would favor the deep-rooted perennial bunchgrasses and disfavor invasive annual grasses, which would aid in facilitating recovery of BSCs where they are not killed by fire. Management under these scenarios would create a microclimate for maintenance of existing BSCs or colonization for future BSCs where they would typically exist.

Weed treatments in the past have included spot treatment of noxious weeds and aerial treatment of invasive annual grasses. Continued weed treatments are expected to occur until noxious weeds and invasive annual grasses are reduced to a level that would not require treatment. Invasive annual grasses pose a long-term threat to BSCs (Belnap et al. 2001). It is theorized that invasive annual grasses decrease available soil surfaces for BSCs to use, via increased cover by live plants and litter. Also, the continuity of fuels caused by invasive annual grasses influences wildfire behavior to burn more continuously, which influences BSCs as described above. Continued weed treatments, especially those targeting annual grasses, and proposed management under Alternatives 2, 3, and 4 would cumulatively favor deep-rooted perennial bunchgrasses by limiting use using utilization thresholds, providing growing season rest, and utilizing deferred grazing treatments; management would disfavor invasive annual grasses by grazing them when they are the most vulnerable (Davies, Bates, Perryman, et al. 2021) and utilizing herbicides to reduce presence and density of annual grasses. Weed treatments and grazing as proposed under Alternatives 2 and 3, and to a lesser extent Alternative 1, and even smaller extent Alternative 4,

would also influence fine fuel characteristics that would reduce the structure and continuity of fine fuels, reducing the risk of severe and homogenous fire under normal fire conditions. Grazing under Alternatives 2 and 3, to a lesser extent under Alternative 1, and to a small extent Alternative 4, in combination with weed treatments, is not anticipated to directly cause cumulative loss of BSCs. Alternative 5, which is no livestock grazing, may have cumulative effects by allowing BSCs being outcompeted for soil surfaces by invasive annual grasses and due to increased fine fuel accumulation (amount) in the absence of livestock grazing, which would result in more continuous fuels that would facilitate a hotter and more complete fire that is more likely to kill BSCs in a homogenous burn, reducing the ability of BSCs propagules to spread and recover. Alternatives that remove the fine fuels, combined with weed treatments that limit new growth of annual grasses, would increase the chance of any fire burning in a more mosaic pattern, reducing loss of deep-rooted perennial species, limiting BSC loss, and increasing probability of burned sites being reestablished by BSCs; this benefit decreases as grazing decreases.

Western juniper is covered in more detail in the Vegetation section and Grazing Management section. Western juniper historically was controlled by fire on the landscape, and limited juniper occupancy to fire-safe sites, such as rocky areas with naturally sparse understory vegetation. However, fire suppression has allowed juniper to infill or expand into some areas. Long-term juniper outcompetes grasses, and then shrubs, increasing bare soil and erosion. This means in the absence of fire or other types of treatments, as juniper becomes dominant in areas of the BCA allotments, BSCs would decrease in those areas. Western juniper treatments under the North Steens Ecosystem Restoration Project (Bureau of Land Management 2007e), in the form of cutting, have occurred in some portions of the allotments, which has delayed the negative long-term effects of juniper expansion as a result. Short-term negative effects to BSCs may occur due to any restoration and juniper treatment activities due to potential crushing by vehicles and/or foot traffic, planting and seeding sites (if drilled or dragged to cover seed), and by juniper piling and pile burning. However, these sites are localized to the treatment areas. In the long-term, juniper treatments are beneficial to BSCs by allowing understory vegetation to recover and increase, stabilizing soils, and creating a microclimate in which BSCs can persist. Cumulatively, it is expected that restoration activities, combined with grazing management, would continue to promote or maintain BSCs in the long term.

Cumulative effects relating to road maintenance activities within the project area would be minimal as roads are spot maintained as needed, removing BSCs only where maintenance occurs, and not along the entire route. As roads within the BCA are typically stable, minimal maintenance is expected to be completed; therefore, there would be minimal loss of BSCs. When combining this action with alternatives, it would not result in a measurable change beyond effects already analyzed under each alternative.

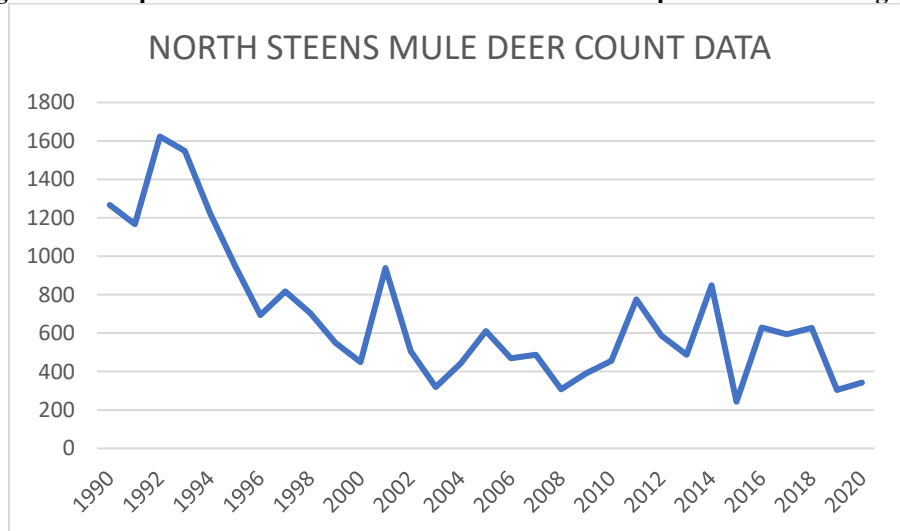
Recreation activities that occur within the BCA would be expected to continue under all alternatives, with trampling of BSCs occurring. It is not expected that this action would result in cumulative measurable changes to BSCs under any alternative.

3.3 Big Game and Other Wildlife Species (BG)

3.3.1 BG Affected Environment

Within the BCA there are 20,026 acres of designated mule deer winter range. Approximately 81 percent (16,334 acres) of designated mule deer winter range in this area has burned with varying severity since 1990 and 52 percent (10,423 acres) has been converted to crested wheatgrass stands starting in the early 1960s. Most recovering shrub habitat within the BCA occurs at higher elevations that may not be available to deer in some years due to deep snow accumulations. Crested wheatgrass domination occurs primarily on the lower elevation slopes, historically preferred by mule deer during late fall and throughout the winter (Coe et al. 2018). While mule deer readily consume crested wheatgrass regrowth during late fall and winter, crested wheatgrass provides no thermal or hiding cover, and has less dry weight nutrition than sagebrush, antelope bitterbrush, chokecherry, or other common native browse plant species (Austin and Urness 1983). The relative low abundance of browse plant species occurring at low elevations dominated by crested wheatgrass and with limited shrubs may concentrate resident deer populations into areas where these browse plant species continue to persist. Deer populations in the North Steens have dropped significantly since 1990 (Figure 3-1). While other factors may be contributing to mule deer population declines in the North Steens, habitat loss and fragmentation are leading causes of population declines in mule deer populations throughout the West (Schuyler 2020); as such, similar effects to mule deer in the North Steens are assumed. However, steep population drops within the localized mule deer population seem to correlate with large wildfires occurring in the North Steens since 1990, and these drops do not correspond with statewide mule deer population trends. Within the allotment 81 percent of mule deer winter range areas have been impacted by wildfire, with some areas burning twice or more within that timeframe. The relatively slow recovery of sagebrush and other shrubs, and the areas converted to crested wheatgrass, have resulted in a decrease in suitable mule deer habitat in this area. While elk are more generalist species, it is expected that past fire has changed elk habitat and movements as well.

Figure 3-1: Unpublished ODFW North Steens Mule Deer Population Monitoring Data



3.3.2 *BG Environmental Consequences*

3.3.2.1 *BG Issue 1: How would each alternative provide for mule deer habitat?*

3.3.2.1.1 *BG1 Alternative 1*

Livestock grazing at the utilization threshold levels under Alternative 1 would maintain or improve bunchgrass and not negatively impact the existing forage base for mule deer over the long term. Livestock grazing on crested wheatgrass and native grass species would reduce grazing on existing upland shrub areas that comprise preferred forage, hiding, and thermal cover for big game, thereby improving habitat conditions within all seasonal ranges for mule deer. Direct competition resulting from the presence of cattle is likely to displace deer from a given area while cattle are present. If comparable habitat is available in another area nearby where cattle are absent, a neutral effect would be expected. However, should mule deer displaced by cattle be forced into less preferred habitat, a negative effect would result.

3.3.2.1.2 *BG1 Alternative 2*

Effects of Alternative 2, in terms of grazing effects to mule deer vegetative habitat would be the same as those described in Alternative 1. However, under Alternatives 2-4, the grazing season of use would be extended into the winter. As mule deer have high site fidelity to ancestral winter range, quality winter range habitat is limited in the area, mule deer aggregation is high at quality locations not precluded by deep snow, and mule deer exhibit social avoidance behavior towards cattle, proposed winter grazing within mule deer winter habitat could displace mule deer occurring within designated winter range and have an adverse effect to the resident mule deer populations. These adverse effects would be limited to only the years when late season (winter) grazing by livestock would occur and when deep snow limits accessible quality winter range.

Grazing would have the same effects to mule deer habitat under Alternative 2 as it would in Alternative 1. However, impacts associated with the presence of cattle during late fall and winter within mule deer winter range are expected. A study conducted in nearby Lake County, Oregon (Zalunardo 1965), showed individual mule deer showed strong winter range site fidelity with individual animals returning to ancestral winter range, whereby site selection is suspected, at least in part, to be learned behavior passed from doe to offspring, year after year. Average winter home range associated with this study was one-quarter mile. Aggregation on deer winter range habitat is high with deer converging on the same area from summer ranges (D'eon and Serrouya 2005). As mule deer exhibit social avoidance of cattle (Loft et al. 1991; Smith and Coblenz 2010), their presence on remaining viable deer winter range within the BCA, during a time when mule deer occupy these areas, could displace resident mule deer from historic wintering areas and into less desirable habitats either higher on the mountain, where deeper snow would make obtaining sufficient forage difficult or, as deer show strong preference for moderate, lower elevation slopes with lower snow depth (D'eon and Serrouya 2005; Coe et al. 2018), to areas with higher anthropogenic disturbance including both gravel and paved roads where incidents of vehicle collision are more likely to occur. While mule deer also exhibit social avoidance of cattle during other times of year, migratory and summer habitat are much less limited, and summer

home ranges are much larger allowing deer to more easily avoid cattle while maintaining access to habitat. Therefore, the effects of cattle presence within mule deer habitat outside winter range are expected to be negligible. Permitting cattle to graze on the designated winter range could displace mule deer from historic winter use sites within the BCA where it overlaps with grazed areas and could have an adverse effect on resident populations.

3.3.2.1.3 BGI Alternative 3

While vegetative utilization thresholds are the same as those described in Alternatives 1 and 2, the number of AUMs proposed in Alternative 3 is increased, making it more likely utilization thresholds would be reached and more livestock would be present in the BCA, or livestock would be present for a longer period. Without a general grazing rotation, when rest would occur and what grazing treatments would be used are unknown, with rotations being determined annually. Without a general grazing rotation, analysis for this alternative is difficult and must be based on assumptions. Assuming cattle are annually authorized to graze during the fall and winter in more pastures with designated mule deer winter range than would occur under Alternative 2, livestock and mule deer would be in more conflict compared to other alternatives, and mule deer are more likely to be displaced. Due to the lack of a grazing rotation, this alternative would have the most negative effects to mule deer, especially during fall and winter.

3.3.2.1.4 BGI Alternative 4

Prescribed grazing under Alternative 4 would be held to 30 percent utilization throughout the allotments and AUMs would be reduced from Alternative 1 by 50 percent; effects would be reduced compared to Alternative 1. These effects would be further reduced in the areas of Mud Creek and Hardie Summer Allotments that are not achieving appropriate ecological objectives as identified in the LH Determination (Bureau of Land Management 2023b), or subsequent determination, as these areas would not have livestock grazing. However, where ecological objectives are not achieved due to a causal factor other than livestock grazing, those causal factors would continue to impact ecological conditions⁶⁸. However, as fall and winter grazing would still occur, mule deer displacement would still be expected to occur. This social conflict would be less than under other grazing alternatives as fewer AUMs are permitted; therefore, fewer cattle would be present, or cattle would be present for a shorter period. While mule deer may benefit in late fall from the availability of increased residual bunchgrass forage (due to fewer AUMs being removed), the desired winter shrub component is limited due to past fires and crested wheatgrass seedings. Winter range habitat would be limited, particularly in severe winters when snow covers the grass and thermal cover refugia is absent. Reduced grazing may increase the availability of perennial bunchgrasses utilized by deer to supplement their diet, particularly when browse shrubs are limited. With fewer AUMs, lower utilization thresholds, and no NR grazing to reduce fine fuels, the risk of catastrophic wildfire (a wildfire that burns complete instead of in a mosaic and results in death of desirable species) is increased under this alternative compared to other grazing alternatives (Davies, Bates, Boyd, et al. 2021). If

⁶⁸ See Table 1-3 for a summary of current causal factors.

catastrophic fire were to occur, it would indirectly affect mule deer habitat in the long term (refer to the Vegetation section for more discussion).

3.3.2.1.5 *BG1 Alternative 5*

Under Alternative 5 the BCA allotments would be ungrazed and there would be no conflict between cattle and mule deer. Available grasses and shrubs would be available to be utilized by mule deer. Areas remaining ungrazed would continue to favor grass production, and increase the risk of large catastrophic wildfire, which would further limit desirable shrubs, decrease perennial bunch grasses, and increase annual grasses, limiting quality habitat and habitat recovery from previous fires. The risk of catastrophic fire would be largest under this alternative, and the risk would increase each year as fine fuels accumulate with limited removal by wildlife only. Therefore, the effects of not grazing would result in increased risk of mule deer habitat loss in the long term, while in the short-term big game access to habitat and habitat availability may be improved.

3.3.2.2 **BG Issue 2: How would the level, timing, and location of proposed livestock use impact big game habitat?**

Big game species occurring within the allotment include mule deer, elk, and pronghorn. For a discussion on mule deer, see BG Issue 1. Currently, elk and pronghorn populations are stable or increasing.

3.3.2.2.1 *BG2 Alternative 1*

Given that grazing would not be permitted within the allotments during winter months and would thereby not cause cattle to directly compete with big game within limited winter habitat, the effect of cattle presence would be neutral. As a maximum utilization of 60 percent would occur within crested wheatgrass stands and 50 percent allowed on native vegetation, adequate grass forage for elk and pronghorn would remain, and Alternative 1 would not likely cause measurable negative impacts resulting from forage competition between cattle and big game. As this alternative does not permit additional grazing infrastructure there would be no change in the effects of currently existing fences and water features for cattle to big game. This alternative would reduce fine fuel accumulation that has occurred since 2014 and limit future accumulation, which would decrease the risk of catastrophic wildfire in the BCA, which would benefit big game habitat (compared to the No Grazing Alternative) if fire were to occur.

3.3.2.2.2 *BG2 Alternative 2*

Grazing would have the same effects to big game habitat under Alternative 2 as it would in Alternative 1. However, impacts associated with the presence of cattle during late fall and winter would have a negative effect to big game, though it is expected that this effect would be less for elk and pronghorn compared to mule deer (discussed under BG Issue 1). However, the extended season of use may extend the period in which conflict with livestock may occur, though as AUMs would stay the same (except in Hammond), this could result in fewer livestock being

present at any given time, potentially reducing conflict. In Mud Creek, the utilization maximum threshold would be the same; however, it would start at a lower threshold and only increase following monitoring. This could result in less conflict with cattle and for resources in the short term compared to Alternative 1.

Reduced risk of large wildfires (compared to Alternatives 1, 4, and 5) resulting from reduction of fine fuels would have a long-term beneficial effect to big game and their habitat as existing vegetation would remain vigorous and the risk of catastrophic wildfire would be reduced, allowing sites to recover better in the event of a fire. Alternative 2 also allows 6.5 miles of new fence construction that would have an adverse effect to big game including mule deer, by increasing incidents of fence collision and entanglement and reducing habitat connectivity by creating barriers that would otherwise not be present. However, it also has 8.7 miles of proposed fence removal. Therefore, there would be a net improvement to big game habitat under this alternative due to a decrease in risk of fence collision and barriers. Alternative 2 would provide for improved habitat when compared to Alternative 1.

3.3.2.2.3 BG2 Alternative 3

Alternative 3 would increase AUMs and extend the season of use in Hardie Summer and Hardie Summer FFR by two months when compared Alternative 2. While the maximum utilization threshold remains the same as Alternatives 1 and 2, the utilization threshold in Mud Creek Lower Field would not be variable based on VOR monitoring. Grazing management for Alternative 3 would not include a general grazing rotation that specifies when cattle may be present within a given allotment or pasture in a given year, or when rest or defer treatments would occur in individual pastures. The BLM assumes that grazing would occur during the entire season of use and growing season rest is less likely to occur or would occur less often than in Alternatives 1 or 2, even with periodic growing season rest being required. Grazing vegetation consistently during the growing season without providing rest at regular intervals could result in decreased habitat quality in the long term, especially if long periods occurred between growing season rest events. Given the increase in AUMs associated with this alternative compared to Alternative 1, if grazing were to occur within big game winter range habitat during late fall and winter with the maximum number of cattle allowed within those areas, negative effects to big game populations would be expected.

If grazing management provides periodic growing season rest regularly, similar to in Alternative 2, the vegetation component of quality habitat would not be negatively reduced, and impacts would be similar to Alternative 2. Higher AUMs would result in utilization meeting maximum thresholds more regularly, potentially prior to AUMs being utilized. Along with less rest in pastures, this would be expected to reduce vegetation below what would be available for wildlife under other alternatives.

Reduced risk of large wildfires would be similar to those described under Alternative 2, but even further decreased as fine fuel reduction would be maximized (though still at or below utilization thresholds) under this alternative. Alternative 3 also allows for 7.6 miles of new fence (1.1 miles more than Alternative 2) that would have an adverse effect to big game including mule deer, by

increasing incidents of fence collision and entanglement and reducing habitat connectivity by creating barriers that would otherwise not be present. However, it also has 5.6 miles of proposed fence removal (3.1 miles less than under Alternative 2). Therefore, there would be a net decrease in big game habitat due to a net increase in fences of 2 miles. In addition, this alternative would also include corrals, which would remove approximately 2 acres of habitat, as well as the construction of a water pipeline and troughs, which would remove a small amount of quality habitat where developments are placed but may provide additional water for wildlife species to use, especially during drought years. Alternative 3 would reduce the risk of catastrophic wildfire (negatively impacting big game habitat) in the long term, when compared to other alternatives. However, increased AUMs and extended season of use, along with a net increase in developments, result in a decrease of quality or improved habitat when compared to other alternatives.

3.3.2.2.4 BG2 Alternative 4

As mule deer exhibit avoidance to cattle, winter grazing within the limited winter range for mule deer would result in conflict that would likely displace mule deer from areas occupied by cattle. Should snow depth make available winter grass forage difficult for cattle to reach, they would likely utilize above snow shrub cover, creating competition for scarce winter mule deer forage. Elk and pronghorn show less avoidance to cattle and this impact would be less. This alternative would have the most negative effects to mule deer due to the limited winter habitat availability, particularly in heavy snow years, within the Hammond, Hardie Summer, and adjacent allotments. However, the effect would be reduced in the Mud Creek and Hardie Summer Allotment where Standards are not achieved and livestock grazing is not authorized, as there would be less displacement and competition for forage above snow level.

3.3.2.2.5 BG2 Alternative 5

As Alternative 5 does not permit grazing, there would be no direct effects associated with the timing and intensity of grazing on mule deer. No new fences would be constructed; however, fences falling into disrepair could result in increased opportunities for collision or entrapment. Continued accumulations of fine fuels increase risk of catastrophic wildfires that would result in habitat and connectivity loss resulting in negative impacts to affected resident and migratory big game populations.

3.3.2.3 **BG Issue 3: How would proposed fences and other infrastructure impact wildlife?**

Fencing can fragment habitats by reducing the ability of wildlife to move throughout the habitat, such as between summer and winter range, freely. Proposed fence construction would utilize design features to reduce risk to wildlife of both collision and entanglement. While fences constructed with “wildlife friendly” design reduce mortality, it is still not fully understood how or if these fences impact habitat connectivity for wildlife (Segar and Keane 2020). Gavin and Komers (2006) also found anthropogenic barriers such as fences can alter wildlife behavior to avoid fences and other infrastructure that can negatively affect the ability of wildlife to utilize

available resources, such as water and forage, and require animals to exert energy and time finding alternative resources in order to avoid fences (Seidler et al. 2018).

3.3.2.3.1 BG3 Alternative 1

This alternative does not propose new fence construction or fence removal; therefore, there would be no impacts for those activities. Unmaintained fences pose a significantly greater risk for wildlife mortality resulting from collision or entanglement than properly maintained fences. Therefore, alternatives that do not include maintenance or removal of existing fences would pose an increased risk of injury, stress, and mortality.

3.3.2.3.2 BG3 Alternative 2

Alternative 2 proposes fence removal of approximately 8.7 miles and fence construction of approximately 6.5 miles of new fence, resulting in a net decrease in fencing of 2.2 miles. A decrease in fencing reduces the likelihood of wildlife mortality and injury resulting from entanglement and/or collision. As many fence miles would be relocated, there would be an increased risk for collision and entanglement for the short term while wildlife learned the new fence locations; however, fence marking would minimize this impact. Still, risk of injury or mortality is not eliminated by the addition of “wildlife friendly” construction design or visual markers. In a study of four ungulate species (elk, mule deer, white-tailed deer, and pronghorn) Segar and Keane (2020) concluded that fences constructed with “wildlife friendly” fence design resulted in reduced risk of collision or entanglement by an average of 33 percent. However, overall risk varied between species, with pronghorn and elk experiencing greater disadvantage when attempting to cross wildlife friendly fence compared to mule deer and white-tailed deer. The same study showed that juvenile ungulates were also disadvantaged and were eight times as likely to experience injury or mortality resulting from fence crossing attempts (Segar and Keane 2020). Due to the net decrease in fences, compared to current conditions (Alternative A) and Alternative 3, this alternative produces the most desirable outcome in terms of impacts resulting from fence construction.

3.3.2.3.3 BG3 Alternative 3

Alternative 3 would have the same direct and cumulative effects as Alternative 2 in terms of risks to big game associated with fences. However, as Alternative 3 proposes to remove 5.6 miles of old fence and construct 7.6 miles of new fence, there would be a net increase of 2.0 miles of fence. Therefore, Alternative 3 would increase risk and decrease connectivity in comparison to currently existing conditions (Alternative 1) and Alternative 2.

3.3.2.3.4 BG3 Alternative 4

Same as Alternative 1.

3.3.2.3.5 *BG3 Alternative 5*

Same as Alternative 1.

3.3.2.4 BG Cumulative Effects

For all wildlife, the cumulative effects affected area (CEAA) would be the BCA plus a ten-mile buffer. This is an appropriate geographic unit for assessing effects because it captures the scope of the direct and indirect effects of the proposed action and alternatives combined with reasonably foreseeable future actions on multiple species, with varying sized home ranges. RFFAs for cumulative effects would be fire, livestock grazing, weed treatments, road maintenance, recreation activities, restoration activities (seeding and planting), and juniper treatments. With the exception of fire, other RFFAs are designed to result in short-term disturbance to wildlife and big game species, which may temporarily displace animals. RFFAs that are focused on restoration activities would result in cumulative positive impacts in the long term to big game habitat.

Annual distribution of cattle throughout the BCA would have a neutral direct and cumulative effect to mule deer, as livestock have not been allowed to graze within the BCA for the last ten years (with the exception of 2019). However, livestock grazing has continued within the CEAA outside of the BCA, and all livestock grazing is managed to maintain or move rangeland conditions toward desired conditions and to ensure livestock grazing is not preventing the attainment of standards and guidelines. As such, managed livestock grazing would not have a long-term negative impact on habitat. Livestock grazing would result in short-term displacement of big game when livestock are present, but displacement would likely still be within the CEAA as livestock grazing would not occur in all areas at the same time. Big game would return once livestock leave the specific location, if desired. These impacts would be less for elk and pronghorn compared to mule deer. When livestock grazing in the fall and winter overlapped with mule deer winter range, which is limited in the CEAA due to previous fire events, displaced mule deer could be forced to either move up to adjacent winter range or higher elevations, where snow conditions limit forage resources and make movement difficult, or into other low elevation areas, where desired winter forage conditions are not present. As such, cattle occurrence within mule deer winter range during late season grazing, could have a negative impact on mule deer, dependent on how grazing within the BCA and adjacent areas was authorized, especially if grazing in all portions of winter range within the CEAA occurred at the same time, limiting mule deer availability to move to other areas of quality winter range. If this were to occur, it may result in increased winter mortality and contribute to a prolonged negative population trend. Where additional developments, specifically fences, are proposed, there would be an increase in potential for entanglement or collision, though the net risk would be decreased under Alternative 2. However, as fences are common within the CEAA, changes to the total miles of fences and associated impacts would be minimal.

If grazing were returned to this area, there would be a reduction of fine fuels due within the BCA. This would be an overall reduction of fine fuels within the CEAA, resulting in reduced risk of large or catastrophic fires, further protecting ecological conditions and existing habitat

within the CEAA, which would be beneficial to big game, especially to mule deer and their preferred shrub habitat, which is already limited due to previous fires.

Without active treatment, areas dominated by perennial and invasive annual grasses would continue to persist into the foreseeable future and may limit the recovery of the perennial upland vegetation that provides hiding and thermal cover, and forage, important for big game. As grazing when annual grasses are green can reduce invasive annual grasses and limit seed growth, continued grazing exclusion may result in an increased seed presence and potential dominance of invasive annual grass, increasing the likelihood of large wildfires that could damage or destroy remaining mule deer habitat, and lead to additional mule deer declines throughout their migratory range. Restoring grazing would have the opposite effect in the BCA and CEAA; however, due to the size of the BCA in comparison to the CEAA, these impacts would be small cumulatively.

Continued exclusion of cattle, or management of livestock grazing to minimize conflict, especially in the winter, would benefit mule deer populations throughout their migratory range by reducing competition for space and forage. However, as grazing in the CEAA, outside of the BCA, would continue as has been occurring, this impact would likely be immeasurable.

Any action that would adversely affect the long-term vigor and abundance of perennial vegetation would have a negative effect on habitat for mule deer and other big game species (see the Vegetation section for more details). RFFAs such as the North Steens Ecosystem Restoration Project, Mud Creek Restoration, aerial and ground weed treatments, and emergency stabilization and rehabilitation efforts would continue to improve habitat for big game species by moving systems back towards conditions appropriate to associated ecological sites. Fire, especially large-scale catastrophic fire, with high plant mortality and limited pockets of desirable vegetation, would decrease available habitat for big game and would increase the presence and dominance of invasive annual grasses, which further decreases habitat suitability.

3.4 Climate Change and Emissions (CCE)

3.4.1 CCE Affected Environment

Executive and Secretarial Orders issued in 2021 address the importance of considering climate change when analyzing impacts from Federal actions. The January 2021 Executive Order 13990, “Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis” (Biden, Jr. 2021 Jan 21) directs all executive departments and agencies to “... immediately commence work to confront the climate crisis.” The Executive Order also directs the Council on Environmental Quality (CEQ) to review its final guidance entitled “Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews,” (Council on Environmental Quality 2016). Department of Interior Secretarial Order 3399 (Haaland 2021) calls for a department-wide approach to the climate crisis and establishes a Departmental Climate Task Force. Secretarial Order 3399 (Haaland 2021) also calls for the consideration of greenhouse gas emissions in NEPA analyses and, as appropriate, the assessment of the social

cost of carbon (see Socioeconomics section). On January 9, 2023, CEQ issued interim NEPA guidance to assist agencies in analyzing greenhouse gas and climate change effects in their NEPA analyses (Council on Environmental Quality 2023).

In response to the direction in the Executive Orders and the 2023 CEQ interim guidance (Council on Environmental Quality 2023), this EIS analyzes the greenhouse gas (GHG) emission and carbon sequestration effects of the alternatives on climate change and displays the social cost of GHG emissions (see Socioeconomics section) of the alternatives. The BLM recognizes that the observed and projected changing climate will influence the success and viability of the actions being proposed and the efforts BLM undertakes to promote a resilient, healthy landscape that allows for and supports varying levels of livestock grazing. Where applicable, the affected environment sections for each individual resource in Chapter 3 will address how climate change is affecting the resource.

There is a scientific consensus that global climate change is occurring, caused in whole or in part by increased emissions of GHGs that keep the Earth's surface warm by trapping heat in the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) is responsible for assessing the science related to climate change globally through the United Nations, and have released many reports in the past 5 years discussing multiple aspects climate change (Intergovernmental Panel on Climate Change et al. 2006; Intergovernmental Panel on Climate Change 2015; Intergovernmental Panel on Climate Change 2019a; Intergovernmental Panel on Climate Change 2019b; Intergovernmental Panel on Climate Change 2021; Intergovernmental Panel on Climate Change 2022; Intergovernmental Panel on Climate Change 2023a). The IPCC's most recent report published in March 2023 is the Synthesis Report of the Sixth Assessment Report (Synthesis Report) (Intergovernmental Panel on Climate Change 2023b). The Synthesis Report highlights new information since the Fifth Assessment Report in 2015 (Intergovernmental Panel on Climate Change 2015) and provides a comprehensive overview of what is known about the science of climate change globally.

The Synthesis Report confirms that "unsustainable and unequal energy and land use as well as more than a century of burning fossil fuels have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020" (Intergovernmental Panel on Climate Change 2023b).

Warming has led to rapid, widespread changes in the biosphere (living things), atmosphere, ocean, and cryosphere (snow and ice), and resulted in effects to global weather and climate extremes (heatwaves, heavy precipitation, droughts) adversely impacting humans and the natural world (Intergovernmental Panel on Climate Change 2023b). The Synthesis Report (Intergovernmental Panel on Climate Change 2023b) forecasts that impacts over the long term will be many times greater than observed (high confidence). The IPCC in the Synthesis Report (2023b) projects that adverse effects and resulting damage from climate change will increase with each incremental change in global warming. "Climatic and non-climatic risks will increasingly interact, creating compound and cascading risks that are more complex and difficult to manage (high confidence)" (Intergovernmental Panel on Climate Change 2023b: 14). GHG emissions and changes in biological carbon sequestration due to land management activities have

been cited as potential factors influencing global temperatures. GHG emissions and net losses of biological carbon sinks may be contributing to a net warming effect of the atmosphere, primarily by decreasing the amount of heat radiated from the earth back into space (Forster et al. 2007).

To limit global warming caused by human activities, the Synthesis Report (Intergovernmental Panel on Climate Change 2023b) concludes GHG emissions must be reduced to net zero. The quantity of carbon emissions before reaching net zero and the amount of reduction in GHG emissions during this decade determine whether warming can remain below an increase of 1.5°C to 2°C (Intergovernmental Panel on Climate Change 2023b: 19). The Synthesis Report further concludes that exceeding an increase of 1.5°C will cause irreversible negative impacts to certain ecosystems with low resilience (Intergovernmental Panel on Climate Change 2023b: 23). Limiting warming to an increase of 2° will necessitate “rapid and deep and, in most cases, immediate greenhouse gas emissions reductions in all sectors this decade” (Intergovernmental Panel on Climate Change 2023b: 20).

Anthropogenic (human caused) GHGs are commonly emitted air pollutants that include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). In 2019, concentrations of atmospheric CO₂ were more than at any point over the past 2,000,000 years, and CH₄ and N₂O concentrations were both more than at any point over at least the past 800,000 years (Intergovernmental Panel on Climate Change 2023b). In 2022, concentrations of CO₂ had increased since the pre-industrial era by 49.5 percent, CH₄ by 173.1 percent, and N₂O by 24.3 percent (National Oceanic and Atmospheric Administration (NOAA) 2024).

The primary GHG emitted from livestock grazing is CH₄ caused by rumen (stomach) microbial fermentation also referred to as enteric fermentation. While CH₄ emissions made up 11.1 percent of emissions nationally in 2022, enteric fermentation was one of the three highest sources along with systems using natural gas, and decomposition in landfills (Environmental Protection Agency 2024a).

The impact of a given GHG on global warming depends both on its radiative forcing and how long it lasts in the atmosphere. Different GHGs also have different atmospheric lifetimes. Some, such as CH₄, react in the atmosphere quickly (around 12 years); others, such as CO₂, typically last for hundreds of years or longer. Climate scientists have calculated a factor, known as the global warming potential (GWP), for each GHG that accounts for these effects.

The GWP is used as a conversion factor to convert a mixture of different GHG emissions into carbon dioxide equivalents (CO₂e). Specifically, GWP is a measure of how much energy the emissions of one ton of a GHG will absorb over a given period, relative to one ton of CO₂ in the same timeframe. The larger its GWP, the more the specific gas warms the earth as compared to CO₂. The GWP for CO₂ is defined as one regardless of the timeframe, because the gas is being used as the reference. The GWP values are updated periodically to account for changing concentrations in the atmosphere and as new estimates on energy absorption or atmospheric lifetime for each gas become available. GWPs have been developed over different time horizons including 20-year, 100-year, and 500-year for several GHGs. The GWP for a relatively short-lived GHG, such as CH₄, is larger over short periods (for example, 20 years) than it is over

longer periods (such as 100 years) because most of the CH₄ will have reacted away well before 100 years have passed. Conversely, very long-lived GHGs have a 20-year GWP that is lower than the 100-year GWP because the time-integrated radiative forcing is less (relative to CO₂) over the shorter time interval.

The 100-year GWP was adopted by the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol and is now used widely as the default metric by researchers and regulators. In addition, the EPA and Oregon Department of Environmental Quality (ODEQ) use the 100-year time horizon in their annual inventories. In this assessment, the BLM will use both the 100-year and 20-year GWPs from the most recent updated IPCC Sixth Assessment Report (2023b).⁶⁹

Scientists predict that nationally and globally the frequency of extreme precipitation events, heat waves, and droughts will increase, while snowpack will decrease (Christensen et al. 2007; Polley et al. 2013). Increasing minimum temperatures may have adverse implications for any plant species that requires cold temperatures before initiating growth in spring, such as juniper and sagebrush, which are dependent on the water stored in deeper soil layers during fall and winter.

The climate within the BCA is considered continental, with most precipitation in winter-spring. However, high interannual variability in the amount of precipitation is a key characteristic of the BCA, ranging from less than 7 inches to over 25 inches. Winter precipitation is typically snow-dominated, due to the high elevation of the Steens Mountain. Summers are typically very dry. Frost can occur nearly any month of the year. These conditions are becoming warmer and effectively drier and may be shifting towards a spring-summer dominant precipitation regime.

Taking broad-scale climate projections and making them relevant for land management decisions at a planning area or project scale can be difficult and requires land managers to make assumptions about what the broader projections could mean at these smaller scales (Daniels et al. 2012). Newer methods of down-scaling are starting to approach the level of resolution that land managers could find useful. The Oregon Climate Change Research Institute (OCCRI) in 2018 completed a report for the Oregon Department of Landscape Conservation and Development that looked at future climate predictions in Harney County relevant to specific natural hazards for the 2020s (2010-2039 average) and the 2050s (2040-2069 averages) compared to the 1971-2000 average (The Oregon Climate Change Research Institute 2018). General projections for Harney County in the 2050s as described in the OCCRI (2018) report include:

- Heat Waves: Extreme heat events are expected to increase in frequency, duration, and intensity due to continued warming temperatures. In Harney County, the frequency of hot days with temperatures at or above 90°F is projected to increase on average by 36 days (with a range of 18 to 48 days) by the 2050s under the higher emissions scenario compared to the historical baseline. In Harney County, the temperature of the hottest day

⁶⁹ There are references to emissions data or aggregated emissions in this report that are developed by entities that use different GWPs than those presented in this section. Any external emissions data (e.g., EPA's "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022," (Environmental Protection Agency 2024a) which uses AR5 GWP values) are being presented at face value, meaning that the BLM is not attempting to convert those emissions to the GWP basis presented in this assessment. The variability in GWPs used in various reports may introduce small numerical differences when comparing emissions on a relative basis.

of the year is projected to increase by 8°F (with a range of 3 to 10°F) by the 2050s under the higher emissions scenario compared to the historical baseline.

- Cold Waves: Cold extremes are still expected to occur from time to time, but with much less frequency and intensity as the climate warms. In Harney County, the frequency of days at or below freezing is projected to decline on average by 12 days (with a range of 6 to 17 days) by the 2050s under the higher emissions scenario compared to the historical baseline. In Harney County, the temperature of the coldest night of the year is projected to increase by 9°F (with a range of 3 to 15°F) by the 2050s under the higher emissions scenario compared to the historical baseline.
- Heavy Rains: The intensity of extreme precipitation events is expected to increase slightly in the future as the atmosphere warms and is able to hold more water vapor. In Harney County, the magnitude of precipitation on the wettest day and wettest consecutive five days per year is projected to increase on average by about 18 percent (with a range of -1 percent to 35 percent) and 13 percent (with a range of -8 percent to 29 percent), respectively, by the 2050s under the higher emissions scenario compared to the historical baseline. In Harney County, the frequency of days with at least 0.75" of precipitation and the frequency of days exceeding a threshold for landslide risk is not projected to change substantially.
- Flooding: There is limited information regarding future flood risk related to climate change for Harney County, however, flood risk to Harney County may increase as precipitation falls more as rain and less as snow and precipitation extremes become more intense.
- Drought: Drought conditions, as represented by low spring snowpack, are projected to become more frequent whereas drought conditions represented by low summer soil moisture and low summer runoff may become less frequent in Harney County by the 2050s compared to the historical baseline.
- Wildfire: Wildfire risk, as expressed through the frequency of very high fire danger days, is projected to increase under future climate change. In Harney County, the frequency of very high fire danger days per year is projected to increase on average by about 39 percent (with range of -8 to +86 percent) by the 2050s under the higher emissions scenario compared to the historical baseline.
- Air Quality: Under future climate change, the risk of wildfire smoke exposure is projected to increase in Harney County. The number days with high concentrations of wildfire-specific particulate matter is projected to increase by 27 percent by 2046–2051 under a medium emissions scenario compared with 2004–2009.
- Windstorms: Limited research suggests very little, if any, change in the frequency and intensity of windstorms in the Pacific Northwest as a result of climate change.

- Dust Storms: Limited research suggests that the risk of dust storms in summer would decrease in eastern Oregon under climate change in areas that experience an increase in vegetation cover from the carbon dioxide fertilization effect.
- Increased Invasive Species and Pests: Warming temperatures, altered precipitation patterns, and increasing atmospheric carbon dioxide levels increase the risk for invasive species, insect and plant pests for forest and rangeland vegetation, and cropping systems.
- Loss of Wetland Ecosystems: Freshwater wetland ecosystems are sensitive to warming temperatures and altered hydrological patterns, such as changes in precipitation seasonality and reduction of snowpack.

Greenhouse gas emissions and climate change would be considered reasonably foreseeable future action that is expected to impact the BCA. However, proper management including utilization limits, adaptive management (especially during drought), and conformance to S&Gs would minimize impacts of climate change within the allotment and allow for changes in management to occur based on annual conditions.

The Oregon Global Warming Commission (2023a) released the Oregon Climate Action Roadmap to 2030 (Roadmap) in March of 2023. It recommends Oregon reduce GHG emissions 45 percent below 1990 levels by 2030, 70 percent by 2040, and 95 percent by 2050 (Oregon Global Warming Commission 2023a). The baseline Oregon emissions in 1990 were 57 million metric tons (MMT) CO₂e (ODEQ 2024). To meet the Oregon GHG reduction goals, emissions should not exceed 31 MMT CO₂e in 2030, 17 MMT CO₂e in 2040, and 3 MMT CO₂e in 2050 (Oregon Global Warming Commission 2023a).

The U.S. has set an economy-wide target to reduce GHG emissions 50-52 percent below 2005 levels in 2030 through its Nationally Determined Contribution under the Paris Agreement (The United States of America 2021), and net zero GHG emissions by 2050 (Biden, Jr. 2021). In order to meet the U.S. target to reduce GHG emissions and meet the 2030 goal, the Oregon Climate Action Roadmap to 2030 reported Oregon would need to limit GHG emissions to 33 MMT CO₂e per year (2023a). The OGWC also oversaw the Transformational Integrated Greenhouse Gas Emissions Reduction Project (TIGHGER Project), which evaluated Oregon's progress towards emission reduction goals and informed the Roadmap (Oregon Global Warming Commission 2023b).

The U.S. Geological Survey (2008) reviewed the applicable science on GHG emissions and concluded that it is beyond the scope of existing science to identify any specific source of GHG emissions, or carbon sequestration, and designate it as the cause of specific climate impacts at any specific location. The Council on Environmental Quality (2016) also acknowledged that it is not possible to attribute specific climate impacts to individual projects and recommends using GHG emissions and changes in carbon sequestration/storage as proxies for assessing potential impacts to climate (Council on Environmental Quality 2016).

At a national level, total U.S. emissions decreased by 3 percent from 1990 (from 6,536.91 MMT CO₂e) to 2022 (6,343.21 from 6,536.91 MMT CO₂e) (Environmental Protection Agency 2024a). Within the U.S., GHG emissions by economic sector, as of 2022 are: Transportation (28 percent - 1,801.52 MMT CO₂e), Electric Power (25 percent - 1,577.49 MMT CO₂e), Industry (23 percent - 1,452.54 MMT CO₂e), Residential and Commercial (13 percent - 854.96 MMT CO₂e), and Agriculture (10 percent - 633.96 MMT CO₂e) (Environmental Protection Agency 2024a). The U.S. Agriculture sector emissions are broken into three categories, with crop cultivation resulting in the largest emissions nationally (319.09 MMT CO₂e), followed by livestock production (274.30 MMT CO₂e), and fuel combustion (40.58 MMT CO₂e) (Environmental Protection Agency 2024a).

Preliminary data from the ODEQ 2021 inventory (2024), indicate Oregon emitted a total of 61.4 MMT CO₂e. Oregon's transportation sector reflects the national trend, with 2021 data showing GHG emissions by economic sector being: Transportation (35.29 percent - 21.66 MMT CO₂e), Residential and Commercial (33.9 percent - 20.81 MMT CO₂e), Industrial (19.93 percent - 12.23 MMT CO₂e), and Agriculture (10.87 percent - 6.67 MMT CO₂e) (Oregon Department of Environmental Quality 2024). The Oregon Agriculture sector emissions are crop cultivation resulting in the largest emissions (3.786 MMT CO₂e), followed by livestock production (3.348 MMT CO₂e), and fuel combustion (0.411 MMT CO₂e) (Oregon Department of Environmental Quality 2024). For the agricultural section, the ODEQ (2024) estimate (6.67 MMT CO₂e) is less than the EPA (2024a) estimate for Oregon (7.55 MMT CO₂e) in 2021. Table 3-3 provides emissions information on enteric fermentation and manure management.

Table 3-3: Livestock Emissions for Oregon and U.S.

EMISSIONS CATEGORY	OREGON (ODEQ 2021 DATA)	NATIONAL (EPA 2022 DATA)
Enteric Fermentation (All Livestock)	2.75 MMT CO ₂ e	192.58 MMT CO ₂ e
Enteric Fermentation (Beef)	No Data	136.95 MMT CO ₂ e
Manure Management (All Livestock)	0.34 MMT CO ₂ e	81.72 MMT CO ₂ e
Manure Management (Beef)	No Data	10.71 MMT CO ₂ e

GHG emission trends from a population perspective in Oregon are generally static or declining. Oregon's population has increased between 1990 and 2016, while in-state emissions per capita have decreased in the same time period (Oregon Department of Environmental Quality 2018). Since 2011, Oregon's in-state production of emissions per capita have stayed relatively flat, around 13 metric tons (MT) of CO₂e per person. The EPA estimates that U.S. national per capita emissions are higher and closer to 20 MT of CO₂e per person. Population increases are expected to increase use of motor vehicles in the rapidly growing areas. These changes are expected to have commensurate losses of carbon sequestration and increases in GHG emissions.

Contributions from the agricultural sector include GHGs methane (CH₄) from enteric fermentation in domestic livestock, livestock manure management, rice cultivation, and field burning of agricultural residues; nitrous oxide (N₂O) emissions from agricultural soil management, livestock manure management, and field burning of agricultural residues; and carbon dioxide (CO₂) emissions from liming and urea fertilization (Environmental Protection Agency 2024a). The EPA report (2024a) also states "In 2022, agricultural soil management was the largest source of N₂O emissions, and enteric fermentation was the largest source of CH₄

emissions in the United States. This sector also includes small amounts of CO₂ emissions from fossil fuel combustion by motorized farm equipment such as tractors. Indirect emissions from electricity use in agricultural activities (e.g., powering buildings and equipment) are about 5 percent of direct emissions.” GHG emissions from cattle on rangeland will be comprised of enteric CH₄ emissions, manure CH₄ emissions, and direct plus indirect N₂O emissions from manure deposited on rangeland.

According to the EPA (2024a), of all domestic animal types, beef and dairy cattle were the largest emitters of CH₄, making up 71 percent and 25 percent of GHG from enteric fermentation. However, it is important to note that most studies of GHG emissions from livestock have been conducted in feedlot or dairy type conditions, and not on rangelands, and when rangelands are discussed, they are often combined with other types of pastures (Intergovernmental Panel on Climate Change 2019a). As animal diet is a factor in enteric fermentation, it is expected that values from animals on range would differ from those of animals in a dairy or on a feedlot. “Beef cattle account for the largest amount of CH₄ emissions, as well as the largest degree of uncertainty in the emission estimates—due mainly to the difficulty in estimating the diet characteristics for grazing members...” (Environmental Protection Agency 2024a). Guo (2022) considered two different livestock production models and found that ecological model (which is not designed on rangelands, but is closer to what would occur on rangelands than the non-ecological model) resulted in almost 4 times less total GHG emissions compared to the non-ecological model. The EPA (2024a) recognizes there is limited data available and “[e]ach year, some emission estimates in the Agriculture sector of the Inventory are recalculated and revised with improved methods and/or data. In general, recalculations are made to the U.S. greenhouse gas emission estimates either to incorporate new methodologies....”

Nationally, the EPA (2024a) found in 2022 there was 192.6 MMT CO₂e of CH₄ from enteric fermentation (137.0 MMT CO₂e for beef cattle), and 81.7 MMT CO₂e from manure management (64.7 MMT CO₂e from CH₄ (4.3 MMT CO₂e for beef cattle) and 17 MMT CO₂e from N₂O (6.4 MMT CO₂e from beef cattle)). CO₂ emissions from livestock are not estimated because annual net CO₂ emissions are assumed to be zero – the CO₂ photosynthesized by plants is returned to the atmosphere as respired CO₂ (Intergovernmental Panel on Climate Change et al. 2006).

From 1990 to 2022, emissions from enteric fermentation have increased by 5.2 percent; however, from 2021 to 2022, emissions decreased by 2 percent, largely driven by a decrease in beef cattle populations (Environmental Protection Agency 2024a). While emissions generally follow trends in cattle populations, there are exceptions across the time series (Environmental Protection Agency 2024a). These trends indicate that while emissions per head are increasing, emissions per unit of product (i.e., meat, milk) are decreasing (Environmental Protection Agency 2024a). In 2019, Oregon CO₂e. from enteric fermentation was 2.7 MMT (Environmental Protection Agency 2024a).

Generally, from 1990 to 1995 emissions from beef cattle increased and then decreased from 1996 to 2004 (Environmental Protection Agency 2024a). These trends were mainly due to fluctuations in beef cattle populations and increased digestibility of feed for feedlot cattle (Environmental Protection Agency 2024a). Beef cattle emissions generally increased from 2004

to 2007, as beef cattle populations increased, and an extensive literature review indicated a trend toward a decrease in feed digestibility for those years (Environmental Protection Agency 2024a). Beef cattle emissions decreased again from 2007 to 2014, as populations again decreased, but increased from 2015 to 2018, consistent with another increase in population over those same years (Environmental Protection Agency 2024a). Emissions and populations generally declined from 2018 to 2022, with a slight post-pandemic rebound in 2021 (Environmental Protection Agency 2024a).

Methane emission rates from cattle vary widely and depend on many variables (Johnson and Johnson 1995; DeRamus et al. 2003). Raynor and others (2024) have been working on models specific to rangeland livestock production, but no real estimates have been determined and more research is needed. Calculations in this section are based on the methodologies included within the USDA guidelines *Quantifying Greenhouse Gas Sources and Sinks in Animal Production Systems* (Leytem et al. 2024) and the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use* (Buendia et al.).⁷⁰ The calculator used for emissions calculations was designed for the BLM by April B. Leytem, Ph.D., Research Soil Chemist with the USDA-Agricultural Research Service Northwest Irrigation and Soils Research Lab and a contributing author to Volume 4: Agriculture, Forestry and Other Land Use of the 2024 IPCC Report (Leytem et al. 2024).

It is difficult to estimate livestock production emissions on BLM-managed land, as there is uncertainty in the impacts of BLM-grazing permits of livestock numbers within the BLM Burns District or at state or national levels. In general, it is assumed that when livestock grazing is not authorized on BLM-managed land, one of three assumptions, or a combination, may occur to the livestock that would have grazed on that permit:

1. Cows are kept in the area but located on non-BLM-managed land; therefore, emissions from the individuals would not contribute to BLM Burns District emissions but would still contribute to local, state, and national emissions for their productive life.
2. Cows would be relocated to a different area where forage is available either through public land or private land grazing; therefore, these individuals would not contribute to BLM Burns District emissions or local emissions but would still contribute to state emissions (either Oregon or another state) and national emissions for their productive life.
3. Cows are culled from the herd to reduce livestock numbers to a number that is sustainable using other available forage on BLM-managed land or private managed land; therefore, livestock emissions at all levels would be reduced to emissions associated with feedlots and meat production of beef cattle.

Therefore, it cannot be assumed that not permitting livestock grazing on a portion of BLM-managed land would result in local, state, or national emissions being reduced by emission estimates that may occur if grazing was authorized. Likewise, it cannot be assumed that permitting livestock grazing on BLM-managed land where livestock grazing has not been

⁷⁰ As there are multiple methods in calculating GHG Emissions, calculations using the two identified methods allow for a fuller comparison when comparing emissions to district, state, and national levels.

recently occurring would increase emissions at local, state, and national levels, as some animals that may be used to graze on the newly issued permit may already be contributing to emissions on other land.

To provide an estimated baseline of GHG emissions from livestock grazing on BLM-managed land within the BLM Burns District, and the Andrews/Steens Field Office, the BLM will use multiple estimates. In order to convert AUMs to head per year, the AUM value is divided by 12; the resulting number is Animal Unit Years (AUY), which is assumed is equivalent to head of livestock for these calculations. AUMs used for calculations are from the 2023 grazing year.

Table 3-3, shows emission calculations using the IPCC (Buendia et al.) estimate for non-dairy cattle in North America of 64 kg CH₄ per head per year (pp. 10.40). It is important to note that the IPCC (Buendia et al.) does not break this number up by class of animal (i.e. cow, calf, bull, etc.). As this number is not adjusted to include emissions from calves, and most cattle producers in BLM Burns District graze cow/calf pairs, this number is likely an underestimate.

Table 3-4 shows emissions estimates using the EPA values from the Inventory of US Greenhouse Gas Emissions and Sinks 1990-2022, Annex A Table A-144 (2024a), of 111 kg CH₄ per head per year.⁷¹

In both tables, kg CO₂e per year are calculated, using both the 100-year global warming potential (GWP) of 27 and the 20-year GWP of 79.7 (Intergovernmental Panel on Climate Change 2021: 1017). Using the GWP 100, the total calculated emissions are also estimated as a percentage of total livestock production emissions from both Oregon and nationally.

**Table 3-4: IPCC (2021) Estimates of Enteric Fermentation Emissions
from Livestock Production for BLM Burns District**

AREA	BLM BURNS DISTRICT	AMU	STEENS CMPA
Auth. AUMs	157,079	57,189	16,585
Animal Unit Years (AUY; Head/Year)	13,090	4,766	1,382
Total kg CH ₄	837,755	305,008	88,453
GWP100 Total kg CO ₂ e	22,619,376	8,235,216	2,388,240
GWP100 Total MT CO ₂ e	22,619	8,235	2,388
GWP100 Total MMT CO ₂ e	0.0226	0.0082	0.0024
% of Oregon Enteric Fermentation Emissions from all Livestock	0.823%	0.299%	0.087%
% of National Enteric Fermentation Emissions from all Livestock	0.012%	0.004%	0.001%
% of National Enteric Fermentation Emissions from Beef	0.017%	0.006%	0.002%
GWP20 Total kg CO ₂ e	66,769,047	24,309,138	7,049,731
GWP20 Total MT CO ₂ e	66,769	24,309	7,050

⁷¹ EPA (2024a) breaks estimates down by animal class. For this calculation, we are assuming all AUMs are cow (100 kg CH₄ per head per year) and calf (kg CH₄ per head per year) pairs, for a total of 111 kg CH₄ per head per year. As all other classes of livestock grazing BLM-managed land have lower emissions, these calculations are expected to provide the maximum emissions, and are probably overestimates of emissions.

**Table 3-5: EPA (2024) Estimates of Enteric Fermentation Emissions
from Livestock Production for BLM Burns District**

AREA	BLM BURNS DISTRICT	AMU	STEENS CMPA
Auth. AUMs	157,079	57,189	16,585
Animal Unit Years (AUY; Head/Year)	13,090	4,766	1,382
Total kg CH ₄	1,452,981	528,998	153,411
GWP100 Total kg CO ₂ e	39,230,480	14,282,953	4,142,104
GWP100 Total MT CO ₂ e	39,230	14,283	4,142
GWP100 Total MMT CO ₂ e	0.0392	0.0143	0.0041
% of Oregon Enteric Fermentation Emissions from all Livestock	1.427%	0.519%	0.151%
% of National Enteric Fermentation Emissions from all Livestock	0.020%	0.007%	0.002%
% of National Enteric Fermentation Emissions from Beef	0.029%	0.010%	0.003%
GWP20 Total kg CO ₂ e	115,802,566	42,161,161	12,226,877
GWP20 Total MT CO ₂ e	115,803	42,161	12,227

For easier comparison of alternatives, these numbers are also converted into kg CO₂e per AUM (total kg CO₂e / authorized AUMs). These calculations found that using IPCC (2021) estimates, GWP100 results in 144 kg CO₂e per AUM, while GWP20 results in 425.07 kg CO₂e per AUM, and using the EPA (2024a) estimates, GWP100 results in 250 kg CO₂e per AUM, which GWP20 results in 737.23 kg CO₂e per AUM.

For reference, the EPA has estimated that a “typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year” (2024 Aug 23). Using the estimate of emissions from Table 3-3, the BLM Burns District emissions from livestock grazing would be the equivalent of 4,917 “typical passenger vehicle[s]” per year. Within the AMU, it would be an equivalent of emissions from a 1,790 “typical passenger vehicle[s]” per year, and within the Steens CMPA it would be an equivalent of emissions from 519 “typical passenger vehicle[s]” per year.

Using the estimate of emissions from Table 3-4, the BLM Burns District emissions from livestock grazing would be the equivalent of 8,528 “typical passenger vehicle[s]” per year. Within the AMU, it would be an equivalent of emissions from a 3,105 “typical passenger vehicle[s]” per year, and within the Steens CMPA it would be an equivalent of emissions from 900 “typical passenger vehicle[s]” per year.

Using the largest estimate as seen in Table 3-4 (to overestimate rather than underestimate emissions), emissions from livestock production on BLM-managed land within the BLM Burns District represents only a small portion of Oregon (1.172 percent) and National (0.014 percent) livestock production emissions.

While livestock grazing constitutes the second largest contributor to GHG emissions in the BCA via CH₄, the largest contributor of GHG emissions in the BCA is wildfire. Wildfires in the BCA contribute more GHG emissions (CO₂e) than all other inputs combined by an overwhelming margin and, at the same time, have a compounding effect of reducing the carbon sequestration potential of the BCA through the loss of vegetation. Rau and others (2011) estimated that combustion of trees during fire may release up to 70 percent of the organic carbon stored in the above-ground biomass to the atmosphere. One study of a dry Ponderosa pine forest estimated

above-ground carbon emissions from a 41,000-hectare wildfire in central Oregon averaged 2.55 kilograms per square meter. To put these emissions in perspective, this estimate represented about 2.5 percent of Oregon's total emissions from fossil fuels and industrial processes for that year (Meigs et al. 2009). Most of the carbon (75–90 percent) is stored in soils and organic matter below ground; removal of vegetation through wildfire can accelerate rates of carbon loss from soils (Schuman et al. 2002; D'Amore and Kane 2016). This cycle can be exacerbated by subsequent soil loss through erosion (D'Amore and Kane 2016).

In some cases, carbon emission estimates from the subsequent decomposition of trees killed in wildfires exceeded the amount emitted from the fire itself (Irvine et al. 2007; Díaz et al. 2009). Several studies have also concluded that carbon release from forests under wildfire conditions is much greater than carbon release under prescribed fire conditions (Hurteau and North 2009; Meigs et al. 2009; Wiedinmyer and Hurteau 2010). Many studies have indicated that climate change will intensify wildfire risk, particularly in the summer, extending the fire season from spring to winter (An et al. 2015). The frequency, intensity, and scale of wildfires has increased in such environments due in large part to the effects of climate change; this trend will continue and intensify in the future if projections of warmer and drier conditions prevail.

Data and research to develop and provide accurate information on biomass and resulting GHG emissions caused by wildfire are limited. The BLM models general information for specific areas—and to a limited extent for specific fire incidents—on vegetation associated with discrete events. These numbers wholly depend on atmospheric conditions, existing vegetation, burn periods, fuel moisture, etc. of a prescribed fire or wildfire event. Evidence suggests that healthy ecosystems are more resilient and resistant to the effects of climate change, thereby acting as a barrier against the propagation and encroachment of invasive species (West et al. 2009).

In 2023, Ratcliff and others (2023) found that even “[t]aking into account the GHGs emitted by cattle grazing as well as the GHGs emitted by wildfires reveals that grazing tends to reduce the amount of CO₂e emitted from wildfires in grazed grasslands” on California rangelands. However, they also found that “over time, the degree to which grazing will contribute to or offset GHG emissions from wildfire in an area is a factor of fire return intervals, total forage production, and the total consumption of forage by cattle” (Ratcliff et al. 2023). This shows how complicated GHG emissions can be once you consider indirect effects. It is also important to point out that livestock grazing of rangelands “does not alter the order of the magnitude of CO₂e emissions from the beef industry in California; however, it demonstrates that fuel management by livestock can, to a minor degree, mitigate greenhouse gas and particulate emissions from grasslands that burn in wildfires” (Ratcliff et al. 2023).

Carbon sequestration is another important topic on rangelands as rangelands can capture and store atmospheric CO₂ in soil, plants, and water (Silveira et al. 2024). According to the NRCS, rangelands are predominantly native grasses, forbs and shrubs, and cover approximately 30 percent of the United States, with a large portion of that found in the western US (U.S. Department of Agriculture, Natural Resources Conservation Service 2024a). Current research regarding carbon sequestration at the national level is consistent with trends and effects seen in Oregon. Nationally, undeveloped land uses (for example rangelands) and forestry (i.e., “managed

forests”) contribute to GHG emissions. Undeveloped lands typically are considered carbon sinks (absorbing more carbon from the atmosphere than it emits). Due to the large extent of rangelands, these ecosystems can have a large impact on GHGs through carbon sequestration (Abberton et al. 2010).

Rangeland plants capture CO₂ in the process of photosynthesis, losing some through respiration (biogenic carbon emissions) and the rest is stored, or sequestered, in biomass (both living and dead). Fluxes in carbon storage often depend on annual precipitation with wet years showing increased carbon sequestration (due to increased vegetative production) and dry years showing a loss in carbon sequestration (due to respiration exceeding photosynthesis); in average years, healthy rangelands tend to be carbon neutral (photosynthesis is roughly equal to respiration) (Gilmanov et al. 2006; Svejcar et al. 2008; Ahlström et al. 2015; Maxwell and Germino 2022).

Both vegetation and soils serve as major carbon sinks and interact as part of the carbon/nitrogen cycle (Silveira et al. 2012). While between 75–90 percent of carbon is stored in soils and below ground vegetation, research assessing carbon sequestration by above ground vegetation (biomass) is more prevalent and is used in this analysis to develop associations between management actions impacting carbon sequestration. The type of vegetation can have an impact on carbon storage. Research has found that juniper woodlands store more carbon than healthy sagebrush steppe, which stores more than degraded sagebrush steppe (Cleary et al. 2010; Rau, Johnson, Blank, Tausch, et al. 2011; Throop and Lajtha 2018; Nagy et al. 2021; Maxwell and Germino 2022). Fires also influence carbon dynamics through direct loss of biomass, indirect loss from smoke, post-fire erosion, and increased potential for conversion to an undesirable plant state, such as one dominated by invasive annual grasses (Cleary et al. 2010; Rau, Johnson, Blank, Tausch, et al. 2011; Lohse et al. 2022).

Estimates of vegetation biomass/fuel loading vary widely. For example, estimates of median biomass fuel loading in sagebrush/grass communities in the west varied from 0.75 to 40.9 tons per acre (Sikkink et al. 2009). Other research estimates that shrub and grass-covered rangelands sequester an estimated 198 metric tons of carbon dioxide equivalents (Fynn et al. 2009); however, long-term above-ground carbon sequestration may not be possible in arid, fire-prone systems (Hurteau and North 2009; Rau et al. 2010). Improper livestock grazing can also reduce carbon sequestration through soil degradation and the removal of vegetation, though proper grazing can improve carbon sequestration through improvement of ecological processes (see Grazing Management and Vegetation sections).

Rangeland ecosystems are complex in the BCA. Elevation differences (varying from a low of approximately 4,200 feet above sea level to over 7,200), precipitation (from less than 7” to over 25”, annually), aspect, soil function, existing and historic vegetation communities, disturbance, and past restoration activities all affect the ecology of an area and, therefore, carbon storage. The vegetative communities and the conditions that affect them vary across the planning area (e.g., age, topography and aspect, geomorphology, climate, etc.); each community would also vary by its associated biomass and carbon storage potential. The condition, function, and composition of vegetation in an area influences its ability to sequester carbon. Variation in vegetation communities, which can be modified by management actions, can lead to changes in soil carbon

sequestration and possibly GHG emissions, particularly prior to and during wildfires (Fynn et al. 2009). A growing concern in forest and rangeland ecosystems is the effects of altered vegetation composition and fire regimes on both carbon and nitrogen balances. Healthy ecosystems are more effective in sequestering carbon and are more resistant to invasive species and disease and, therefore, are more able to withstand the effects of climate change. There are long-term carbon sequestration benefits of maintaining high levels of ecosystem function, resistance, and resilience. The variability of ecosystem conditions and function is directly related to how the actions impact—and are impacted by—climate.

Changes in vegetative composition (through natural processes or restoration/rehabilitation actions) impact both the ability of the community to sequester carbon and the release of GHGs during wildfire. Undesirable species, such as invasive annual grasses, may alter carbon storage and dynamics by invading open niches in plant communities or by displacing native species by virtue of greater competitive or reproductive ability, particularly after disturbance. Invasive species also alter ecosystem processes (e.g., hydrology and geomorphology, nutrient cycling, and primary production and decomposition) (Baseline and Projected Future Carbon Storage and Carbon Fluxes in Ecosystems of Hawai‘i 2017). “These latter two processes represent the most direct determinants of carbon storage and cycling in ecosystems” (Baseline and Projected Future Carbon Storage and Carbon Fluxes in Ecosystems of Hawai‘i 2017). Vegetation communities dominated by, or converted to, monocultures of invasive annual grasses are estimated to sequester carbon at 50 percent of the rate of properly functioning vegetation communities (Austreng 2012). As noted in the Vegetation section, there are areas in the BCA that are at risk to conversion to invasive annual grasses due to the presence of invasive annual grasses.

Another factor in evaluating carbon sequestration and how the alternatives may impact the climate is the resistance and resilience of an area. Plant species found at higher elevations in the BCA are far more resilient than those found at lower elevations; more resilient plant communities at all elevations across the BCA are capable of sequestering higher levels of carbon than less resilient (or degraded) communities (Chambers et al. 2014). More resilient vegetation communities are also typically less susceptible to the effects of climate change. Conversely, vegetation communities found at mid- and lower elevations—often possessing lower levels of resistance and resilience—are more vulnerable to the effects of climate change and are expected to sequester lower levels of carbon.

Although there is limited information on how to convert the contribution of the current vegetative biomass in the BCA to carbon sequestration; the U.S. Forest Service’s Science Framework (2019) describes the contribution of sagebrush ecosystems to carbon sequestration. “Actions taken to maintain or enhance the resilience of sagebrush ecosystems to disturbance have implications for greenhouse gas emissions and carbon storage. Semiarid ecosystems strongly influence the trend and interannual variability in the global carbon balance, in part due to widespread woody species expansion and high interannual variability in temperature and precipitation (Ahlström et al. 2015)”. Actions that prevent invasive annual grass infestation or stop the spread of these species and increase resilience and resistance of the site enhance carbon storage, reducing GHGs emissions at all scales (Bradley et al. 2006; Rau, Johnson, Blank, Lucchesi, et al. 2011; Germino et al. 2016). In sagebrush ecosystems most carbon is stored

below ground in the roots (Rau, Johnson, Blank, Lucchesi, et al. 2011). Conversion of native sagebrush ecosystems to annual grassland converts areas that store large amounts of GHG to one that becomes a GHG source, as aboveground biomass and belowground carbon storage can both decrease (Bradley et al. 2006; Rau, Johnson, Blank, Lucchesi, et al. 2011; Germino et al. 2016).

Juniper and piñon expansion and infill in sagebrush ecosystems increase aboveground carbon storage many-fold due to the large increase in biomass, but the impacts belowground are not well understood (Rau, Johnson, Blank, Tausch, et al. 2011; Rau et al. 2012). Once aboveground tree cover equals 50 percent, resilience to disturbance and resistance to invasive annual grasses drop, and the site may become susceptible to invasive annual grasses after fire (Rau et al. 2012) or other stand-replacing disturbances. The tree cover at which this reduction occurs may be lower on less productive sites. Further, juniper and piñon expansion and infill reduce total soil nitrogen, which has long-term adverse implications for carbon storage in deep soil, where the carbon pool is very stable (Rau et al. 2012). Juniper and piñon expansion and infill can lengthen fire return intervals but greatly increase the biomass consumed during fire in comparison to sagebrush dominated ecosystems. Consequently, the science is unclear as to the long-term tradeoffs in potential greenhouse gas emissions.

Even though the increase in biomass from tree cover would seem more consistent with increasing carbon storage, over the longer term it may be less sustainable than maintaining or restoring sites to sagebrush ecosystems. Short-term greenhouse gas emissions and reductions in carbon storage from projects intended or designed to reduce juniper and piñon expansion and restore sage-grouse habitat are acceptable tradeoffs (Council on Environmental Quality 2016). Management objectives to increase carbon storage that are consistent with maintaining habitat and key ecosystem functions will be most beneficial in the long term. The amount of carbon in rangeland biomass varies from between 35 to 65 percent of the dry weight; 50 percent is often taken as a default value. Carbon sequestration is roughly equivalent to the dry mass of the vegetation type, or 50 percent of the biomass (Fynn et al. 2009).

The extent to which the BLM is effective in impacting climate change through management actions that maintain or increase carbon sequestration is, in part, affected by the acres treated and the effectiveness of the treatments. Other than livestock grazing, no vegetation treatments are considered within the BCA as most treatments can occur under previous NEPA as described in the cumulative effects sections, and the DNAs for restoration (Bureau of Land Management 2023c; Bureau of Land Management 2024a) and associated NEPA documents including the North Steens Ecosystem Restoration Project EIS and ROD (Bureau of Land Management 2007d; Bureau of Land Management 2007e) and the 2006 South End Complex Emergency Stabilization Plan Environmental Assessment (Bureau of Land Management 2006a).

Livestock grazing can affect rangeland carbon levels, through changes in plant community and changes in ecosystem processes, but the effects have been variable and inconsistent among the ecosystems studied (Schuman et al. 2009; Stanley et al. 2018). Some studies have found that grazing can result in increased carbon storage compared to no grazing, because of increased plant turnover and changes in plant species composition (Follett et al. 2001). Many changes in rangeland carbon from different grazing practices do not result in substantial changes in total

ecosystem carbon, but are redistributions of carbon, for example, from aboveground vegetation to root biomass (Derner and Schuman 2007). Overall, changes in rangeland carbon storage, as a result of changes in grazing practices, are expected to be small and difficult to predict, especially where ecosystems are already functioning, and vegetative communities are at or near reference condition.

The BLM has completed two regional EISs that summarized the science regarding climatic trends, predictive modelling study results, and sources of uncertainty in the Pacific Northwest (2010 Vegetation Treatments Using Herbicides on BLM Lands in Oregon EIS (Bureau of Land Management 2010: 169–174) and 2015 Oregon Greater Sage-grouse Final EIS (Bureau of Land Management 2015e: 3–159 to 3–164). These analyses are hereby incorporated by reference in their entirety.

3.4.2 CCE Environmental Consequences

Under all alternatives, the small number of proposed developments (fence removal, fence construction, corrals, pipeline, and troughs) would result in immeasurable impacts to GHG emissions and would not result in large enough differences between alternatives to be useful in the decision-making process. Therefore, GHG emission estimates from developments proposed under alternatives will not be calculated.

3.4.2.1 CCE Issue 1: What would the emissions from proposed livestock grazing be annually and for the entire 10-year permit period?

On April 11, 2024, the EPA published the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022(2024a). In Annex 3, Part B, the EPA calculated a more detailed Tier 2 emission factor for enteric fermentation from cattle in the United States by region. The emission factors for Oregon are found on pages A-295-296, Table A-144, and are 100 kilograms/head/year of CH₄ for beef cows and 11 kilogram/head/year of CH₄ for beef calves. However, the BLM will use the ARS calculator to determine emissions for each alternative.

While this analysis provides estimates on GHG emissions under the proposed alternatives, the BLM recognizes that there is uncertainty in how this would impact the overall emissions, as it would be impacted by variables that cannot be determined at this time, as described above under the affected environment.

- The BLM does not speculate on the percentage of livestock that could be relocated to other non-BLM administered areas, if no grazing is authorized within the BCA. The BLM recognizes that, if a permitted area on public land were made unavailable to grazing, a permittee may reduce the size of his/her herd, find forage on/near their base property, or shift to other available locations within or outside of the planning area.
- The below calculations are for only the AUMs permitted by the BLM, and do not include any AUMs available on private land.

- Calculations are based on year 1 of the general grazing rotation for Alternatives 1, 2, and 4. As Alternative 3 and FFRs do not have a general grazing rotation, calculations are based on the grazing permit.
- As AUMs are calculated based on number of head, season of use, and percent public land, calculations can result in partial AUMs (for example 122.4 AUMs). For these calculations, AUMs are always rounded up to the next whole number resulting in a slight overestimate of total GHG emissions.
- It is assumed that when pastures are rested, the associated AUMs are absorbed by the remainder of the allotment that is being grazed. For these calculations, the AUMs assigned to the rested pastures are divided by the number of grazing treatments (i.e. early, graze, defer), and then that amount is added to each of the grazing treatments. When determining values for the calculations, numbers are adjusted slightly to get as close to permitted AUMs as possible.

The below estimates of GHG emissions from livestock are higher than the IPCC (2021) estimate of 64 kg CO₂e per head per year. However, this is expected as a large portion of GHG emissions are modelled from studies in feedlot settings. Capper (2012) and Klopatek and others (2022) both found that compared to feedlot systems, pasture-based beef systems resulted in emissions 167 percent and 174 percent higher, respectively. This is due to the fact that the amount of digestible energy is much higher in diets with a high grain component compared to grass-based diets. However, these numbers do not account for how much carbon storage offsets emissions on rangelands and pastures compared to feedlots, which do not provide carbon storage offsets.

The conversion of emissions to carbon dioxide equivalents (CO₂e) is made using guidance from the IPCC 6th Assessment (2021).⁷² The inputs required for calculations are:

- *Location* - The location of the rangeland being grazed.
- *Number of Animals* – Number of cows grazing the location.
- *Days Grazing at Location* – Number of days the cattle are in the location.
- *Animal Class* – Type of animals being grazed: Cows, steers, heifers, or bulls.
- *Body Weight (BW)* – Default body weights are based on animal class.
- *Lactation* – If cows are lactating or dry.
- *Forage Quality* – Provide input as to the quality of the forage on rangeland.
- *Forage %* – The forage content of the diet cattle are fed.
- *Forage Crude Protein (CP) %* – Enter the crude protein of the forage being grazed (typically between 5-10 percent).

⁷² The IPCC 6th Assessment (2021) identifies a 100-year global warming potential of 29.8 for methane of fossil origin, 27.2 for methane of non-fossil origin, and 273 for N₂O.

For the purpose of calculations, the following inputs and assumptions have been made:

- *Location* – BCA. Specifically, the Hammond, Mud Creek, Hardie Summer, and Hammond FFR Allotments for Alternatives 1, 2, and 4. Alternative 3 would also include the Hardie Summer FFR.
- *Number of Animals* – Number of animals is determined through the general grazing rotation, and specific pasture's carrying capacity as it relates to total authorized AUMs within the allotment and the general grazing rotation. Under Alternatives 2, the proposed grazing authorization mandatory terms and conditions show a 365-day season of use. However, grazing yearlong is not the proposed grazing management under any alternative for any pasture. Therefore, assumptions for calculations are based on anticipated seasons of use, following the proposed grazing management rotations for each allotment, under each alternative. The exception for this is Alternative 3, which does not have a general grazing rotation. Under Alternative 3, the number of animals will be based on the grazing authorization. Calculations will assume no livestock loss.
- *Days Grazing at Location* – This number is based on the general grazing rotation and grazing treatments, which provide a general idea of the number of days grazing would likely occur within each allotment. The exception for this is Alternative 3, which does not have a general grazing rotation. Under Alternative 3, the days grazing at location will be based on the grazing authorization.
- *Animal Class* – Typically operators within Harney County turn out cow/calf pairs (a cow with a calf less than 6 months old). However, at certain times of year, it may be just cows (after weaning and before calving) that are turned out. For these calculations, we will run a calculation under the assumption that the operator would calve in the spring (typical of Harney County). When an animal calves would be considered in determining what animal class would be expected to be present. Bulls may also be turned out during the breeding season and will have their own line in the calculation. The number of bulls used for the calculation would be 1 bull for every 20 cows,⁷³ and assumes bulls remain with the herd all year. Calculations will assume all cows have a calf with them and there is no calf loss. This is expected to be an overestimate as there is typically 3-10 percent calf loss (Bohnert 2023). As calves rely on the cows' milk for the majority of their diet for the first 100 days, only calves predicted to be over 100 days at the time of grazing are included.
- *Body Weight* – This number is set within the emissions calculator based on animal's class. These weights range from 215 kg for a calf less than one year old, and 821 kg for a bull.⁷⁴

⁷³ This ratio of bulls to cows was provided by David Bohnert, Director and Professor, Eastern Oregon Agricultural Research Center – Burns and Union Stations, Oregon State University (Bohnert 2023).

⁷⁴ 43 CFR 4100.0-5 Definition: Animal unit month (AUM) means the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month. The Society for Range Management further defines an animal unit as the forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old as consuming 26 pounds of air-dry forage per day or 790 pounds per month (Bedell 1998). However, these calculations are based on specific animal weights for the animal class in order to get a better estimate for GHG emissions.

- *Lactation* – This would be determined based on when calving would occur. The options are either lactating or dry (not lactating). Lactation would be assumed to occur March 1 through October 15 (Bohnert 2023).
- *Forage Quality* – Forage quality would change throughout the year and would correspond to general grazing treatments expected to occur under each alternative. Cook and Harris (1968) found that crested wheatgrass had a total digestible nutrient (TDN) of approximately 69 percent early in the year, dropping to 50 percent TDN when the grasses were dormant. As they found that crested wheatgrass had the highest TDN, forage quality is based on these numbers (Cook and Harris 1968). Therefore, during the early and graze treatments, the forage quality will be considered medium, with the defer and winter treatments providing low quality forage.

Table 3-6: Forage Quality Levels Used in GHG Emissions Calculations

FORAGE QUALITY	TOTAL DIGESTIBLE NUTRIENTS (TDN) (%)	EXAMPLE FORAGES
Low	<52	Dry winter forage, mature legume and grass hay, straw
Medium	52-59	Dry summer pasture, dry pasture during the fall, late-bloom legume hay, boot stage and early bloom grass hay
High	>59	Mid-bloom, early bloom, pre-bloom legume hay; pre-boot stage grass hay; lush, growing pasture; silages

- *Forage %* – The input for forage quality would be set to >75 percent forage, which is a typical situation where there is little supplementation of rangeland with other feed/forages.
- *Forage Crude Protein %* – 10 percent CP is used when forage quality is medium, and 7.5 percent CP is used when forage quality is low. Crude protein is higher in the spring when grasses are growing and then typically levels out at their lowest point around October. Forage crude protein for native species within the BCA is expected to range from approximately 20 percent (spring) to 2 percent (fall), with different species providing different amounts of crude protein (Ganskopp and Bohnert 2001). Crude protein on crested wheatgrass ranges from 28 percent (spring) to 3 percent (fall) (Angell et al. 1990).
- *Forage Dry Matter Intake (DMI)* – DMI is based on cattle body weight estimates, forage quality, and whether or not cows are lactating or dry. Table 3-4 provides the percentages used. When these percentages are applied to body weight as appropriate, the resulting DMI is in weight of forage per day per animal.

Table 3-7: Dry Matter Intake as a Percentage of Body Weight

FORAGE QUALITY	FORAGE DMI AS a OF BW	
	DRY	LACTATING
Low	1.8	2.2
Medium	2.2	2.5
High	2.5	2.7

- *Methane yield (MY)* (Calculated as MY g CH₄/ kg DMI) is the amount of enteric CH₄ generated per unit of DMI, considering the composition of the diet (Table 3-5).

Table 3-8: Methane Yield Estimate Based on Diet Composition

FORAGE %	FEED QUALITY (%) DIGESTIBLE ENERGY (DE)	MY G CH ₄ /KG DMI
>75% Forage	DE < 62	23.3
Rations of > 75% high quality forage and/or mixed rations, forage of between 15 and 75% the total ration mixed with grain, and/or silage	DE 62-71	21.0

- *Enteric CH₄ (kg CH₄ per year)* - The total enteric CH₄ for all the cows across all days that they are grazing within one year.
- *Total volatile solids (VS) excreted (kg)* - The total amount of volatile solids excreted for all the cows across all days grazing on that section. The value of 7.6 kg VS/1000 kg BW is used (Intergovernmental Panel on Climate Change 2019b).
- *Methane from manure (kg/year)* is the CH₄ generated from the manure deposited on the rangeland over the time period cattle are grazing and is calculated as follows:

$$\text{CH}_4 \text{ emissions} = \text{VS} * \text{B}_0 * 0.67 * \text{MCF}$$

Where the VS are the total VS excreted (kg) by the cattle across all days grazing, B₀ is the maximum CH₄ potential of that manure (0.17 m³ CH₄/kg VS) (Leytem et al. 2024), 0.67 is a conversion factor of m³ CH₄ to kg CH₄ and the MCF is the CH₄ conversion factor (0.0047) (Leytem et al. 2024).
- *Nitrogen intake (kg N)* is the amount of nitrogen consumed by all the cattle across all days of grazing calculated as: Total DMI * CP (%) / 6.25. Typically, crude protein ranges from 5 to 10 percent.
- *Nitrogen excretion (kg N)* is calculated using the equation by Waldrip and others (2013), which is dependent on N intake.
- *Direct N₂O emissions (kg/yr)* are the emissions from the deposition of manure on rangeland calculated as the nitrogen excreted times an emission factor (0.002) (Intergovernmental Panel on Climate Change 2019b) and converted from N to N₂O (multiply by 44/28).
- *Indirect N₂O emissions (kg/yr)* are the emissions resulting from emissions of ammonia, nitrogen, and redeposition back into the landscape calculated as: Total amount of N excreted * emission factor for ammonia (0.21) * emission factor for N₂O (0.01) and converted from N to N₂O (multiply by 44/28) (Intergovernmental Panel on Climate Change 2019b).

1830 While manure management CH₄ and direct and indirect N₂O emissions are calculated, as the
 1831 emissions are such a small contributor to the total, those values are only included in the total
 1832 emissions values data, and not shown individually.

1833
 1834 *3.4.2.1.1 CCEI Alternative 1*

1835
 1836 Table 3-9 shows inputs and assumptions for Alternative 1, by allotment, using inputs and
 1837 assumptions defined above, and assumes spring calving, which is what is most common in
 1838 Harney County.

1839
 1840 **Table 3-9: Emission Calculation Assumptions**

ALLOT.	# OF HEAD	DAYS	ANIMAL CLASS	BODY WEIGHT (KG)	GRAZING TREAT.	LACTATING	FORAGE TYPE /QUALITY	CRUDE PROTEIN
Hammond	80	61	Cows	544	Early	Yes	Medium	10
Hammond	5	61	Bulls	821	Early	No	Medium	10
Hammond	128	68	Cows	544	Graze	Yes	Medium	10
Hammond	128	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hammond	7	68	Bulls	821	Graze	No	Medium	10
Mud Creek	252	68	Cows	544	Graze	Yes	Medium	10
Mud Creek	252	68	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Mud Creek	12	68	Bulls	821	Graze	No	Medium	10
Hardie Summer	104	100	Cows	544	Graze	Yes	Medium	10
Hardie Summer	104	100	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hardie Summer	5	100	Bulls	821	Graze	No	Medium	10
Hardie Summer	21	68	Cows	544	Defer	Yes	Low	7.5
Hardie Summer	21	68	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hardie Summer	1	68	Bulls	821	Defer	No	Low	7.5
Hammond FFR	31	30	Cows	544	Early	Yes	Medium	10
Hammond FFR	31	30	Calves >100 days < 1 yr	215	Early	No	Medium	10
Hammond FFR	1	30	Bulls	821	Early	No	Medium	10

1841
 1842 Enteric emission estimates for Alternative 1 are shown in Table 3-10.

1843
 1844 **Table 3-10: Alternative 1 Enteric Methane Emission Estimates from Livestock**

	Enteric methane kg CH ₄ per yr	Enteric methane kg CH ₄ / head (or pair) / year	Enteric methane kg CH ₄ / AUM
Totals kg	18,316.63	146.34	12.19
Total kg CO₂e AR6 - 100 Yr	494,548.96	3,951.12	329.26
Total CO₂e MMT AR6-100 Yr	0.0004945	0.0000040	0.0000003
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.01798%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.00026%		
% of Annual National Enteric Fermentation Emissions from Beef	0.00036%		
Total kg CO₂e AR6 - 20 Yr (non-fossil)	1,459,835.27	11,663.13	971.93
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.001460	0.0000117	0.00000097
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.05308%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.000758%		
% of Annual National Enteric Fermentation Emissions from Beef	0.001066%		

1845 Total emissions estimates for Alternative 1 are shown in Table 3-11.

1846

1847

Table 3-11: Alternative 1 Total Emission Estimates from Livestock

	TOTAL	PER HEAD	PER AUM	PER 10-YEAR PERMIT
Total kg CO₂e AR6 - 100 Yr	2,953,813.03	23,599.04	1,966.59	29,538,130.26
Total CO₂e MMT AR6-100 Yr	0.00295381	0.00003137	0.00000197	0.02953813
Total kg CO₂e AR6 - 20 Yr (non-fossil)	3,926,718.66	31,371.92	2,614.33	39,267,186.65
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.00392672	0.00003137	0.00000261	0.03926719

1848

1849 Emissions from livestock grazing in the BCA under Alternative 1 would represent 0.0015
 1850 percent of the annual U.S. CO₂ equivalent emissions from enteric fermentation for all livestock,
 1851 and 0.1075 percent of the annual Oregon CO₂ equivalent emissions from enteric fermentation for
 1852 all livestock.

1853

1854 3.4.2.1.2 CCEI Alternative 2

1855

1856 Table 3-12 shows inputs and assumptions for Alternative 2, by allotment, using inputs and
 1857 assumptions defined above, and assumes spring calving, which is what is most common in
 1858 Harney County.

1859

1860

Table 3-12: Emission Calculation Assumptions

ALLOT.	# OF HEAD	DAYS	ANIMAL CLASS	BODY WEIGHT (KG)	GRAZING TREAT.	LACTATING	FORAGE TYPE /QUAL	CRUDE PROTEIN
Hammond	160	61	Cows	544	Early	Yes	Medium	10
Hammond	8	61	Bulls	821	Early	No	Medium	10
Hammond	176	68	Cows	544	Graze	Yes	Medium	10
Hammond	176	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hammond	9	68	Bulls	821	Graze	No	Medium	10
Hammond	253	100	Cows	544	Defer	Yes	Low	7.5
Hammond	253	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hammond	13	100	Bulls	821	Defer	No	Low	7.5
Mud Creek	158	68	Cows	544	Graze	Yes	Medium	10
Mud Creek	158	68	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Mud Creek	8	68	Bulls	821	Graze	No	Medium	10
Mud Creek	64	100	Cows	544	Defer	Yes	Low	7.5
Mud Creek	64	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Mud Creek	3	100	Bulls	821	Defer	No	Low	7.5
Hardie Summer	36	68	Cows	544	Graze	Yes	Medium	10
Hardie Summer	36	68	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hardie Summer	2	68	Bulls	821	Graze	No	Medium	10
Hardie Summer	81	100	Cows	544	Defer	Yes	Low	7.5
Hardie Summer	81	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hardie Summer	4	100	Bulls	821	Defer	No	Low	7.5
Hammond FFR	2	61	Cows	544	Early	Yes	Medium	10
Hammond FFR	2	61	Calves >100 days < 1 yr	215	Early	No	Medium	10
Hammond FFR	1	61	Bulls	821	Early	No	Medium	10
Hammond FFR	2	68	Cows	544	Graze	Yes	Medium	10
Hammond FFR	2	68	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hammond FFR	1	68	Bulls	821	Graze	No	Medium	10
Hammond FFR	1	100	Cows	544	Defer	Yes	Low	7.5
Hammond FFR	1	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hammond FFR	1	100	Bulls	821	Defer	No	Low	7.5
Hammond FFR	2	136	Cows	544	Winter	No	Low	7.5
Hammond FFR	2	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hammond FFR	1	136	Bulls	821	Winter	No	Low	7.5

Enteric emission estimates for Alternative 2 are shown in Table 3-13.

Table 3-13: Alternative 2 Enteric Methane Emission Estimates from Livestock

	Enteric methane kg CH ₄ per yr	Enteric methane kg CH ₄ / head (or pair) / year	Enteric methane kg CH ₄ / AUM
Totals kg	29,576.03	120.39	10.03
Total kg CO₂e AR6 - 100 Yr	798,552.77	3,250.55	270.88
Total CO₂e MMT AR6-100 Yr	0.0007986	0.0000033	0.0000003
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.02904%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.00041%		
% of Annual National Enteric Fermentation Emissions from Beef	0.00058%		
Total kg CO₂e AR6 - 20 Yr (non-fossil)	2,357,209.48	9,595.15	799.60
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.002357	0.0000096	0.00000080
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.08572%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.001224%		
% of Annual National Enteric Fermentation Emissions from Beef	0.001721%		

Total emissions estimates for Alternative 2 are shown in Table 3-14.

Table 3-14: Alternative 2 Total Emission Estimates from Livestock

	TOTAL	PER HEAD	PER AUM	PER 10-YEAR GRAZING PERMIT
Total kg CO₂e AR6 - 100 Yr	4,323,082.84	17,597.35	1,466.45	43,230,828.43
Total CO₂e MMT AR6-100 Yr	0.00432308	0.00002400	0.00000147	0.04323083
Total kg CO₂e AR6 - 20 Yr (non-fossil)	5,895,256.29	23,996.97	1,999.75	58,952,562.94
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.00589526	0.00002400	0.00000200	0.05895256

Under Alternative 2, NR AUMs may also be authorized; however, the number of AUMs (which is calculated using the number of animals and days grazing), would vary depending upon annual production and the amount of residual forage. When NR AUMs are utilized, emissions would be higher than calculated, but would not be expected to add more than 50 percent of the calculated emissions as NR grazing would be limited to no more than half of the pastures in a given allotment per year.

Emissions from livestock grazing in the BCA under Alternative 2 would represent 0.0022 percent of the annual U.S. CO₂ equivalent emissions from enteric fermentation for all livestock, and 0.1572 percent of the annual Oregon CO₂ equivalent emissions from enteric fermentation for all livestock. This is slightly more than would occur under Alternative 1, but less than what would be expected under Alternative 3, even when NR AUMs are considered.

1881 3.4.2.1.3 CCEI Alternative 3

1882

1883 Table 3-15 shows inputs and assumptions for Alternative 3, by allotment, using inputs and
 1884 assumptions defined above, and assumes spring calving, which is what is most common in
 1885 Harney County.

1886

1887

Table 3-15: Emission Calculation Assumptions

ALLOT.	# OF HEAD	DAYS	ANIMAL CLASS	BODY WEIGHT (KG)	GRAZING TREAT.	LACTATING	FORAGE TYPE /QUALITY	CRUDE PROTEIN
Hammond	214	61	Cows	544	Early	Yes	Medium	10
Hammond	11	61	Bulls	821	Early	No	Medium	10
Hammond	214	68	Cows	544	Graze	Yes	Medium	10
Hammond	214	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hammond	11	68	Bulls	821	Graze	No	Medium	10
Hammond	214	100	Cows	544	Defer	Yes	Low	7.5
Hammond	214	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hammond	11	100	Bulls	821	Defer	No	Low	7.5
Hammond	214	136	Cows	544	Winter	No	Low	7.5
Hammond	214	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hammond	11	136	Bulls	821	Winter	No	Low	7.5
Mud Creek	79	61	Cows	544	Early	Yes	Medium	10
Mud Creek	4	61	Bulls	821	Early	No	Medium	10
Mud Creek	79	68	Cows	544	Graze	Yes	Medium	10
Mud Creek	79	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Mud Creek	4	68	Bulls	821	Graze	No	Medium	10
Mud Creek	79	100	Cows	544	Defer	Yes	Low	7.5
Mud Creek	79	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Mud Creek	4	100	Bulls	821	Defer	No	Low	7.5
Mud Creek	80	136	Cows	544	Winter	No	Low	7.5
Mud Creek	80	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Mud Creek	4	136	Bulls	821	Winter	No	Low	7.5
Hardie Summer	56	61	Cows	544	Early	Yes	Medium	10
Hardie Summer	2	61	Bulls	821	Early	No	Medium	10
Hardie Summer	56	68	Cows	544	Graze	Yes	Medium	10
Hardie Summer	56	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hardie Summer	2	68	Bulls	821	Graze	No	Medium	10
Hardie Summer	56	100	Cows	544	Defer	Yes	Low	7.5
Hardie Summer	56	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hardie Summer	2	100	Bulls	821	Defer	No	Low	7.5
Hardie Summer	35	136	Cows	544	Winter	No	Low	7.5
Hardie Summer	35	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hardie Summer	2	136	Bulls	821	Winter	No	Low	7.5
Hardie Summer FFR	35	61	Cows	544	Early	Yes	Medium	10
Hardie Summer FFR	2	61	Bulls	821	Early	No	Medium	10
Hardie Summer FFR	35	68	Cows	544	Graze	Yes	Medium	10
Hardie Summer FFR	35	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hardie Summer FFR	2	68	Bulls	821	Graze	No	Medium	10
Hardie Summer FFR	35	100	Cows	544	Defer	Yes	Low	7.5
Hardie Summer FFR	35	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hardie Summer FFR	2	100	Bulls	821	Defer	No	Low	7.5
Hardie Summer FFR	36	136	Cows	544	Winter	No	Low	7.5
Hardie Summer FFR	36	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hardie Summer FFR	2	136	Bulls	821	Winter	No	Low	7.5
Hammond FFR	25	61	Cows	544	Early	Yes	Medium	10
Hammond FFR	1	61	Bulls	821	Early	No	Medium	10

ALLOT.	# OF HEAD	DAYS	ANIMAL CLASS	BODY WEIGHT (KG)	GRAZING TREAT.	LACTATING	FORAGE TYPE /QUALITY	CRUDE PROTEIN
Hammond FFR	25	68	Cows	544	Graze	Yes	Medium	10
Hammond FFR	25	29	Calves >100 days < 1 yr	215	Graze	No	Medium	10
Hammond FFR	1	68	Bulls	821	Graze	No	Medium	10
Hammond FFR	25	100	Cows	544	Defer	Yes	Low	7.5
Hammond FFR	25	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hammond FFR	1	100	Bulls	821	Defer	No	Low	7.5
Hammond FFR	26	136	Cows	544	Winter	No	Low	7.5
Hammond FFR	26	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hammond FFR	1	136	Bulls	821	Winter	No	Low	7.5

1888

1889 Enteric emission estimates for Alternative 3 are shown in Table 3-16.

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Table 3-16: Alternative 3 Enteric Methane Emission Estimates from Livestock

	Enteric methane kg CH ₄ per yr	Enteric methane kg CH ₄ / head (or pair) / year	Enteric methane kg CH ₄ / AUM
Totals kg	52757.47	135.07	11.26
Total kg CO₂e AR6 - 100 Yr	1,424,451.60	3,646.99	303.92
Total CO₂e MMT AR6-100 Yr	0.0014245	0.0000036	0.0000003
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.05180%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.00074%		
% of Annual National Enteric Fermentation Emissions from Beef	0.00104%		
Total kg CO₂e AR6 - 20 Yr (non-fossil)	4,204,770.11	10,765.36	897.11
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.004205	0.0000108	0.00000090
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.15290%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.002183%		
% of Annual National Enteric Fermentation Emissions from Beef	0.003070%		

1892

1893 Total emissions estimates for Alternative 3 are shown in Table 3-17.

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Table 3-17: Alternative 3 Total Emission Estimates from Livestock

	TOTAL	PER HEAD	PER AUM	PER 10-YEAR PERMIT
Total kg CO₂e AR6 - 100 Yr	6,503,725.09	16,651.31	1,387.61	65,037,250.92
Total CO₂e MMT AR6-100 Yr	0.00650373	0.00002384	0.00000139	0.06503725
Total kg CO₂e AR6 - 20 Yr (non-fossil)	9,311,051.86	23,838.84	1,986.57	93,110,518.55
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.00931105	0.00002384	0.00000199	0.09311052

1896

1897 Under Alternative 3, NR AUMs may also be authorized; however, the number of AUMs (which
 1898 is calculated using the number of animals and days grazing), would vary depending upon annual
 1899 production and the amount of residual forage. When NR AUMs are utilized, emissions would be
 1900 higher than calculated, but would not be expected to add more than 100 percent of the calculated
 1901 emissions as NR grazing would not be limited and could occur in any pasture in any given year.

In addition, as Alternative 3 does not provide a general grazing rotation, or have specific terms and conditions related to NR AUMs (beyond the utilization thresholds), the increase in emissions when NR AUMs are authorized would be more than under Alternative 2.

Emissions from livestock grazing in the BCA under Alternative 3 would represent 0.0033 percent of the annual U.S. CO₂ equivalent emissions from enteric fermentation for all livestock, and 0.2365 percent of the annual Oregon CO₂ equivalent emissions from enteric fermentation for all livestock. This is more than two-times the emissions that are estimated under Alternative 1, and more than estimates under Alternatives 2 and 4, with the change increasing in magnitude as more NR AUMs are authorized.

3.4.2.1.4 CCEI Alternative 4

Table 3-18 shows inputs and assumptions for Alternative 4, by allotment, using inputs and assumptions defined above, and assumes spring calving, which is what is most common in Harney County.

Table 3-18: Emission Calculation Assumptions

ALLOT.	# OF HEAD	DAYS	ANIMAL CLASS	BODY WEIGHT (KG)	GRAZING TREAT.	LACTATING	FORAGE TYPE /QUALITY	CRUDE PROTEIN
Hammond	32	100	Cows	544	Defer	Yes	Low	7.5
Hammond	2	100	Bulls	821	Defer	No	Low	7.5
Hammond	32	136	Cows	544	Winter	No	Low	7.5
Hammond	32	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hammond	2	136	Bulls	821	Winter	No	Low	7.5
Mud Creek	56	100	Cows	544	Defer	Yes	Low	7.5
Mud Creek	56	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Mud Creek	3	100	Bulls	821	Defer	No	Low	7.5
Mud Creek	56	136	Cows	544	Winter	No	Low	7.5
Mud Creek	56	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Mud Creek	3	136	Bulls	821	Winter	No	Low	7.5
Hardie Summer	39	100	Cows	544	Defer	Yes	Low	7.5
Hardie Summer	39	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hardie Summer	2	100	Bulls	821	Defer	No	Low	7.5
Hardie Summer	39	136	Cows	544	Winter	No	Low	7.5
Hardie Summer	39	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hardie Summer	2	136	Bulls	821	Winter	No	Low	7.5
Hammond FFR	2	100	Cows	544	Defer	Yes	Low	7.5
Hammond FFR	2	100	Calves >100 days < 1 yr	215	Defer	No	Low	7.5
Hammond FFR	1	100	Bulls	821	Defer	No	Low	7.5
Hammond FFR	1	136	Cows	544	Winter	No	Low	7.5
Hammond FFR	1	136	Calves >100 days < 1 yr	215	Winter	No	Low	7.5
Hammond FFR	1	136	Bulls	821	Winter	No	Low	7.5

Enteric emission estimates for Alternative 4 are shown in Table 3-19.

Table 3-19: Alternative 4 Enteric Methane Emission Estimates from Livestock

	Enteric methane kg CH ₄ per yr	Enteric methane kg CH ₄ / head (or pair) / year	Enteric methane kg CH ₄ / AUM
Totals kg	10,663.37	169.93	14.16
Total kg CO₂e AR6 - 100 Yr	287,910.86	4,588.22	382.35
Total CO₂e MMT AR6-100 Yr	0.0002879	0.0000046	0.0000004
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.01047%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.00015%		
% of Annual National Enteric Fermentation Emissions from Beef	0.00021%		
Total kg CO₂e AR6 - 20 Yr (non-fossil)	849,870.21	13,543.75	1,128.65
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.000850	0.0000135	0.00000113
% of Annual Oregon Enteric Fermentation Emissions from all Livestock	0.03090%		
% of Annual National Enteric Fermentation Emissions from all Livestock	0.000441%		
% of Annual National Enteric Fermentation Emissions from Beef	0.000621%		

Total emissions estimates for Alternative 4 are shown in Table 3-20.

Table 3-20: Alternative 4 Total Emission Estimates from Livestock

	TOTAL	PER HEAD	PER AUM	PER 10-YEAR PERMIT
Total kg CO₂e AR6 - 100 Yr	579,132.03	9,229.20	769.10	5,791,320.26
Total CO₂e MMT AR6-100 Yr	0.00057913	0.00001828	0.00000077	0.00579132
Total kg CO₂e AR6 - 20 Yr (non-fossil)	1,147,098.37	18,280.45	1,523.37	11,470,983.70
Total CO₂e MMT AR6-20 Yr (non-fossil)	0.00114710	0.00001828	0.00000152	0.01147098

Emissions from livestock grazing in the BCA under Alternative 4 would represent 0.0003 percent of the annual U.S. CO₂ equivalent emissions from enteric fermentation for all livestock, and 0.0211 percent of the annual Oregon CO₂ equivalent emissions from enteric fermentation for all livestock. This is less than under all other grazing alternatives. If no grazing were to occur in areas not achieving Standards within the Mud Creek and Hardie Summer Allotment, emissions from livestock grazing would be further reduced.

3.4.2.1.5 CCEI Alternative 5

Under this alternative there would be no cattle grazing occurring on BLM-managed land. Therefore, there would be no emissions related to issuing a grazing permit, as no permit would be issued.

3.4.2.1.6 CCE1 Comparison of Alternatives

Table 3-21: Estimated Annual and 10-Year GHG Emissions from Livestock Grazing (MMT)

ALTERNATIVE	AUMS ⁷⁵	KG METHANE (CH ₄)	KG NITROUS OXIDE (NO ₂)	ANNUAL		10-YEAR	
				AR6 100- YEAR KG CO ₂ e	AR6 20- YEAR KG CO ₂ e	AR6 100- YEAR KG CO ₂ e	AR6 20- YEAR KG CO ₂ e
1	1,502	18,461	8,994	2,953,813	3,926,719	29,538,130	39,267,187
2	2,945	29,833	12,885	4,323,083	5,895,256	43,230,828	58,952,563
3	4,687	53,270	18,555	6,503,725	9,311,052	65,037,251	93,110,519
4	753	10,777	1,055	579,132	1,147,098	5,791,320	11,470,984
5	0	0	0	0	0	0	0

3.4.2.2 CCE Issue 2: How would proposed livestock grazing impact carbon storage?

Impacts on carbon sequestration could occur from changes in grazing levels when vegetation is negatively impacted, such as areas of concentrated use by livestock. This would largely occur along trailing routes, loafing areas, and at water sources (principally near developed sites). Where well-managed grazing occurs, Schuman and Derner (2004) found that grazing improves nutrient cycling and stimulates root respiration as well as aboveground production, all of which can increase carbon storage on a site. Shrestha and Stahl (2008) found that there was no significant difference in soil organic carbon between long-term ungrazed (40+ years) and lightly grazed (20-35 percent utilization) treatments when looking at calculated soil organic carbon per hectare. The BLM also recognizes that livestock grazing can reduce the risk of catastrophic wildfire (Davies, Bates, Boyd, et al. 2021), which has a positive impact on carbon storage. Science related to carbon storage is minimal and analysis on carbon storage is discussed in generalities.

3.4.2.2.1 CCE2 Alternatives 1 and 2

Grazing management that focuses on maintaining and improving healthy, resilient, and resistant communities, as identified in the alternatives, would be expected to make the area more resilient to the effects of climate change. Alternatives 1 and 2 would result in the most maintenance and improvement of ecological conditions and reduction in risk of wildfire and would be expected to store the most carbon.

3.4.2.2.2 CCE2 Alternative 3

Alternative 3 would theoretically maintain conditions with utilization thresholds and requirements to achieve S&Gs (or at a minimum that livestock are not a causal factor); however,

⁷⁵ As AUMs are calculated based on the number of livestock head and the season of use, calculated AUMs are sometimes higher or lower than authorized. In the case of climate change, when the exact number of AUMs being proposed in the alternative was unable to be calculated, the BLM always took the number that was closest to the number of AUMs to be authorized under that alternative. In alternatives 1, 3, and 4, these numbers are 2 more AUMs than would be authorized. Under alternative 2, these numbers are 2 less than would be authorized. The AUMs in this table would not be authorized and are only used for the calculation of emissions. The number of AUMs to be authorized can be found under each alternative description in Chapter 2 of this document.

with no general grazing rotation conditions at this site would be at more risk for degradation caused by livestock when compared to other alternatives. However, Alternative 3 would also result in the most fine fuel reduction and it would have the lowest risk of fire; protecting the site from catastrophic wildfire would help ensure continued carbon storage.

3.4.2.2.3 CCE2 Alternative 4

Under Alternative 4, grazing would have a minimal impact on ecological conditions, which would be expected to be maintained. However, over time, vigor of perennial species may decrease due to shading (see Vegetation section), which would decrease the overall ecological condition of the BCA. In addition, this alternative would have the highest risk of catastrophic wildfire of all grazing alternatives, which would limit the site's ability to store carbon into the future. This risk would be increased if livestock grazing was not authorized in areas that are not achieving ecological objectives within the Mud Creek and Hardie Summer Allotments.

3.4.2.2.4 CCE2 Alternative 5

Alternative 5 would have similar effects as Alternative 4; however, under Alternative 5, there would be no removal of fine fuels due to livestock grazing. Over time, shading would have a larger negative impact on vegetation than under Alternative 4, and risk of catastrophic wildfire under this alternative would be higher than under all alternatives, limiting, or reducing the BCA's ability to store carbon.

3.4.2.3 CCE Cumulative Effects

In the 2023 CEQ interim guidance on analyzing greenhouse gas and climate change effects in NEPA analyses (Council on Environmental Quality 2023), the CEQ advised, "...the analysis and public disclosure of cumulative effects can be accomplished by quantifying GHG emissions and providing context for understanding their effects...."

To follow this guidance, the BLM compares this project's emissions to the most recent emission inventory data from the Oregon Greenhouse Gas Sector-Based Inventory: 1990 through 2019 and preliminary 2020 and 2021 data (Oregon Department of Environmental Quality 2024). Oregon's total 2019 GHG emissions were 63.5 million metric tons (MMT) of CO₂e. The greatest annual GHG emissions anticipated from any of the action alternatives is from Alternative 3 at 6,503.7 metric tons (MT) CO₂e (0.006504 million MT; 100-year global warming potential value) and 9,311.1 MT CO₂e (0.009311 MMT; 20-year GWP value); for the 100-year GWP, this would be 0.011 percent of Oregon's total 2021 GHG emissions (61.4 MMT). Enteric fermentation from livestock grazing for Alternative 3 would emit 4,323.1 MT CO₂e (100-year global warming potential value) and 5,895.3 MT CO₂e (20-year global warming potential value), which would be 0.157 percent and 0.214 percent of Oregon's 2019 enteric fermentation sub-sector inventory total of 2.75 MMT CO₂e.

For additional context, the EPA's Greenhouse Gas Equivalencies Calculator (Environmental Protection Agency 2024b) allows us to translate total GHG emissions into equivalent emissions

from cars, households, etc. Using the greatest annual GHG emissions produced from Alternative 3 (20-year global warming potential value), emissions are equivalent to 2,216 gasoline powered passenger vehicles driven for one year or 1,214 homes' energy use for one year, and equal to the carbon sequestered by 153,959 tree seedlings grown for 10 years. Alternative 5, which has the lowest emissions of 0, as livestock would not be permitted to graze within the BCA, assumes that these emissions would not occur if livestock were not authorized. However, there is no way to determine how much a permittee may decrease their herd (no emissions if no animals would exist with a no grazing decision), or find alternative forage, which would still result in some emissions from the livestock. In addition, while these numbers provide context for emissions, they are not reduced by the amount of carbon that is stored in healthy, properly grazed rangelands that are less likely to have a catastrophic wildfire. Nichols and others (2021) found that "fire significantly reduced the total soil C[arbon] in aggregates relative to unburned soil," and that even single fires in intact sagebrush stands can result in reduced soil organic carbon levels. They also found that the soil carbon stays low after multiple fires if the site does not recover (Nichols et al. 2021). Lohse and others (2022) found that soil organic carbon was reduced following a fire and had not recovered after 3 years. While research on the dynamics between grazing and soil carbon are limited, research suggests that proper grazing would have a minimal impact on carbon storage (Shrestha and Stahl 2008) while fire results in a direct reduction in carbon storage that exists for a number of years following fire.

On rangelands, a catastrophic wildfire that removes aboveground vegetation and kills large amounts of below ground biomass would release a large amount of carbon. As catastrophic wildfires are typically large, often growing to over 100,000 acres on rangelands, fire would be expected to result in a larger reduction in carbon storage than continued livestock grazing would (Ratcliff et al. 2023). See the affected environment of this section for a discussion on carbon storage.

The OGWC developed and analyzed actions across economic sectors in the Oregon Climate Action Roadmap to 2030 (2023a). The nearest-term GHG emission reduction goal recommended in the Roadmap 2030 (2023a) is a 45 percent reduction below 1990 by 2030, which equates to a reduction in total state emissions to 31 MMT CO₂e. The TIGHGER Project found that Oregon is on track to meet its earlier 2035 emission reduction goal through implementation of 15 currently adopted programs and regulations (Oregon Global Warming Commission 2023b). For Oregon to meet the accelerated 2030 reduction goals, the TIGHGER Project determined it would be necessary to implement 35 additional actions beyond the 15 programs and regulations already in place (Oregon Global Warming Commission 2023b). None of Oregon's adopted programs, regulations, and additional TIGHGER Project actions address direct GHG emission reductions in the agricultural sector or enteric fermentation sub-sector. As such, we are unable to make a meaningful comparison to Oregon's overall GHG emission reduction goals from livestock grazing or methane emissions from enteric fermentation resulting from the alternatives. However, as these sectors were not mentioned as a targeted program, it can be extrapolated that Oregon believes their goal can be met without modifications to agricultural practices, beyond how they indirectly tie into the 15 programs and regulations addressed.

Although Oregon does not have a methane emission reduction goal, in September 2021, President Biden announced that the United States was joining with the European Union in challenging the world to meet a Global Methane Pledge (The White House 2021 Sep 18) and reduce the world's methane emissions 30 percent from 2020 levels by 2030. Alternatives 4 and 5 will reduce the number of AUMs from the No Action Alternative (Alternative 1) and thus would reduce methane emissions from enteric fermentation. Alternative 4 would produce approximately 42 percent less annual methane than the No Action Alternative and Alternative 5 would further reduce the annual methane emissions by 100 percent from the No Action Alternative.

Climate change and greenhouse gas emissions are complicated topics that have a large number of variables, and impacts can appear very different depending on what aspect is being considered. Within the BCA, change over time, considering proposed alternatives and RFFA such as treatment of annual grasses and juniper are planned, the rangelands within the Hammond, Mud Creek, and lower elevation portion of the Hammond FFR are expected to improve, resulting in increased carbon storage across the landscape. In areas where juniper is treated to protect ecological functions, carbon storage may be reduced. Where no restoration treatments are planned, under any alternative it would be expected that carbon storage would have minimal change within the BCA without disturbance such as fire.

3.5 Cultural Resources (CR)

3.5.1 CR Affected Environment

The Great Basin Culture Area is a large geographic area between the Cascade Mountain Range and the Rocky Mountains, encompassing portions of southern Oregon and Idaho, western Utah, and most of Nevada. It is characterized by an arid, semi-desert climate with large watercourses and many smaller drainages. The first inhabitants of Oregon's Great Basin encountered and adapted to extremely demanding landscapes and variable weather. Pre-contact adaptations were often influenced by the availability of resources and affected by climatic changes.

Nearly 1,145 acres (or about 10 percent) of the Hammond Allotment has been inventoried for cultural resources. All of the inventory has been in support of various BLM projects, such as water developments, juniper management, fire suppression and rehabilitation efforts, and other forms of habitat management. Like many other places on Steens Mountain, the allotment is rich in geophytic, edible root populations, and seasonal abundance of various wildlife, that attracted pre-contact inhabitants to set up seasonal camps. Within the allotment, there are 19 recorded sites. There are 16 pre-contact sites, ranging in complexity from simple tool manufacturing stations to more complex camps where a fuller range of activities took place. Based on the arrow and spear points found at some of these camps during surveys, the Hammond Allotment was occupied mainly between 6,000 and 200 years ago, although there is evidence of occupation as long ago as 10,000 years before present (BP). Three sites are multi-component sites, which are a mix of pre-contact elements and associated refuse dumps, dating to the mid-to-late 20th century. Of the 19 sites recorded in the area, more than half contain some sort of rock feature. Sites in the

allotment have been affected by various agents as shown in Table 3-22. Grazing impacts include impacts from hoof shear, wallowing, and trailing.

Table 3-22: Documented Impacts on Cultural Sites

IMPACT AGENT	NUMBER OF AFFECTED SITES	% OF TOTAL SITES
Unknown/Not Reported	5	26 ⁷⁶
Grazing	14	100 ⁷⁷
Erosion	12	85
Weathering of Metal Artifacts	3	21
Road	4	28
Fire	3	21

The allotment has a high probability of containing other cultural resources, with a potential for some of those sites to be eligible for the NRHP.

The BLM only has completed 150 acres (~2 percent of the allotment) of cultural resources inventory for the Hardie Summer Allotment. The BLM has conducted resource inventory within this allotment in support of wildfire rehabilitation efforts. Currently, there are no recorded sites within the allotment. Based on cultural resource surveys within surrounding areas, the allotment has high potential for containing pre-contact upland root gathering and summer hunting camps, as well as historic herding camps.

Within the Mud Creek Allotment, the BLM has completed 230 acres (3 percent of the allotment) of cultural resources inventory. The BLM conducted cultural resources inventory in support of BLM range projects, such as fences and reservoir maintenance. The allotment is rich in geophytic, edible root populations, and seasonal abundance of various wildlife, which attracted pre-contact inhabitants. Despite the limited amount of cultural resource survey, eight archaeological sites have been recorded in the allotment. One site consists of a rock wall/fence connected to an old barbed-wire fence. Two sites are multi-component sites consisting of pre-contact artifacts along with cans dating in the late 1800s to early 1900s. The remaining five sites are pre-contact and range in complexity between simple flaked tool manufacturing stations and much more complex camps, with a wide array of both flaked stone tools and grinding stones. Site condition and impact agents were recorded at three of the eight sites. Impacts were a result of grazing, erosion, weathering of metal artifacts, animal burrowing, and fire. No impacts were noted for five sites. The probability of finding additional archaeological sites is high, with potential for some of those sites to be eligible for the NRHP.

Just over 310 acres (or about 27 percent) of the Hammond FFR has been inventoried for cultural resources. The surveys were for split-mineral on private land, and wildfire rehabilitation efforts. There are two pre-contact sites and one multi-component site (containing both pre-contact and historic components) within the FFR. The sites range in complexity from simple tool manufacturing stations to more complex camps where a fuller range of activities took place.

⁷⁶ This percentage was computed by dividing the number of affected sites by the total number of sites (n=19) found in the allotment.

⁷⁷ This percentage (and the remainder below it) was computed by dividing the number of affected sites by the 14 sites where condition and impacting agents were noted.

Artifact dating indicates occupation from 10,000 years BP to 1910. Only one site had impacts from wildfire and erosion; two sites reported no impacts. The probability of finding other cultural resources in the allotment is high, with potential for some of those sites to be eligible for the NRHP.

3.5.2 CR Environmental Consequences

3.5.2.1 CR Issue 1: How would proposed livestock grazing and developments impact cultural resources including National Register of Historic Places (NRHP) listed, eligible, or unevaluated archaeological or historical sites?

3.5.2.1.1 CRI Alternative 1

Grazing permits would be issued with the same terms and conditions as the previously issued permits and no new developments would be added to the project area.

Cultural resource sites within existing livestock congregation areas (such as livestock watering locations) could be affected by livestock. In concentration areas, livestock hoof prints can churn the soil up to 12" deep (when wet), possibly causing lateral and vertical movement of cultural materials, and artifact breakage to occur. However, these existing sites have already been affected by livestock grazing, including historical overgrazing, over the last approximately 150 years since domestic livestock grazing began on the Steens Mountain. Any new effects to cultural material within the BCA from livestock grazing would be expected to be insignificant due to historical levels of livestock grazing (often overgrazing) that BLM believes have already affected cultural resources, though grazing could still result in some immeasurable negative impacts.

3.5.2.1.2 CRI Alternative 2

Alternative 2 is focused on increasing the periodic growing season rest, which would favor deep rooted bunchgrasses, and expanding the season of use to allow for more flexibility and an ability to graze invasive annual grasses while perennial grasses are dormant. The effects would be similar to Alternative 1, with slightly more risk to cultural resources due to increased AUMs within the Hammond Allotment and increased chances for hoof impact and new concentration sites that become established along new fences. Areas where new developments are proposed would be surveyed for cultural resources prior to construction (see Section 2.2.1 PDEs), and the proposed development location would be modified, if necessary, to avoid impacts on cultural resources from construction or subsequent concentrations of livestock. Proposed development sites would be surveyed prior to construction and avoid all sites, removing the direct impact of developments on cultural resources.

3.5.2.1.3 CRI Alternative 3

Under this alternative the impacts to cultural resources would be similar to Alternative 2; however, it would pose additional risks to cultural resources as more AUMs would be permitted,

resulting in increased livestock presence within the BCA and at concentration sites. In addition, grazing would occur in the Bridge Creek Canyon (new Canyon Pasture), which has not occurred since 1984. While past and historic livestock grazing may have already impacted the cultural resources sites present within the Bridge Creek Canyon drainage, free thaw and water flow may have uncovered new sites, which would receive negative impacts from livestock grazing due to hoof action as animals move up and down the drainage. Authorizing grazing along the creek, where soils are wet, is expected to result in more (deeper) hoof action impacts, that may increase negative impacts to sites. Impacts from developments would be more than under Alternative 2 due the construction of the spring development pipeline and troughs, proposed corrals, and net increase in fences.

3.5.2.1.4 CRI Alternative 4

Under this alternative, the BLM would permit AUMs at 50 percent of what is analyzed in Alternative 1 and have would have reduced grazing utilization thresholds, resulting in fewer AUMs being used in any given pasture, and grazing would be further reduced in Mud Creek and Hardie Summer Allotment where ecological objectives are not met. Therefore, a decreased chance of new or additional impacts to cultural resources through hoof action. In addition to this, the permitted season of use would be more restrictive, which may further decrease potential for hoof action. Therefore, impacts to cultural resources under this alternative would be less than what would occur under Alternative 1.

3.5.2.1.5 CRI Alternative 5

Under this alternative, livestock grazing would not occur. The direct effects of grazing would be eliminated; however, management issues such as fine fuel loading would be expected to continue as it has post-2014, without reduction from grazing. This may result in indirect risk of increased damage to cultural resources due to fires that may burn more intensely (hotter) and more completely, with less of a mosaic.

3.5.2.1.6 CR Cumulative Effects

The CEAA for cultural resources in the allotment is the project area plus a mile visual buffer. A one-mile buffer was identified because the surrounding landscape and visual setting can contribute to the eligibility of certain types of historic properties, for example traditional cultural properties or historic roads and trails. Small changes to the visual landscape, may or may not impact the setting of a historic property, but cumulative visual changes are more likely to adversely impact sites. Slow erosional changes or conversion of natives to annual invasive plants can also affect sites or traditional plant gathering areas. Sites should be considered in terms of impacts to visual, cultural, and scientific relationships between sites in the region, and the interface between cultural resources and historic landscapes. Past, present, and RFFAs that could have an impact on historic properties and/or traditional use areas/practices are fire, livestock grazing, recreation activities, road maintenance, weed treatments, vegetation/restoration treatments, and existing developments. Ground disturbing actions and potential effects to cultural resources and traditional use areas associated with RFFAs would be caused by large machinery.

Both direct and indirect impacts would be addressed by PDEs and BMPs. If adverse effects to historic properties are identified during this process, the project would be redesigned to avoid, minimize, or mitigate impacts. Impacts to cultural resources that occur slowly over time can be more difficult to avoid, minimize, or mitigate. These include impacts from grazing and erosional changes, where protective soils are gradually removed, leading to the exposure of sites over time. Exposure increases the risk of theft, vandalism, trampling, and/or fire exposure.

3.6 Grazing Management (GM)

3.6.1 GM Affected Environment

Livestock grazing has been present in the vicinity of the BCA since at least the 1870s. At that time grazing management was largely uncontrolled and lands were grazed on a first come first served basis. This often resulted in areas being grazed repeatedly within a growing season by multiple kinds of livestock, ultimately resulting in heavy to severe use of the rangeland vegetation. The result was damage to rangeland vegetation that set the scene for the future livestock management of the BCA allotments. The Taylor Grazing Act of 1934 set into motion the process of determining orderly use of rangelands, which led to adjudication that defined who could use what areas, with how many livestock, and what kind (i.e., cattle, sheep, horses). Adjudication for the BCA allotments was solidified by the early to mid-1960s and they have been grazed with cattle since that time. Between 1934 and the 1980s many laws were passed that affected public lands, and ultimately how livestock grazing was to be managed, and culminated with the Andrews Grazing Management Plan Final EIS, which was approved in 1984 (Bureau of Land Management 1984). This was the first-time modern livestock grazing for proper use⁷⁸ of vegetation was formally analyzed and implemented for the BCA. Davies and Boyd (2020) state that grazing “management can determine the consequences and benefits of grazing on ecosystem services and function”, recognizing that grazing is not inherently good or bad, but it is the management that determines what the effects are on the landscape. For a detailed description of history and management changes for each allotment in the BCA, refer to 2023 BCA LHA (Bureau of Land Management 2023a).

The discussion regarding the allotments often goes in the order of Hammond, Mud Creek, and Hardie Summer because of the elevation (low to high), and the resulting pattern of forage growth and readiness has matched the general grazing rotation order between allotments. Since at least 1990, the grazing rotation through the allotments has been an “out and back” pattern, where livestock move through the low elevation to high elevation, and then return home in reverse order. The Hammond Allotment, specifically the crested wheatgrass seedings, have typically been used first, then livestock were transitioned to the Mud Creek Allotment, and finally to the Hardie Summer Allotment. Use in the Hammond FFR would usually occur when the adjacent pastures within the other three allotments were being used. In the process of leaving the

⁷⁸ Proper grazing use is defined in the Standards for Rangeland Health and Guidelines for Grazing Management for Public Lands Administered by the BLM in Oregon and Washington (Bureau of Land Management 1997a) as “grazing that, through the control of timing, frequency, intensity and duration of use, meets the physiological needs of the desirable vegetation, and provides for the establishment of desirable plants and is in accord with the physical function and stability of soil and landform.”

allotments in the fall, livestock have typically been moved from Hardie Summer, back through the Mud Creek Allotment, and finally through the Hammond Allotment.

The forage base for livestock in the BCA is predominantly cool season perennial bunchgrasses. Cruz-Guerra Ruben (1994) reviewed livestock preference for the major introduced and native perennial bunchgrasses in the Northern Great Basin, which overlaps with the BCA, including crested wheatgrass, bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, Thurber's needlegrass, and Sandberg's bluegrass, and found that they were consistent forage for livestock. For distribution of the perennial bunchgrass (forage) species by allotment, refer to the Vegetation section where Disturbance Response Groups are discussed. Forage in the semiarid sagebrush-bunchgrass range is high in nutrient quality during the early stages of the growing season, and as the plant matures, after about mid-June (Hyder and Sneva 1963), quality declines rapidly to a point where the forage only provides for animal maintenance. Ganskopp and Bohnert (2005) suggest after grasses complete their lifecycle and cure (e.g., during deferred grazing treatments), cattle are much less aware of the older cured stems and tend to graze the area with improved distribution (Ganskopp et al. 1992). Therefore, together, species and timing of growing season are important considerations for livestock management and influence livestock distribution.

The amount of slope, displayed in a percentage, has influence on past and present land management within the allotments. In studies related to the topic, analysis pointed out slope gradient as the physical factor most consistently associated with cattle use of the landscape (Gillen et al. 1984). In relationship to these allotments, the increase in elevation from west to east is gradual, which is reflected in the slope gradients. For simplicity's sake, slope ranges have been broken into four categories, 0–10 percent slope, 11–30 percent slope, 31–60 percent, and 60 percent slope and greater (Figure 3-2 shows the slope percentage, of the BCA, that is in each category). Livestock use is negatively related to slope, meaning that the higher the slope gradient (steeper), the less time livestock spend or forage there.

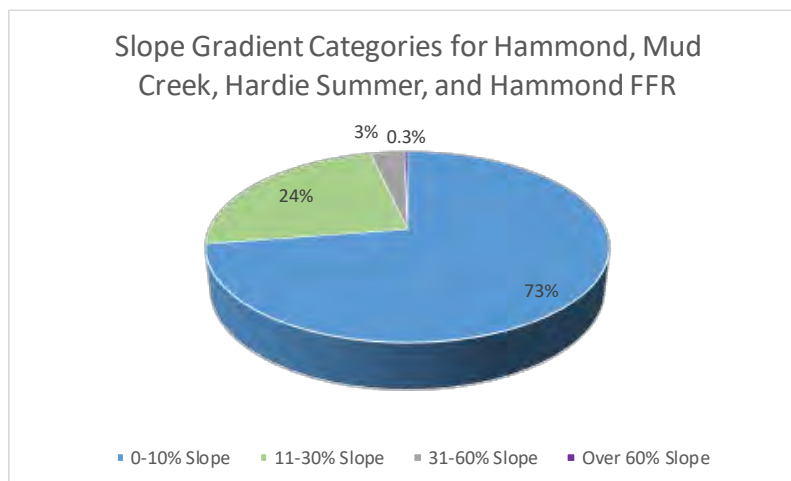


Figure 3-2: Slope Gradients for Allotments⁷⁹

⁷⁹ Blue and green indicates % of area routinely useable by livestock, gray is area that may have limitations to livestock use, purple is area that is considered typically low use or unusable by livestock.

In similar vegetation types, studies have shown that livestock routinely use areas with 20 percent or less slope and favored areas with 10 percent slope or less (Mueggler 1965; Ganskopp and Vavra 1987). Forage on steeper slopes, over 60 percent, has been shown to receive little to no use by cattle (Holechek et al. 2011). For slopes between 21–60 percent, the science varies on how much or little livestock use them; there is agreement they do get used to a lesser extent than gentler slopes, but at the same time they are not considered “ungrazable” (Mueggler 1965; Ganskopp and Vavra 1987; Holechek et al. 2011). Other factors, such as type and availability of forage, season of use (spring versus summer), water (amount and distribution), salt and mineral location, protein supplementation location, livestock behavior, familiarity with the area, and active herding all likely contribute more to utilization on slopes between 20–60 percent. Most of the acreage within the Hammond, Mud Creek, and Hardie Summer Allotments is considered usable by livestock from a slope standpoint. Slope gradient is also important from a drill seeding standpoint; all the areas seeded to crested wheatgrass between the 1960s and 1980s have been in the 0–10 percent slope category. Furthermore, many of these areas were identified for seeding because they were known to be degraded from heavy historical use with little herbaceous understory prior to being seeded (Griffith 1902; Hedrick et al. 1969)(Hedrick 1967, Griffith 1902).

Topography also influences livestock movement and distribution. Many of the effective pasture boundaries in the Hammond Allotment are rimrock (Photo 3-1) and are combined with wire fence to keep livestock within defined use areas, such as pastures. In the Mud Creek Allotment rimrock canyon wall on the north side of the Mud Creek drainage is a physical barrier on the southern allotment boundary and keeps livestock from accessing Mud Creek drainage. Existing fences in the BCA are shown in Map C – Current Grazing Allotments & Developments.



Photo 3-1: Example of Rimrock Created Pasture Boundary in Hammond Allotment

Water gaps are designated areas for cattle to water out of a stream and are designed so that livestock cannot access the remainder of the stream channel while in a specific pasture. There are two water gaps in the Mud Creek Allotment, one that allows livestock to water in Mud Creek, and one that allows them to water in Bridge Creek.

Water is an important tool in managing livestock (see Appendix G: Grazing Management Data and Literature Review for supporting information). Livestock water in the BCA is from streams and spring developments that fill water troughs, reservoirs, and pipelines. In the crested wheatgrass seedings in Hammond Allotment, there is a pipeline system that services multiple pastures by piping water from a spring (located on private property) to a storage tank, and then water is directed, based on the pasture rotation, to specific troughs in multiple pastures. Where pipelines are present, water can be turned on in specific troughs and off in other troughs, allowing water to be an active management tool in improving livestock distribution.

The livestock actual use in AUMs for the allotments, by year, is shown in Appendix G: Grazing Management Data and Literature Review. Average actual use for all allotments during the entire evaluation period, including non-renewable (NR) use, and not including rest or ungrazed years, is 3,074 AUMs.

The Hammond Allotment has a long history of crested wheatgrass seedings being created through drill seeding for a variety of management reasons. The focus from the 1950s to the 1970s was to create an improved bunchgrass understory, eliminate sagebrush competition, and create more pounds of high-quality forage for livestock (Bureau of Land Management 1967). In the early 1980s the crested wheatgrass seedings were drilled in for wildfire restoration and to compete with invasive annual grass species (Pilliod et al. 2024). All told, about 62 percent of the Hammond Allotment is seeded to crested wheatgrass and continues to be managed as a set of crested wheatgrass seedings.

The stocking rate (the number of livestock for a period of time within a defined area) for the Hammond Allotment was originally set in the 1960s, prior to the crested wheatgrass seedings being planted. Seeding dramatically increased the amount of herbaceous biomass in the area. As a result, the grazing permittee had been authorized NR grazing going back to 1978. Starting in 1993, NR use was being authorized on a consistent annual basis, the amount dependent on the annual production. The rationale behind the use of NR AUMs was to maintain crested wheatgrass health and vigor, and to provide flexibility to the grazing seasons in the Mud Creek and Hardie Summer Allotments. In addition, utilization studies showed NR AUMs could be used and would stay within utilization targets. The recorded utilization by allotment and pasture is in Appendix G. While the stocking rate and adjudication of AUMs within the other three allotments was also set in the 1960s, these allotments have not been seeded to crested wheatgrass, so while changes may have occurred, they are not as extreme as within the Hammond Allotment, and the current allocation of forage to livestock within those allotments is appropriate, based on carrying capacity estimates.

Grazing within the Mud Creek Allotment has been absent since 2014. Since the 2006 fire that consumed the sagebrush, the Mud Creek Allotment has shown a large release and increase in the presence of grass residual vegetation. This puts the area at risk of catastrophic wildfire as grass residual vegetation results in the buildup of continuous fine fuels. Monitoring has not found any major increases in shrubs in the plant community composition over the last ten years. However, within the Mud Creek area, observationally there has been an increase in deep-rooted perennial vegetation and a decrease in invasive annuals. This is a result of invasive annual grass treatments

that reduced invasive annual grass competition with deep-rooted perennial bunchgrasses that have occurred during the early 2020s rather than the lack of grazing. Under the Mud Creek Restoration DNA (2023c), the BLM has planted almost 2,000 sagebrush seedlings within the Mud Creek Allotment to provide additional seed sources for natural recovery; however, the success of this effort has not yet been determined. Riparian areas that were in PFC or demonstrating healthy and functioning systems prior to 2014 have remained healthy and functioning in the Mud Creek and Hardie Summer Allotments. Krumbo Creek in the Hammond Allotment, the major area of riparian concern, has not improved in condition since 2014, but has remained stable. Trespass livestock continues to be an issue in the Krumbo Creek drainage. For more information on vegetation conditions see the 2023 BCA Land Health Assessment (Bureau of Land Management 2023a) and Determination (Bureau of Land Management 2023b).

3.6.2 *GM Environmental Consequences*

3.6.2.1 *GM Issue 1: How would proposed season of use and developments affect grazing management and livestock distribution?*

3.6.2.1.1 *GM1 Alternative 1*

For comparison purposes, Alternative 1 provides the general baseline for grazing management and livestock distribution against the other grazing alternatives, with two exceptions. First, between 1993 and 2014, the livestock movements between allotments were often delayed from what was scheduled between Hammond and Mud Creek, and Mud Creek and Hardie Summer Allotments. Meaning, cattle entry into the allotment(s) was authorized by the BLM to be shifted one month to six weeks later and cattle exit was shifted a corresponding amount of time. These shifts placed grazing outside the permitted season of use and would not be authorized under Alternative 1 going forward. Another exception is in the Hammond Allotment NR AUMs were authorized (averaging between 1,000–1,500 NR AUMs between 1994 and 2012) but would not be authorized under Alternative 1. The grazing treatments in Hammond would still be during the second half of the early treatment, the graze treatment, defer treatment, and first half of winter treatment. Those grazing seasons would span between April 1 and October 30 (Appendix E: Grazing Treatment Descriptions). Mud Creek would be used during the graze season (critical growing season for native perennial grasses) and the rotation would include periodic growing season rest. Hardie Summer would still be grazed during the deferred season of use. The existing fence, natural barriers (topography), and water developments would be the same and would influence the patterns of use and distribution in the same manner as in the past. Since no new developments are proposed under this alternative, there are no anticipated changes in livestock distribution, or different concentrated areas of use related to water or fences. The Mud Creek and Bridge Creek water gaps would continue to be used as in previous grazing management. Livestock would continue to have limited access to Bridge Creek, where animals were occasionally able to get around the fences and rim at the water gap.

3.6.2.1.2 GMI Alternative 2

Under Alternative 2, the permitted seasons of use are expanded to allow for more flexibility on when the forage can be used within the allotments. For the Hammond Allotment, it adds the first half of the early and winter grazing seasons of use. Mud Creek Allotment would have multiple options to graze outside of the critical growing period (graze) for perennial bunchgrasses, including the early, defer, and winter seasons of use. Because of the higher elevation landscape position, Hardie Summer would mostly continue to be defer season of use but would also have opportunity to have early winter grazing. While the forage species and their distribution are expected to stay consistent, grazing management flexibility into the early and winter seasons of use would allow for standing dead forage to be more readily utilized by cattle. Early and winter seasons are also when the forage species are least vulnerable to grazing stress (refer to vegetation affected environment). Protein supplements would likely need to be provided for cattle during the dormant season to make up for the decreased nutritional value. Protein supplements may also be used as a tool to draw cattle to certain areas, thereby increasing distribution. Fence removal under Alternative 2 in both Hardie Summer Allotment and Hammond Allotment - Krumbo Creek Pasture would remove fences that are not functional or effective, making grazing management easier to carry out, with less risk to livestock from potential entanglement. Similar to Alternative 1, livestock would not be able to access Bridge Creek except at the water gap. However, the proposed fencing in the water gap area would be reconfigured to ensure livestock are not able to go around the fence, providing the drainage extra protection from livestock. The proposed fence construction in Hardie Summer would make it easier to manage grazing within Little Fir Creek corridor. This fence would allow more controlled timing (periodic) and shorter duration of use in Little Fir Creek, along with better dispersal of livestock in the uplands of the new Little Fir Pasture. Fencing out private property within the Hardie Summer Allotment would also reduce the area livestock were able to access. It would remove 0.14 mile of fence out of the Steens Mountain Wilderness, removing 38 acres from the Sylvies Pasture within proposed Hammond FFR and adding those 38 acres to the Old Frazier Field of the Frazier Field Allotment. The alternative would also remove approximately 0.35 mile of fence on the boundary between Hardie Summer Allotment and the Sylvies Pasture and include building 0.84 mile of fence on the private property - BLM boundary (Appendix A: Map E), which would reduce any potential conflict between the landowner and the permittee, if they are different entities. No additional water developments are proposed under Alternative 2; therefore, the livestock grazing distribution would not change as a result of changed available water. However, the Sylvies Pasture would lose a waterhole, which would reduce the available use area for livestock within that pasture, while the Old Frazier Field Pasture (adjacent Frazier Allotment) would get an additional waterhole, increasing its livestock use areas and reducing the likelihood of cattle entering the wilderness.

In the Lower Field of the Mud Creek Allotment, the utilization level would be initially reduced to 35 percent, which may be increased to 50 percent if objectives are met as determined by monitoring. A utilization level of 35 percent may alter or reduce grazing distribution (livestock would not spread out as much within the pasture) because the livestock would need to be moved to the next grazing pasture sooner when compared to Alternatives 1 and 3, where 50 percent

utilization is proposed. This is because livestock may not be able to graze as large of an area prior to being moved.

3.6.2.1.3 GMI Alternative 3

Under this alternative, AUM levels would be immediately increased in the Hammond (to 2,700 AUMs) and Mud Creek (to 1,000 AUMs) Allotments, beyond what would be allowed under any other alternative and exceeding carrying capacity (see GM3). Within the Hardie Summer Allotment, the same number of AUMs would be authorized as under Alternatives 1 and 2, but because of allotment boundary changes they would be on fewer acres (2,271 acres less than Alternative 1 and 1,600 acres less than Alternative 2) within the Hardie Summer Allotment. This would result in the operator using more AUMs per acre than occurred with past grazing. Even so, the utilization threshold would be the same as Alternatives 1 and 2⁸⁰ (50 percent on native key forage species and 60 percent on desirable non-native key species). When the utilization threshold is reached, livestock would move to the next pasture in the rotation regardless of how many AUMs were used by the exit date. The grazing treatments would be similar to Alternative 2. One exception is that under Alternative 3, the pastures in Hardie Summer may be grazed in June during the “graze” season of use. The grazing rotation would be determined annually and would provide for periodic growing season rest in each pasture, so impacts based strictly on season of use and grazing treatment would be similar to under Alternative 2; however, impacts would be greater due to increased AUMs.

Under Alternative 3, all fences in the Bridge Creek water gap would be removed. This combined with the creation of the Canyon Pasture, would allow livestock to regularly graze within the Bridge Creek drainage. This would increase livestock distribution across the Mud Creek Allotment by allowing livestock access to the drainage, as well as expanding the Mud Creek Allotment to include an additional 1,656 acres. While livestock distribution would be increased, regular use of the Bridge Creek drainage, which would not follow a general grazing rotation, may result in increased impact to any riparian areas and compromise achievement of land health standards 2 and 4. The proposed South Granddad Pasture would add another pasture into the grazing rotation, and increase total acres within the Mud Creek Allotment, which would help managers promote better distribution across the allotment as a whole. However, this increase in acres would result in a decrease in acres to the adjacent Krumbo Mountain Allotment, which would result in decreased acres being available and reduced distribution occurring within that allotment. In the Hardie Summer Allotment, the addition of a pipeline with three troughs would add a reliable water source in two proposed pastures, Witzel and Thompson. Currently, water in this area is often limited, especially later in the year, which results in livestock congregating around the limited sources. Increased water sources would improve livestock distribution, decreasing utilization in currently accessible areas and increasing utilization in areas not currently available.

⁸⁰ With the exception of Mud Creek Allotment, which would have an initial utilization threshold of 35 percent.

3.6.2.1.4 GM 1 Alternative 4

Under this alternative, livestock use would be approximately half of the authorized AUMs and the utilization threshold would be reduced to 30 percent utilization on all forage species (light graze). The permitted use would be reduced even further in Mud Creek and Hardie Summer Allotments, as livestock would not be authorized in areas that are not meeting ecological objectives. The permitted entry and exit dates for livestock would be two to four weeks shorter, per allotment, than Alternative 1 (except Hammond FFR), this would result in livestock being present within each allotment for a shorter period, and utilizing fewer AUMs, resulting in the permittee having to find additional forage for livestock or reduce livestock numbers. No new developments (fence or water) would be constructed. Existing developments would continue to be used to influence livestock management and distribution as described in the affected environment. Overall, grazing management under this alternative would be more difficult than under other grazing alternatives due to the decreased season of use and limitations on the ability to have a grazing rotation that covers multiple treatments.

3.6.2.1.5 GM1 Alternative 5

Under this alternative, livestock grazing would not occur. Alternative 5 would not improve grazing management or livestock distribution because livestock grazing would not be authorized.

3.6.2.2 **GM Issue 2: How would grazing management be affected by the different levels of permitted active use AUMs and NR grazing?**

The Vegetation section further discusses the effects from reduced or no grazing on native and introduced vegetation, invasive annual grasses, and fine fuel accumulation.

3.6.2.2.1 GM 2 Alternative 1

Under this alternative, permitted livestock AUMs would be 1,500, the same as under the previous permit. However, the permittee(s) would not be authorized any NR AUMs in any of the allotments. NR AUMs had been authorized in the Hammond Allotment previously from at least 1994 to 2012 and averaged between 1,000-1,500 AUMs annually. The intensity of livestock grazing under Alternative 1 without NR use would leave a large amount of standing dead forage available within the Hammond Allotment crested wheatgrass seedings. This is because production would exceed forage removed by permitted AUMs annually. Over time, the accumulation of vegetation from previous years may reduce plant vigor and production on the site, reducing the overall amount of forage available in the crested wheatgrass seeding pastures. While accumulation has been occurring largely unimpeded (some vegetation removal has occurred by wildlife) due to lack of grazing or another vegetation removing disturbance, this alternative would continue accumulation, to a lesser extent than under Alternatives 4 and 5, but more accumulation would occur than under Alternatives 2 and 3 (see Vegetation section for more information on impacts of residual vegetation and accumulation). Without NR AUMs, livestock would be unable to take advantage of years that provide above average forage production, resulting in additional accumulation of forage. Level of use in the Mud Creek,

Hardie Summer, and Hammond FFR Allotments would be anticipated to be the same as before 2014 (Appendix G) with the proposed permitted AUMs, and consequently have similar effects to grazing management.

3.6.2.2.2 GM2 Alternative 2

Under this alternative, permitted AUMs would be increased within the Hammond Allotment, which would result in an increase in total AUMs (from all 4 allotments) of 96 percent. This increase would occur over five years to match the calculated carrying capacity (proposed AUMs) within crested wheatgrass seedings. This would ensure that permitted use, in a normal production year, stays near or under the utilization thresholds. This would help match production with livestock use, reducing the accumulation of old vegetation, while ensuring that there is enough vegetation present after grazing to meet other resource needs. In years of high production in all allotments, NR AUMs would be authorized allowing the permittee(s) to utilize available forage.

Grazing management under this alternative would be improved compared to Alternative 1 since the permittee(s) would be required to follow additional terms and conditions (identified in Sections 2.3.1 Permit Issuance and 2.4.1. Permit Issuance, respectively), and use would still be limited to 50 percent utilization on native key species and 60 percent utilization on desirable non-native species, NR use would still ensure S&Gs can be achieved or if not achieved livestock would not be a causal factor. This flexibility in AUMs with NR use, combined with flexibility in grazing season of use, would allow opportunity for improved grazing management within the allotments.

3.6.2.2.3 GM2 Alternative 3

Under this alternative, active use AUMs would be increased above both Alternatives 1 (212 percent) and 2 (59 percent). Use at these levels may or may not result in full AUMs being used prior to hitting the utilization threshold in any given year.

Within the Hammond Allotment, AUMs would be immediately increased to 2,700 with no phased-in approach. This number represents the calculated carrying capacity from the 2007 Hammond Allotment Evaluation in all pastures, native and crested. However, this was the calculated carrying capacity before proposed pasture changes (pastures shifting to the Hammond FFR). This number of permitted AUMs during a normal production year may result in years where utilization thresholds are met before all permitted AUMs are used. The permitted level of use proposed in the Mud Creek Allotment under Alternative 3 in some years may also cause livestock to be moved before all the AUMs are used due to the utilization threshold being met. The direct effect to grazing management is that livestock may be moved earlier than planned based on utilization monitoring, resulting in the permittee needing to find additional feed to cover additional AUMs. The permitted use on the Hardie Summer Allotment is the same as Alternatives 1 and 2. However, the area of BLM-managed land within the Hardie Summer Allotment under this alternative is decreased from 5,976 acres under Alternative 1 to 3,705 acres of BLM-managed land under Alternative 3. Therefore, while grazing management would have a higher level of flexibility compared to all other alternatives, the effect of permitted grazing levels

on ecological conditions would be expected to be higher than under Alternatives 1 or 2 since permitted AUMs would be removed from a smaller area and there would be a higher potential for damage to occur prior to livestock removal. This may also result in increased likelihood that livestock would need to be removed prior to using all permitted AUMs in order to stay below the utilization threshold. NR use authorized would have the same effects in general as discussed under Alternative 2 as utilization limits would be maintained. One difference is that under Alternative 3, a larger portion of the BCA would be open to NR use, which may increase flexibility over Alternative 2. Another difference is that the likelihood that additional AUMs would be available for NR use would be less under Alternative 2 compared to Alternative 3 as Alternative 3 would be expected to meet utilization thresholds more often than Alternative 2. However, this reduction in the flexibility provided by NR AUMs under Alternative 3 would be offset by the increased number of AUMs permitted under this alternative.

3.6.2.2.4 GM2 Alternative 4

Under this alternative permitted AUMs are reduced by half; this is paired with light grazing use (30 percent for all species). Annually authorized AUMs would be further reduced in Mud Creek and Hardie Summer Allotments where Standards are not achieved, and ecological objectives are not met. Under Alternative 4, the principles of grazing management and factors influencing livestock utilization and distribution that have been discussed in the Grazing Management Affected Environment would continue. Alternative 4 does not propose any NR use, or additional developments (fence or water).

As this would be new grazing management, which has not previously occurred, the BLM cannot say with certainty that the full use of AUMs would occur prior to reaching the reduced utilization threshold. However, as AUMs have been reduced by at least half (50 percent) under this alternative, while the utilization threshold has only been reduced by 20 percent on native species and 30 percent on desirable non-native species, it is expected that permitted AUMs would be fully used prior to hitting utilization thresholds. This would result in decreased distribution as livestock grazing would focus in the areas closest to water, with little need to spread out into other areas further from water. An increase in livestock distribution under this alternative would be possible with additional effort from the permittee(s) by herding livestock on a consistent basis. However, with half of the AUMS permitted compared to Alternatives 1 and 2, and reduced utilization thresholds, the benefit of herding would not be expected to outweigh the cost to the operator. In all the allotments, with the combination of permitted livestock AUMs proposed and utilization threshold, there would be an accumulation of fine fuels, increasing risk of a catastrophic wildfire.

3.6.2.2.5 GM2 Alternative 5

Under this alternative, livestock grazing would not occur. Alternative 5 would have a negative effect to permitted and NR livestock use by eliminating it. This alternative would not respond to the need to address the higher production of crested wheatgrass and availability of additional forage that has occurred in the Hammond Allotment (Section 1.2 Purpose and Need for Action).

3.6.2.3 **GM Issue 3: What is the carrying capacity of the allotments under each alternative and how is that calculated?**

Carrying capacity was calculated the same way between all alternatives. In 2023, the carrying capacity was updated utilizing remote sensing, continuous vegetation data, and the piosphere tool. Using remote sensing technologies, Open Range Consulting (ORC) integrated a 2017 vegetative field survey with Natural Resources Conservation Service soil sites' vegetative production, palatability, water availability, and slope to estimate carrying capacity. ORC's process is based on how rangeland carrying capacity has historically been adjudicated on most BLM allotments but is enriched spatially using GIS data and aerial imagery, as well as on-the-ground photos (Sant et al. 2014). This spatial enrichment makes the process much more dynamic as it can easily be adjusted to investigate the effects in changes in water points, fences, types of livestock, management, unique knowledge, and precipitation. This process used ORC's Piosphere tool that uses "abiotic GIS data to predict livestock distribution across a landscape" (Anderson 2022). A piosphere is a radiating zone of animal use centered around available stock water. Factors that were used to determine carrying capacity included slope, soils, current vegetation, and production. This purpose of this modelling was to assess all the allotments in the BCA to determine the number of AUMs that would be available to livestock within each allotment and or pasture, under each alternative.

The Piosphere tool starts with the estimated site production based on the production on the ESDs; the total production is pro-rated by continuous cover data (which was determined using aerial imagery and remote sensing technology along with on the ground photos (Sant et al. 2014). Per the NRCS Plant Fact Sheet for Crested Wheatgrass, it produces approximately 1.5-2x more production than natives; therefore, within areas seeded to crested wheatgrass, production estimates were adjusted as appropriate. This modelling also took into account palatability, availability, and distance to water, and slope. This estimate of production is then further adjusted by the piosphere, which approximates grazing activity and estimated utilization based on distance to water and slope (Anderson 2022). This resulted in estimated production, which was then converted into AUMs, utilizing only the areas livestock are expected to access, at utilization thresholds appropriate to each alternative. The variables/assumptions made in the process are:

- Total production is determined from NRCS ESDs.
- Palatability is determined by using the percent cover of perennial grass. Annual grass is not included. This is pro-rated out of total production.
- Piospheres
 - Less than 10 percent slope can all be utilized, greater than 35 percent cannot be utilized, with a gradient in between (Cook 1966; Gillen et al. 1984; Stuth 1991; Bailey 1999; Vavra 2005; George et al. 2007; Holechek et al. 2011).
 - Less than 0.5 miles from water can all be utilized, greater than 2 miles cannot be utilized (Vallentine 2001; George et al. 2007; Ganskopp 2011; Holechek et al. 2011), with a gradient in between.
 - A management objective was set for flat and close to water areas of 50 percent utilization (per the 2005 CMPA RMP (Bureau of Land Management 2005a)). There is then a decreasing gradient of 40 percent, 30 percent and 0 with

increasing distance from water or on steep slopes. For Alternative 4, the maximum utilization was set at 30 percent close to water areas and pro-rated with increasing distance.

- o For Alternatives 1-3, the management objectives for seeding areas were adjusted for utilization. Where it is flat and close to water too it was adjusted to 60 percent (per the 2005 CMPA RMP (Bureau of Land Management 2005a)) and 50 percent, 40 percent, and 0 percent as distance and steepness increase. For Alternative 4 the maximum threshold was set at 30 percent.
- Analysis was run twice, once using only reliable water sources (water sources that are available for use in most years, including drought ones) and again using all water sources.

While these models provide us with valuable information, they are based on assumptions (see above) and are subject to common mapping errors as discussed in Alred and others (2022). Therefore, the numbers in tables 3-4 through 3-7 should be used as guides and not facts. Differences between the values in the tables below are largely due to changes in fences, and to a lesser extent water availability within the modified pastures. Changing fences can result in water sources being removed or added to pastures, as well as change the acreage within each pasture, which directly impacts carrying capacity estimates. Changes in utilization thresholds also impact carrying capacity.

3.6.2.3.1 GM3 Alternative 1

Under this alternative, piosphere modelling estimates carrying capacity at the allotment levels⁸¹ shown in Table 3-4. For a visual representation of the piosphere model see Appendix A: Map G – Alternative 1 Piosphere Modelling.

Table 3-23: Alternative 1 Piosphere Modelled Carrying Capacity (AUMs)

Allotment	Reliable Water Only	All Water
Hammond	1,712	1,742
Mud Creek	749	804
Hardie Summer	1,211	1,275
Hammond FFR	98	98

This carrying capacity represents AUMs available with the current fences and water availability and with a 50 percent utilization threshold on native key species and 60 percent on desirable non-natives.

3.6.2.3.2 GM3 Alternative 2

Under this alternative, piosphere modelling estimates carrying capacity at the allotment levels shown in Table 3-5. For a visual representation of the piosphere model see Appendix A: Map H – Alternative 2 Piosphere Modelling.

⁸¹ As the BLM authorized grazing only on BLM-managed lands, the carrying capacities shown in the tables do not include AUMs available on private land.

Table 3-24: Alternative 2 Piosphere Modelled Carrying Capacity (AUMs)

Allotment	Reliable Water Only	All Water
Hammond	1,620	1,650
Mud Creek	748	804
Hardie Summer	1,164	1,208
Hammond FFR	278	286

This carrying capacity represents AUMs available with the adjusted pasture boundaries due to fence construction and removal and the resulting changes to water availability.

3.6.2.3.3 GM3 Alternative 3

Under this alternative, piosphere modelling estimates carrying capacity at the allotment levels shown in Table 3-25. For a visual representation of the piosphere model see Appendix A: Map I – Alternative 3 Piosphere Modelling.

Table 3-25: Alternative 3 Piosphere Modelled Carrying Capacity (AUMs)

Allotment	Reliable Water Only	All Water
Hammond	1,607	1,635
Mud Creek	745	797
Hardie Summer	614	619
Hammond FFR	176	176
Hardie FFR (New)	718	725

This carrying capacity represents AUMs available with the adjusted pasture boundaries due to fence construction and removal and the resulting changes to water availability. It differs from Alternative 2, and changes to fences are different under each alternative.

3.6.2.3.4 GM3 Alternative 4

Under this alternative, piosphere modelling estimates carrying capacity at the allotment levels shown in Table 3-26. For a visual representation of the piosphere model see Appendix A: Map J – Alternative 4 Piosphere Modelling.

Table 3-26: Alternative 4 Piosphere Modelled Carrying Capacity (AUMs)

Allotment	Reliable Water Only	All Water
Hammond	458	469
Mud Creek	291	323
Hardie Summer	531	599
Hammond FFR	37	37

This carrying capacity represents AUMs available with current pasture boundaries, fences, and water availability. However, it is decreased compared to Alternative 1 due to the utilization threshold on all species being reduced to 30 percent.

3.6.2.3.5 *GM3 Alternative 5*

Under Alternative 5, no livestock grazing would be authorized. Therefore, the set carrying capacity based on BCA goals and objectives would be 0 AUMs for all livestock.⁸²

3.6.2.4 *GM Issue 4: How would proposed crossing permits impact forage allocations?*

3.6.2.4.1 *GM 4 Alternative 1*

This alternative would issue one or more grazing permits on all four allotments for ten years with the same terms and conditions that were on the 2004 grazing authorization. This would continue grazing management as it was authorized on the 2004 grazing authorization.

Under this alternative, trailing within the BCA by the BCA permittee(s) would occur under their grazing authorization and through their annual letter of authorization. Crossing permits (trailing by a permittee from outside the BCA area, across BCA allotments) were not issued in the past and would not be issued under this alternative. Any crossing by a non-permittee would occur under an annual letter of authorization, which would specify terms and conditions of the trailing, including a requirement that it be active (livestock being actively pushed by the permittee, not just allowing livestock to drift on their own). Crossing/trailing occurring under a letter of authorization would not result in exceedance of carrying capacity or impacts to ecological systems that would put the area at risk of not achieving land health standards and guidelines due to grazing, as trailing would be for such a short period and would not remove many, if any, AUMs from the trailing area. As existing trails and roads would be utilized, no new trails would be made. Trailing would not result in any impacts beyond what would occur through permitted grazing.⁸³ Crossing/trailing that occurs without prior approval of the BLM would result in trespass and could result in ecological damage, especially if animals are allowed to trail passively and result in increased use within a pasture.

3.6.2.4.2 *GM4 Alternative 2*

Under this alternative crossing permits (active trailing) are addressed in the terms and conditions of the grazing permit, or for livestock owners that are not permit holders within the BCA, in Section 2.1.6 Crossing Permits. Considered collectively, crossing permits are part of the grazing season and would be recorded on the actual use form (permittees), and would count toward authorized AUMs. Crossing permits for non-permittees would be issued through the BLM Rangeland Administration System and would be charged based on current grazing fees for any AUMs used. Due to the short duration of crossing/trailing, and the ability to apply terms and conditions, such as the use of active trailing and specified time frames, among other terms and

⁸² This would set the administrative carrying capacity as 0, though the BLM recognizes that ecologically, a carrying capacity can always be calculated.

⁸³ Third party crossing of livestock across BLM allotments (not under any of the permittees grazing authorizations issued by BLM) has traditionally occurred through coordination directly with the authorized permittee for those allotments, and not through the BLM. However, the BLM is working to document and appropriately authorize crossing. Currently, within the BCA, there is one permittee that is authorized to trail through the Krumbo Creek Pasture of the Hammond Allotment in order to move livestock from the Krumbo Creek Pasture to Krumbo Mountain Allotment. That crossing authorization contains specific terms tied to the trailing. However, the BLM is working to determine whether unauthorized trailing is occurring within the Krumbo Creek Pasture and to address any associated trespass use.

conditions, it is not expected that crossing or trailing under this alternative would result in exceedance of carrying capacity or impacts to ecological systems that would put the area at risk of not achieving land health standards and guidelines due to grazing. As existing trails and roads would be utilized, no new trails would be made. Trailing would not result in any impacts beyond what would occur through permitted grazing.

3.6.2.4.3 GM4 Alternative 3

Under this alternative crossing permits were not addressed and are not a term and condition on the grazing permit. Crossing would occur as it has in the past, as described under Alternative 1.

3.6.2.4.4 GM4 Alternative 4

Under this alternative crossing permits (active trailing) are addressed in the terms and conditions of the grazing permit, or for livestock owners that are not permit holders within the BCA, in Section 2.1.6 Crossing Permits. Impacts would be the same as described under Alternative 2.

3.6.2.4.4.1 GM4 Alternative 5

Under this alternative, livestock grazing would not occur. Alternative 5 would not provide crossing permits and forage allocations would not be affected. Crossing by non-permittees would occur as it has in the past without a permit.

3.6.2.5 GM Issue 5: How would proposed livestock grazing affect the ability of sagebrush (important cover and forage for GRSG and other sagebrush-obligate species) to reestablish on a burned site?

Sagebrush is important nesting cover and a year-round food source for GRSG, sagebrush obligate songbirds, and other wildlife. The 2006 Granddad Fire burned approximately 60 percent of available sagebrush habitat within the allotments. An additional 5,509 acres of sagebrush and other upland shrub habitat within the allotment have been impacted by additional fires of various size that have occurred since 2006. Successful establishment of sagebrush seedlings within fire impacted areas varies throughout the allotments due to different site characteristics (see Vegetation section). Variability includes sagebrush species (short vs. tall statured) and subspecies type (basin, Wyoming, mountain big sagebrush) and is dependent on several factors including increasing elevation and associated higher annual precipitation. More productive sites result in increased germination and accelerated plant growth depending on soil type. Loamy soils generally occurring at higher elevations in the north Steens are more productive than clay soils occurring lower on the mountain. Mountain big sagebrush occurring at 4,500 feet or higher tend to be more prolific seed producers than Wyoming big sagebrush, which occurs at lower elevations where growing conditions are more challenging. Another factor influencing sagebrush recruitment is the severity of the fire impacts and subsequent availability of sagebrush seed sources. Where fires burned particularly hot, leaving large areas completely burned, vegetation and/or heat remained in the soil long enough to destroy underground seed stocks, and seed sources required to re-establish sagebrush may not be available. BLM recognizes this issue and

is currently implementing an active restoration project with the goal of re-establishing native shrub habitat within the burned areas where it is currently absent (2023 Mud Creek Restoration DNA (Bureau of Land Management 2023c)); these actions are considered RFFA and considered under cumulative effects.

In 2023, approximately 2,000 sagebrush seedlings were planted within the Mud Creek Allotment. Because sagebrush is not a preferred forage for livestock, very little, if any, direct grazing of sagebrush seedlings is anticipated to occur under any grazing alternative. Livestock are not known to graze sagebrush directly unless other options, such as grass species, are very limited or unavailable. While livestock could trample sagebrush seedlings, as seedlings become established and grow, the risk of trampling under proper grazing management decreases as animals begin to move around the plants. Since utilization thresholds would limit utilization on desirable species there would not be a motive for livestock to alter their preference from grasses to sagebrush. Research has shown that even moderate to high stocking rates still allow for sagebrush reestablishment. A study by Miller, Doescher, and Purrington (1991) suggested that removing livestock grazing was unlikely to increase canopy size and reproductive effort. Austin and Urness (1995) found spring grazing by horses (35-80 percent utilization on grass) led to greater big sagebrush survival and seedling recruitment; in fact, sagebrush survival and seedling recruitment were both lower in the ungrazed plots than in either the moderately or heavily grazed plots.⁸⁴ Big sagebrush cover was almost twice that of non-grazed areas after five years of cattle grazing in a study by Davies and others (2020). Another study found big sagebrush cover and density in a burned area was the same after low, moderate, and high livestock stocking rates (Bates and Davies 2014). Since none of the alternatives include high stocking rates, and livestock would be removed if utilization exceeded 50 percent on native key species and 60 percent on crested wheatgrass, sagebrush cover is expected to increase gradually throughout the allotments under all grazing alternatives. Sagebrush may increase more under grazing alternatives that authorize a higher utilization threshold (Alternatives 1, 2 (except Lower Field Pasture of Mud Creek Allotment), and 3) when compared to Alternative 4.

3.6.2.5.1 GM5 Alternatives 1, 2, and 3

Direct effects from livestock grazing are anticipated to be similar under Alternatives 1 and 2 because the utilization thresholds are the same for the majority of the BCA allotments and pastures. Livestock would graze on herbaceous species, which would reduce some direct competition between herbaceous and shrub species. Another direct effect would be potential trampling of seedlings by cattle in areas where cattle are likely to congregate, such as supplemental feeding sites, fence lines, and near water sources. The risk of this interaction would be higher during the first two-three years of growth when plants are small, and the number of seedlings is high. In areas of congregation, this interaction between livestock and seedlings may reduce or delay re-establishment of sagebrush and other shrubs.

No supplemental feeding beyond what has previously occurred (salt and minerals) would occur under Alternatives 1, 2, 4, or 5. However, under Alternative 3, supplemental feeding of alfalfa is

⁸⁴ Horse and cattle diets overlap, and they graze in similar manners. However, horses can graze to a higher utilization due to a mouth structure that allows them to graze closer to the ground compared to cattle.

proposed. This feeding would occur only in areas previously used for supplementation, which would limit this activity to already disturbed sites.

Under Alternatives 1, 2, and 3, indirect effects would be potentially faster recruitment of sagebrush where there is an adequate sagebrush seed source available. The anticipated effects under Alternative 2 in the Lower Field of Mud Creek Allotment would be the same as under Alternatives 1 and 3, but with a longer time trajectory, provided the utilization threshold was increased. If the utilization threshold is not increased over the long term, sagebrush recruitment, if not augmented by sagebrush planting, could take longer.

3.6.2.5.2 GM5 Alternative 4

Under Alternative 4 the grazing season is limited to the dormant season, meaning all vegetation including herbaceous species have the opportunity to complete their life cycle before grazing occurs. This grazing would not have the same direct effects as Alternatives 1, 2, and 3 because grazing would not occur when the plants are competing for resources, particularly available moisture. Under this grazing timing, livestock grazing would not influence the herbaceous growth in a way that would favor shrubs. Grazing under Alternative 4 is anticipated to have little to no influence on sagebrush establishment because of the timing of grazing, even in portions of the Mud Creek and Hardie Summer Allotments where annual grazing is not authorized due to ecological objectives not being met (though livestock grazing is not currently a causal factor). The intensity of grazing (based on utilization thresholds) would result in few to no short- to long-term effects on herbaceous species, and even less on shrub species; these relationships are further discussed in the Vegetation section.

3.6.2.5.3 GM5 Alternative 5

Under Alternative 5, the No Grazing Alternative, livestock grazing would have no effect on sagebrush recruitment. There would be no grazing impacts that would favor shrub recruitment or reduce herbaceous species competition with shrub species. Shrub recruitment would be limited by available seed source, competition with other vegetation, and environmental conditions. Based on a review of relevant literature, it is anticipated that Alternative 5 would have the slowest rate of shrub establishment, given a seed source is available.

3.6.2.6 GM Issue 6: Would proposed livestock grazing influence juniper expansion?

Woody vegetation has increased on rangelands worldwide for the past 100–200 years, often because of reduced fire frequency (Davies et al. 2019). Modern day western juniper infilling⁸⁵ in the BCA allotments is a long-term (140 year) cumulative result of less fire on the landscape. Over time, fire suppression has allowed juniper to increase and infill sites unimpeded until reduced by other means, which have been largely mechanical in the BCA and vicinity. The history of juniper expansion in the BCA is covered in the Vegetation section. To summarize,

⁸⁵ Infilling is defined as the movement of juniper trees into areas that did not previously have juniper but are located between areas that historically did. For example, infilling could occur on hillslopes between two rocky drainages that historically held juniper.

wildfire continues to be prevented or suppressed on the landscape for several land management reasons such as health and safety of humans and structures, protection of wildlife habitat and livestock forage, and minimizing disturbance that can facilitate invasive annual grass spread potential, amongst others. Grazing invasive annual grasses is one tool to reduce fire behavior and spread, which is discussed in the Vegetation section. Land managers must balance the implications of allowing fire to burn, versus suppressing it, in the context of promoting future multiple uses. By suppressing fire, continuation of juniper infilling is an expected consequence. Juniper woodland expansion in sagebrush steppe plant communities has a number of adverse effects including increased soil erosion, loss of wildlife habitat, and reduced herbaceous and shrub productivity (Miller et al. 2005).

Livestock do not prefer to graze juniper for forage and, therefore, would not have a measurable direct effect to the plant, unless by trampling of small seedlings, which is not common. Seedling stage junipers are prickly and tend to be tucked under a nurse plant such a shrub and are often avoided by cattle. This is in contrast with invasive annual grasses, which livestock will eat, and the timing of such grazing can be used to influence management, to reduce the risk of catastrophic or mega fires (Davies, Bates, Boyd, et al. 2021) (further covered in the Vegetation section). Indirectly, grazing can reduce the likelihood of wildfire ignition and spread by reducing fine fuels and increasing fuel moisture content (Davies et al. 2015a; Davies et al. 2017). Prolonged fire return intervals allow fire sensitive woody species to expand from fire safe areas into more productive areas, and infill in areas where they historically were maintained at low densities (Miller and Rose 1995; Briggs et al. 2002; Johnson and Miller 2008). Where livestock grazing has occurred, there is a higher likelihood of a mosaic burn pattern that would retain patches of sagebrush for wildlife habitat, and islands for desirable vegetation seed post-burn, but within those unburned areas juniper would not be killed and would pose a long-term threat to land health by outcompeting other vegetation.

Scientists disagree on the role and importance of fire and grazing in recent juniper woodland expansion and infill across the Great Basin (Miller et al. 2019). Adding the invasive annual grass variable has only added to the complexity of the current role of fire on the landscape. Initially the livestock grazing practices between the 1880s–1930s were unregulated, and herbaceous vegetation was grazed very heavily (see Vegetation section). Historical grazing practices, paired with fire suppression, allowed juniper to accelerate the rate of infilling or encroachment in the BCA, particularly the Mud Creek Allotment and Bridge Creek Pasture of the Hardie Summer Allotment. In other areas of the west, there was also observed decline in perennial grass cover from heavy grazing in the early 1900s, which coincided with the expansion of young woodlands (Emerson 1932; Nichol 1937; Woodbury 1947). Depletion of perennial grasses due to historic grazing increased the shrub canopy and also augmented woodland expansion by increasing the availability of safe sites for tree-seedling establishment (Miller et al. 2019).

Currently, livestock grazing has been regulated, utilization thresholds are in place, and promoting the health and vigor of deep-rooted perennial bunchgrasses are at the center of grazing management. However, during this shift from historical to contemporary grazing management, juniper has infilled and increased the available seed source. This being the case, it is anticipated under all alternatives (grazing or no grazing) that the absence of fire or other replacement

treatments means juniper would continue to increase. This would occur regardless of timing or intensity of grazing. Furthermore, the juniper that may have benefitted from heavy, unregulated grazing in the late 1800s and early 1900s are the same juniper that have contributed to an increased risk of land health decline in the BCA. However, their continued existence is due to long-term suppression of wildfire, not the moderate grazing management proposed under grazing alternatives.

3.6.2.6.1 GM6 Alternatives 1, 2, and 3

Under Alternatives 1, 2, and 3, it is not anticipated that livestock would directly affect individual junipers or woodlands by grazing or trampling. Indirectly, livestock grazing would reduce fire behavior by impacting fine fuel amounts, fuel structure, burn continuity, ignition, and initial spread. Fire effectively kills junipers at different stages of their lifecycles, but they are especially vulnerable as seedlings. Late phase juniper (mature trees) may have outcompeted other vegetation, resulting in a reduced understory of fine fuels to allow for fire spread regardless of grazing intensity. Davies and others (2023) found that moderate grazing (40–55 percent utilization) reduced the probability of an ignition, and reduced fire spread, whereas light grazing (15–30 percent utilization) was largely ineffective. Utilization thresholds on deep-rooted perennial bunchgrasses would be 50 percent for native bunchgrasses, which generally overlaps where the juniper have primarily been infilling. An exception would be a 35 percent utilization threshold in the Lower Pasture of the Mud Creek Allotment, which, depending on adaptive management, may be increased to 50 percent over time. Since that pasture was almost completely burned in 2006, juniper is less of a current management concern than in other parts of the BCA. Under these assumptions grazed areas would have less ignition and initial spread (Davies, Johnson, et al. 2023), and severity of fire, resulting in fewer juniper killed. Under grazing Alternatives 1, 2, and 3, there is management flexibility to rest and defer grazing to intentionally allow fine fuels to accumulate in preparation for a prescribed fire, which, if it were to occur (not currently proposed), would increase the efficacy of juniper treatments to 30 years (Davies et al. 2019) when compared to cutting juniper. The use of prescribed fire to treat juniper has been analyzed in the North Steens Ecosystem Restoration Project EIS and is outside of the scope of the current EIS.

In summary, grazing would influence fires that may reduce infilling of juniper within the burned area for 30 years or more. However, overall grazing would have a neutral effect on juniper expansion, considering ongoing, widespread fire suppression. Under all grazing alternatives, grazing management could be adjusted to allow for the reintroduction of fire to the landscape for management objectives, including reducing juniper.

3.6.2.6.2 GM6 Alternative 4

Indirectly, the utilization threshold of 35 percent would be on the line between being ineffective at reducing ignition of fire and initial fire spread, according to recent scientific studies (Davies, Johnson, et al. 2023). This means that under Alternative 4, the likelihood of a fire that catches and spreads is higher than under Alternatives 2 and 3 and would kill more juniper where it burned. This likelihood is further increased in the Mud Creek and Hardie Summer Allotments as

areas that are not achieving ecological objectives would not be annually authorized, resulting in increased fine fuel accumulation.

3.6.2.6.3 GM6 Alternative 5

Under Alternative 5, No Grazing, fine fuels would not be reduced in any amount by livestock grazing. Climatic conditions and ecological site potential would control the amount of fuels and fuel continuity. Manipulation of fuel characteristics to prevent or reduce fire behavior would be by other means, such as by mechanical means. Juniper would continue to infill where fires are suppressed. Fires that do occur would likely be hotter and burn more completely, which would kill more juniper, and other vegetation, when compared to a cooler mosaic burn pattern that occurs with lower fuel loading.

3.6.2.7 GM Cumulative Effects

The CEAA for grazing management consists of the four allotments within the BCA because the factors influencing grazing management (permitted use for AUMs, utilization, and season of use) are set at the allotment level. Changes to permitted livestock grazing use outside the BCA would not affect grazing within the BCA allotments.

In addition to the effects to grazing management from past and ongoing actions outlined in the affected environment section, and the effects to grazing management from the alternatives described immediately above, other RFFAs include continued weed treatments, road maintenance, restoration actions, juniper treatments, and fire.

Restoration actions, as analyzed in the North Steens Ecosystem Restoration Project EIS (Bureau of Land Management 2007d) and the South End Complex ESR EA (Bureau of Land Management 2006a) (and reviewed in the Mud Creek Restoration and Adjacent (Non-WSA) North Steens Ecosystem Restoration DNAs (Bureau of Land Management 2023c; Bureau of Land Management 2024a)), and future actions related to fires, include spraying invasive annual grasses and other weeds, seeding of desirable grasses, planting shrubs, and treating juniper would continue to occur under all alternatives. While many of these actions can occur without directly impacting grazing management, others may require avoidance or rest of certain areas, which would result in short-term changes to grazing. As all restoration activities would focus on maintaining and improving ecological conditions, in the long term, they would also benefit livestock grazing.

Road maintenance activities would allow permittees and the BLM to access the BCA in an efficient manner, that best allows for timely monitoring and grazing management.

The indirect effect of proposed grazing management is that livestock would be available to be used for fine fuel reduction and grazing of annual grasses where they occur, during the season when grazing would be most effective or beneficial. For the area as a whole, this would result in improved mosaic patterns when fire occurs, allowing for better recovery of the site, and reducing

the risk that a catastrophic fire would burn within the BCA, and spread to adjacent areas, which would have effects outside of the CEAA for grazing.

3.7 GRSG and Other Sagebrush Obligate Migratory Birds (GRSG)

3.7.1 GRSG Affected Environment

The GRSG Multiscale Habitat Assessment Framework Report is located in Appendix J.

In September 2015, the United States Fish and Wildlife Service (USFWS) determined that designation of GRSG (*Centrocercus urophasianus*) as “Threatened” under the Endangered Species Act was “warranted but precluded...” by limitations within USFWS to manage designation (U.S. Fish & Wildlife Service 2015). However, GRSG remain an ESA candidate species whereby populations and habitat are subject to review every five years for future ESA listing (U.S. Fish & Wildlife Service 2015). In September 2015, the BLM and cooperating partners from state governments and other stakeholders implemented the GRSG ARMPA (Bureau of Land Management 2015a), which effectively amends all existing BLM land management plans, including the AMU and Steens CMPA RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a), to allow BLM to better manage Federal lands to benefit GRSG and curtail further population and habitat loss.

The BLM administers two categories of GRSG habitat in Oregon. PHMA are the highest value lands for maintaining sustainable GRSG populations. GHMA are areas of seasonal habitat outside of PHMA. There are 21,581 acres of PHMA and 4,844 acres of GHMA in the BCA. BLM GRSG management areas were mapped based on coarse-scale models (Durtsche et al. 2009) that were not intended for site-specific use and, therefore, contain areas of non-habitat. For example, crested wheatgrass seedings generally lack adequate sagebrush cover and are, therefore, considered “marginal” or “unsuitable” areas for sage-grouse (Reynolds and Trost 1980; Beck and Mitchell 2000; Connelly et al. 2000; Bureau of Land Management 2005c; Hagen 2011) despite being located within designated GRSG habitat management areas. Other areas within PHMA or GHMA lacking adequate sagebrush cover due to juniper encroachment (which results in a loss of herbaceous production (Morford et al. 2022)), fire, or sites dominated by invasive annual grasses, are also considered to be “marginal” or “unsuitable.” The 2015 GRSG ARMPA mandates that BLM incorporate adaptive management strategies targeting specific vegetative components in order to progress “marginal” and “unsuitable” habitat within GRSG management areas towards “suitable” habitat over time.

PHMAs in Oregon largely correspond directly with priority areas of conservation (PAC) and were based on “Core Areas” described in the Oregon Department of Fish and Wildlife’s 2011 GRSG Conservation Assessment and Strategy Plan (Hagen 2011) to maintain and enhance populations and habitat. The BCA allotments fall within the Steens PAC. Birds may move between this PAC and the adjacent Dry Valley-Jack Mountain PAC, and Pueblos-South Steens PAC.

Four of the seven leks within four miles of the BCA were active and considered occupied as of 2023 (Table 3-8). The three leks closest to Hardie Summer are part of a lek complex and occur in close proximity to each other; however, over the past several years use appears to be occurring at just one of the leks within the complex.

Table 3-27: ODFW Annual and Status of GRSG Leks Within 4 Miles of the BCA Allotments

LEK ID NUMBER	NEAREST ALLOTMENT	MILES	ANNUAL STATUS					Conservation Status (2023)
			2019	2020	2021	2022	2023	
HA0004-01	Mud Creek	0	Active	Inactive	Inactive	Inactive	Active	Occupied
HA0052-01	Hammond	3.3	Inactive	Unknown	Unknown	Unknown	Unknown	Unoccupied
HA0077-01	Hardie Summer	3.1	Active	Active	Active	Active	Active	Occupied
HA0077-02	Hardie Summer	3.6	Inactive	Inactive	Inactive	Inactive	Active	Occupied
HA0077-03	Hardie Summer	3.3	Inactive	Inactive	Inactive	Inactive	Inactive	Unoccupied
HA0098-01	Hammond FFR	0.4	Inactive	Inactive	Unknown	Unknown	Inactive	Unoccupied
HA0098-02	Hammond FFR	0.9	Active	Active	Active	Active	Active	Occupied

The adaptive management strategy outlined in Appendix J of the GRSG ARMPA (Bureau of Land Management 2015a) identifies hard and soft triggers for habitat and populations within Oregon PACs. Soft triggers represent an intermediate threshold indicating that management changes may be needed at the implementation level to reduce the likelihood of tripping a hard trigger. Hard triggers represent a threshold indicating that immediate and more restrictive plan-level action is needed to address GRSG conservation objectives.

The Steens PAC and the Pueblos/South Steens PAC tripped the soft population trigger, for the first time since the triggers went into effect, in 2019. However, in recent years a steady increase in male attendance at leks has been observed, with a peak increase of 23.9 percent in 2022 followed by an additional 10 percent increase in 2023 (Foster 2016; Foster 2017; Foster 2018; Foster 2019; Foster and Vold 2020; Vold 2021; Vold 2022; Vold 2023). Prior to 2020, the number of males observed at the same leks in the Steens PAC had declined 1.68 percent per year since 2003, with an overall population decline of 57 percent (Foster and Vold 2020).

Numbers of male GRSG counted at leks and persistence of leks is directly related to landscape features surrounding the lek (Connelly et al. 2000; Holloran and Anderson 2005; Knick and Hanser 2011). Areas that have burned and human development are the primary factors influencing fate of leks (Knick and Hanser 2011). While exact factors contributing to favorable population trends in the area are unknown, it is assumed ongoing juniper removal, recovery of post-fire vegetation in some areas, and increased winter and spring precipitation within PHMA on the Steens have improved conditions; Drut et al. (1994) found that GRSG may have larger ranges during wet years due to increased forb availability. Recent conditions are likely positively impacting nesting and brood-rearing seasonal habitats, resulting in increased chick survival and recruitment into the adult population.

Table 3-28: Population Trend Data and 2023 BLM Adaptive Management Triggers

Oregon PAC	2023 BLM Estimate (males)	% Change 2022 to 2023	5-Year Average (males)	2023 BLM Population Trigger
Dry Valley/Jack Mountain	93	-1.1	76	Hard
Pueblos/South Steens	107	+32.1	117	None
Steens	196	+35.2	134	None

BLM's 2023 GRSG PAC Adaptive Management Report (Bureau of Land Management 2024b) and the 2023 ODFW GRSG Population Report (Vold 2023) for Steens PAC indicate a 35.2 percent increase in male lek attendance above the 2022 count indicating a continued 4-year upward trend of the GRSG population in the Steens area. However, number of males counted at the same leks has declined 59.7 percent since 2003 (Vold 2023). Population peaks are lower over time, although nadir to nadir (troughs) population estimates appear relatively stable.

The HAF (Bureau of Land Management 2015f) establishes indicators to determine the suitability of GRSG habitat at nested spatial scales. Habitat at the broad-scale (first order) is defined by the extent of GRSG distribution range-wide. Second order describes habitat characteristics linked to bird dispersal capabilities; third order characterizes GRSG seasonal habitat use within a home range(s). In this analysis, the second order area is Warner-Meinzer (11.7 million acres). In the Oregon portion of the Warner-Meinzer area; greater than 80 percent of the historical GRSG habitat is intact (Hagen 2011). The third order area is Steens-South Pueblos (1.2 million acres). The BCA lays entirely within the third order, Steens-South Pueblos area. See Map K – GRSG 2nd, 3rd, and 4th Order HAF Boundaries.

GRSG in Oregon generally exhibit one-stage migratory behavior with the largest movements (approximately 10 miles) occurring between breeding and summer habitats, which corresponds with elevational movements in mountains (Hagen 2011). As sage-grouse habitat covers such large areas of habitat, impacts to habitat can be multivariate and management of habitat requires working across multiple resources (Crawford et al. 2004). In the Steens-South Pueblos third order area, nesting, brood-rearing, and summer ranges are well connected. However, juniper encroachment, burn scars, steep terrain, and roads constrain lek kernel size (Jones 2015). Lek kernel size and frequency of kernel clusters increase from north to south. The least-cost path connecting lek kernels at the north end of the Steens PAC to lek kernels at the south end of the PAC is across the top of Steens Mountain, above the juniper belt and large burn scars. GRSG avoid burned areas in sagebrush landscapes because habitat characteristics important for nesting, brood concealment, and food are destroyed by fire and have slow recovery rates (Connelly et al. 2000). A weak least-cost path with several pinch-points links the Bridge Creek lek kernels to leks west and north of Steens PAC in the Dry Valley-Jack Mountain PAC (Jones 2015: 10 & 14).

At the third order, habitat is suitable, because seasonal use areas are well-connected and anthropogenic disturbance is low. However, the percent of capable acres within the Steens PAC supporting sagebrush cover appropriate for GRSG is at the threshold level for meeting the BLM adaptive management habitat trigger (Bureau of Land Management 2015a). The primary causes of sagebrush loss within the area have been wildfire (231,316 acres since 1990), juniper encroachment (133,109 acres), and managed crested wheatgrass seedings (60,120 acres). Habitat connectivity could be improved in the BCA if sagebrush were reestablished in limiting area and if juniper were removed from the Mud Creek and Hardie Summer Allotments. These actions are beyond the scope of this analysis and restoration actions are already occurring within the BCA through previous analyses (2007 North Steens Ecosystem Restoration Project EIS and ROD (Bureau of Land Management 2007d; Bureau of Land Management 2007e), 2006 South End Complex Emergency Stabilization Plan Environmental Assessment (Bureau of Land Management 2006a), and the 2006 Five Creeks Rangeland Restoration Project EA (Bureau of

Land Management 2006b)), which were reviewed in the 2023 Mud Creek Restoration DNA(Bureau of Land Management 2023c) or the 2024 Adjacent (Non-WSA) North Steens Ecosystem Restoration (Bureau of Land Management 2024a). Both DNAs include restoration activities in the BCA, with the Mud Creek Restoration DNA (Bureau of Land Management 2023c)focusing on restoration within the Mud Creek Allotment, and the Adjacent (Non-WSA) North Steens Ecosystem Restoration DNA (Bureau of Land Management 2024a)focusing on restoration within the Krumbo Creek Pasture of the Hammond Allotment, as well as additional areas outside of the BCA. Restoration activities in these documents include seeding and planting of grasses, sagebrush, and riparian species, among others.

Site-scale (fourth order) habitat objectives for GRSG seasonal habitat are presented in the GRSG ARMPA Table 2-2 (Bureau of Land Management 2015a). Less than 70 percent of the breeding and upland summer/late brood-rearing season habitat within the third order area of analysis was suitable (Table 3-10). Thus, the landscape scale objectives for these seasonal habitats (Bureau of Land Management 2015a: 2–2) were not met. Almost 30 percent of the breeding season habitat plots were unsuitable, while 21 percent of upland summer/late brood-rearing habitat were unsuitable (Appendix J). Most marginal or unsuitable plots, particularly at low elevation sites, had inadequate sagebrush cover and perennial forb cover. Davies and Bates (2010b) found that lower elevations Wyoming big sagebrush sites produced a lower level of forb biomass, with less diversity than higher mountain big sagebrush sites, and site capabilities should be taken into consideration. Plots with juniper cover were mostly unsuitable, as were plots in managed crested wheatgrass seedings.

Table 3-29: GRSG Habitat Suitability Ratings and Proportional Area Estimates⁸⁶ for Seasonal Habitat Types in the Steens/South Pueblos Third Order HAF Analysis Area

SEASONAL HABITAT	NUMBER OF LEKS, PLOTS, OR SITES			PROPORTIONAL AREA ESTIMATE		
	Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
Breeding (Lekking)	36 Leks	17 Leks	3 Leks	NA	NA	NA
Breeding (Nesting/Early Brood-Rearing)	8 Plots	16 Plots	10 Plots	44.6% CI (35.5, 54.1)	32.4% CI (24.3, 41.8)	23.0% CI (16.0, 31.8)
Upland Summer/Late Brood-Rearing	15 Plots	15 Plots	8 Plots	36.6% CI (28.4, 45.5)	46.7% CI (38.0, 56.0)	16.7% CI (11.0, 24.4)
Riparian Summer/Late Brood-Rearing	PFC 86 Sites	FAR 44 Sites	NF 4 Sites	NA	NA	NA
Winter	45 Plots	27 Plots	33 Plots	21.9% CI (17.8, 26.7)	53.3% CI (47.8, 58.6)	24.8% CI (20.5, 29.8)

Overall, habitat suitability was not determined at the allotment scale because not all seasonal habitat suitability indicators identified in the GRSG ARMPA (Bureau of Land Management 2015a: 2–2) were measured at this scale and the number of AIM/LMF plots (which monitor appropriate characteristics) is generally insufficient to make these determinations. Instead, sagebrush canopy cover and perennial grass cover within the allotments are assessed and compared to the HAF site-scale data. Open Range Consulting collected and processed the data presented below using the methods described in Sant and others (Sant et al. 2014).

⁸⁶ Eighty percent confidence intervals. Proportional area estimate is based on unequal weighting of plots.

- *Breeding Habitat (Lekking, Nesting, and Early Brood-Rearing)*: There are 21,971 acres of breeding season habitat comprising 84 percent of the BCA (Appendix J). More than 90 percent of the Hammond FFR, Mud Creek, and Hardie Summer Allotments is breeding habitat, while 66 percent of the Hammond Allotment is breeding season habitat.⁸⁷ Lack of sagebrush cover and low forb abundance are the primary factors causing a marginal or unsuitable rating at all (n=8) AIM and LMF plots (Appendix J). Overall, 18 percent (2,990 acres) of the breeding habitat in the BCA allotments provides suitable sagebrush cover (i.e., 10 to 25 percent sagebrush and < 4 percent juniper cover), varying from 17 percent (482 acres) in Hardie Summer to 18 percent on both the Hammond Allotment and Hammond FFR (1,221 acres and 123 acres respectively) (Table 3-11). Juniper exceeds 4 percent cover on approximately 5,561 acres (25 percent of the breeding habitat in the BCA). The acres of breeding season habitat invaded by juniper, within each allotment, range from 557 acres (8 percent of habitat) in the Hammond Allotment to 2,610 acres (47 percent of habitat) on the Hardie Summer Allotment.

Perennial grass cover is suitable on 12,947 acres (59 percent) of the breeding season habitat within the BCA, ranging from 3,857 acres (48 percent) in Mud Creek Allotment to 5,144 acres (71 percent) on the Hammond Allotment (Table 3-11). Approximately 76 percent of arid sites within the breeding habitat contain suitable perennial grass cover for GRSG (i.e., ≥ 10 percent cover). There are no arid perennial grass sites on Hardie Summer Allotment. Approximately 47 percent of mesic sites within the breeding habitat have suitable perennial grass cover for GRSG (i.e., ≥ 20 percent cover); Hardie Summer (all mesic) has the highest proportion of suitable mesic perennial grass cover (61 percent).

Of 56 active and inactive leks in the Steens-South Pueblos fine scale area, 36 were rated suitable (Appendix J). Lek sites are typically adjacent to sagebrush that provides nesting habitat and protection from avian predators, and support short, sparse vegetation, if any at all (Connelly et al. 2004; Dinkins et al. 2012). Leaks are characterized by low, sparse vegetation or bare ground; no evidence exists indicating that suitable habitat for leks is limiting for GRSG (Schroeder et al. 1999). Juniper encroachment is a primary threat to leks and, more broadly, to the Western Great Basin GRSG population (Baruch-Mordo et al. 2013; U.S. Fish & Wildlife Service 2013).

Less than one-half of the breeding season habitat was suitable (Table 3-11). Analysis of breeding habitat values suggests the primary factors resulting in a marginal or unsuitable rating were inadequate sagebrush cover and perennial forb cover, particularly at low elevation arid sites. Average sagebrush canopy cover was below the GRSG ARMPA objective (Bureau of Land Management 2015a: 2–2), with 18 of 34 (53 percent) plots providing marginal or unsuitable cover. Crested wheatgrass stands and burned areas with less than 5 percent sagebrush cover were unsuitable. Plots with low sagebrush cover but

⁸⁷ It should be noted that most of the breeding season habitat in the BCA (BLM-managed) lands has burned since 1990, including up to 100 percent of Mud Creek, 98 percent of Hardie Summer, 85 percent of Hammond FFR, and 66 percent of Hammond allotments; it is important to know while GIS shows a fire perimeter, this is an estimate typically made from aerial survey and it tends to circle the fire, ignoring unburned islands and fingers, overestimating the total areas burned. Crested wheatgrass seedlings have occurred in breeding habitat including approximately 3,716 acres of Mud Creek, 208 acres of Hammond FFR, and 6,489 acres of Hammond allotments.

adequate perennial grass cover for GRSG broods to safely access preferred forbs rated marginal. Long-term moderate drought, encroachment by juniper, and invasive annual grasses suppress forb cover. Herbaceous height and perennial grass cover were suitable in over 70 percent of plots, indicating adequate nesting and hiding cover was not limiting where sagebrush cover was suitable. While ecological site potential limited the ability of some plots to achieve habitat objectives, the overall plot was rated suitable or marginal if critical habitat indicators such as sagebrush cover and perennial grass cover met objectives.

Table 3-30: Acres of Sagebrush and Perennial Grass Cover on BLM-Managed Lands in Delineated Breeding Habitat with < 4% Juniper Canopy Cover⁸⁸

HABITAT ATTRIBUTE	HAMMOND	HAMMOND FFR	MUD CREEK	HARDIE SUMMER	TOTAL ACRES
Sagebrush Cover	6,672	678	6,216	2,916	16,482
• < 5%	4,531	457	4,098	1,827	10,913
• 5 to < 10%	696	64	653	524	1,937
• 10–25%	1,221	123	1,110	482	2,936
• > 25%	224	34	355	83	696
Perennial Grass Cover	7,213	1,137	8,047	5,498	21,895
<i>Arid Sites</i>	6,702	582	2,217	0	9,501
• < 5%	565	73	131	0	769
• 5 to < 10%	1,160	109	284	0	1,553
• ≥ 10%	4,977	400	1,802	0	7,179
<i>Mesic Sites</i>	511	555	5,830	5,498	12,394
• < 5%	117	162	1,179	948	2,406
• 5 to < 20%	227	198	2,596	1,199	4,220
• ≥ 20%	167	195	2,055	3,351	5,768

- *Upland Summer/Late Brood-Rearing:* There are 12,066 acres of summer season habitat, or 46 percent of the BCA (Appendix J). All of the Hardie Summer Allotment is summer habitat, while < 1 percent of the Hammond Allotment is summer habitat. Most upland summer/late brood-rearing habitat has burned at least once since 1990 (100 percent of Hammond and Mud Creek Allotments; 94 percent of Hammond FFR Allotment; 95 percent of Hardie Summer Allotment). Overall, 21 percent (1,573 acres) of the sagebrush cover in summer habitat is suitable (Table 3-12). Approximately 19 percent of summer habitat on both the Hammond FFR and Hardie Summer Allotments provide suitable sagebrush cover with <4 percent juniper cover. Approximately 39 percent (4,689 acres) of the sagebrush cover in summer habitat on BCA allotments has ≥ 4 percent juniper cover; this amount varies from 1,592 acres (29 percent) in the Mud Creek Allotment to 340 acres (62 percent) on the Hardie Summer Allotment. While 80 percent of the Hammond Allotment has some juniper cover, the allotment contains less than 10 acres of summer habitat.

⁸⁸ Suitable habitat has 10-25 percent sagebrush cover and ≥10 percent perennial grass cover in arid sites and ≥20 percent perennial grass cover in mesic sites (Bureau of Land Management 2015a).

Table 3-31: Acres of Sagebrush Cover in Delineated Upland Summer/Late Brood-Rearing GRSG Habitat with <4% Juniper Canopy Cover⁸⁹

HABITAT ATTRIBUTE	HAMMOND	HAMMOND FFR	MUD CREEK	HARDIE SUMMER	TOTAL ACRES
Sagebrush Cover	2	210	3,900	3,265	7,377
• 0 to < 5%	0	135	2,168	1,883	4,186
• 5 to < 10%	0	25	493	559	1,077
• 10–25%	1	40	918	614	1,573
• > 25%	1	10	321	209	541

- *Riparian Summer/Late Brood-Rearing:* Within the BCA, there are 9 stream reaches totaling 11.15 miles that were assessed for proper functioning condition (Dickard et al. 1998). Of the nine streams reaches, four were rated functioning at risk (FAR) and five rated proper functioning condition (PFC). In both the Hammond and Hardie Summer Allotments three reaches were rated at PFC and two were FAR. In the Mud Creek Allotment, two were rated at PFC and one stream reach spanning both the Mud Creek and Hardie Summer Allotments was rated FAR. Mesic habitat located away from lotic riparian systems was not assessed. Only lotic riparian areas on BLM lands were assessed for GRSG habitat suitability. Mesic areas within the allotments provide additional riparian summer and late-brood rearing habitat (Table 3-13).

Table 3-32: Acres of Lotic and Lentic Areas Capable of Providing Riparian Summer and Late Brood-Rearing GRSG Habitat⁹⁰

MESIC TYPE	HAMMOND	HAMMOND FFR	MUD CREEK	HARDIE SUMMER	TOTAL ACRES
Alfalfa-Cropped	0	384	0	0	384
Mesic Rangeland	455	1,858	498	8,099	10,910
Riparian	467	118	705	0	1,291
Seasonal Wetland	252	0	0	0	252
Wet Meadow	124	71	0	0	195

- *Winter Season Habitat:* Winter habitat comprises 21,970 acres (84 percent) of the BCA allotments (Appendix J). Over 90 percent of the Hammond FFR, Mud Creek, and Hardie Summer Allotments is winter habitat; 66 percent of Hammond Allotment is winter habitat. Approximately 27 percent (5,904 acres) of the winter habitat in BCA has > 4 percent juniper cover (Table 3-14). Slightly more than half of the winter habitat within the Hammond and Hardie Summer Allotments has juniper cover exceeding 4 percent. Overall, 22 percent of the sagebrush cover in winter habitat in BCA allotments is suitable. Lack of sagebrush cover was the primary factor resulting in rating eight of nine AIM and LMF plots marginal or unsuitable (Appendix J). Hardie Summer contains the lowest proportion of suitable sagebrush cover (19 percent or 565 acres), while Mud Creek Allotment contains the most (23 percent or 1,467 acres). Unsuitable plots (Appendix J) lacked sagebrush cover, usually due to ecological potential but also due to historical

⁸⁹ Suitable sagebrush cover is 1–25 percent (Bureau of Land Management 2015a).

⁹⁰ Only riparian areas on BLM lands are assessed for sage-grouse habitat suitability.

sagebrush removal through fire or management. While the availability of winter habitat in the project area is important, Freese (2009) found that GRSG often left areas with suitable winter habitat, suggesting that “something other than the vegetation characteristics described in the guidelines [(Connelly et al. 2000)] are influencing how Greater Sage-grouse are selecting habitat”.

Table 3-33: Percent Sagebrush Canopy Cover in Delineated Winter GRSG Habitat with < 4% Juniper Canopy Cover⁹¹

HABITAT ATTRIBUTE	HAMMOND	HAMMOND FFR	MUD CREEK	HARDIE SUMMER	TOTAL ACRES
Sagebrush Cover	6,672	678	6,215	2,916	16,481
0 to < 5%	4,531	457	4,098	1,827	10,913
5 to < 10%	696	64	653	524	1,937
> 10	1,445	157	1,464	565	3,631

Nesting, foraging, and roosting habitat for migratory birds occurs throughout the allotments. Available habitat located within the analysis area includes sagebrush steppe, aspen stands, willow and other deciduous shrubs, cliff bands, ponds/reservoirs, juniper woodlands, and both native and nonnative perennial bunchgrasses. Habitat quality and quantity is dependent on location within the allotments and the specific habitat type and patch size required for individual bird species. Quantity and quality of available habitat is dependent on the type of forage being sought, the ecological condition of the site, and patch size of contiguous habitat. Common migratory birds observed or expected to occur in the area include Western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), Brewer’s blackbird (*Euphagus cyanocephalus*), red-tailed hawk (*Buteo jamaicensis*), cliff swallow (*Petrochelidon pyrrhonota*), savannah sparrow (*Passerculus sandwichensis*), gray flycatcher (*Empidonax wrightii*), common raven (*Corvus corax*), vesper sparrow (*Pooecetes gramineus*), Brewer’s sparrow (*Spizella breweri*), and sage thrasher (*Oreoscoptes montanus*).

Surveys conducted in the vicinity of the allotments since 1966 as part of the United States Geological Survey (USGS) North American Breeding Bird Survey (U.S. Geological Survey 2023 Feb 3) show a stable trend in species richness and abundance with changes to species composition likely in response to wildfires that typically result in an increase of species favoring grassland habitats and a corresponding decrease in shrubland adapted species (for more information on birds, see Appendix C). Species composition has also changed, likely in response to large scale GRSG habitat restoration efforts that target juniper removal on the western slope of the Steens Mountain. Past and present threats to populations and habitat of resident and migratory birds within the affected area include historical improper grazing, conversion of native vegetation to crested wheatgrass seedings, invasive species establishment and spread, fire that results in loss of shrub habitat, and drought. Harju (2021) found that “raven abundance has increased several fold over historic abundances. Previous research implicates anthropogenic development as one of the main drivers of these trends.”

⁹¹ Suitable sagebrush cover is ≥10 percent (BLM 2015).

Helmstetter (2023) notes that when grazing is properly managed (intensity, duration, and timing) and aligns with current GRSG management guidelines that “grazing management guidelines (e.g., grazing practices that do not uniformly reduce nest concealment across an entire pasture) may play an important role in promoting sage-grouse nest success.” Grazing cattle at improper levels can directly affect migratory birds by reducing the amount of ground vegetation and subsequently decreasing availability of nest sites (U.S. Forest Service 1980; Walsberg 2005). Decreased ground vegetation also decreases the amount of hiding cover for ground nesting species, which can result in increased nest predation (U.S. Forest Service 1980; Keyser et al. 1998; Fondell and Ball 2004). Cattle present during nesting season may also trample the nests, eggs, and nestlings of ground nesting birds (Sabatier et al. 2015; Sharps et al. 2017). Anderson and McCuiston (2008) found grazing management, when upland birds are present, should be flexible, but limited to a light to moderate use (30–50 percent utilization), using deferred or rest-rotation grazing to limit grazing disturbances during critical bird life stages such as nesting. They concluded light to moderate use can increase forb quality and quantity since grazing can delay the maturation of forbs, extending their availability throughout the growing season (Anderson and McCuiston 2008). Research suggests grazing deferral be utilized to prevent livestock caused disturbance to GRSG during nesting, as well as preventing competition for forage, specifically forbs, that are required during that time (Adams et al. 2004; Monroe et al. 2017). Nest site selection by GRSG and nest success are tied to both sagebrush cover as well as greater residual perennial grass cover and height (Holloran 2005). Helmstetter (2023) states “[c]urrent sage-grouse management guidelines recommend maintaining 15–25% sagebrush canopy cover on breeding habitat (Connelly et al. 2000). Yet, our results suggest that in regions where coyotes are the primary nest predator, maintaining large tracks of land with >25% sagebrush canopy cover would improve sage-grouse nest success,” suggesting sagebrush cover objectives may be lower than optimal to reduce predation. Additionally, GRSG nesting success is shown to be associated with greater grass density at the microhabitat scale (Michael A. Gregg and Crawford 2009). Adams and others (2004) found deferred grazing can improve both the plant vigor and the productivity of grass communities, which in turn increases the amount of vegetative cover. Grazing that supports the recovery of sagebrush would benefit sagebrush obligate songbird habitat in the allotments.

Large, long-term ungrazed reference sites within the sagebrush ecosystem, based on seasonal needs of GRSG, are lacking, which confounds the evaluation of grazing effects (Beck and Mitchell 2000; Hockett 2002). Moreover, no published studies exist on the effects of grazing on GRSG vital rates (Dettenmaier et al. 2017). Improper livestock grazing is a threat to GRSG (U.S. Fish & Wildlife Service 2013). Improper grazing, defined as grazing practices that are inconsistent with local ecological conditions and result in degradation of habitat for local wildlife species, can have adverse effects on GRSG and its habitat, and may work synergistically with other potential threats, such as invasive plants and wildfire, to increase impacts (U.S. Fish & Wildlife Service 2015). Properly managed livestock grazing is compatible with managing for GRSG conservation outcomes and can be used to reduce fuel loads (Davies et al. 2010; Davies et al. 2011), to protect intact sagebrush habitat, and to increase habitat extent and continuity (Connelly et al. 2004; Conway et al. 2022). Periods of growing-season rest are necessary to ensure adequate herbaceous cover for hiding nests and producing insects vital to the nesting success of sagebrush obligate songbirds and GRSG (Monroe et al. 2017).

The Migratory Bird Treaty Act of 1918 protects migratory birds regardless of their status as common or rare. Breeding bird surveys conducted in the vicinity of the allotments show a stable trend in species richness and abundance, with changes to species composition occurring in response to wildfires, prescribed fires, and juniper removal resulting in an increase of species favoring grassland habitats and a subsequent decrease in shrubland and woodland adapted species (U.S. Geological Survey 2023 Feb 3). Juniper expansion in this area has changed the species composition to woodland species and reduced sagebrush obligate species abundance. No breeding bird or other extensive migratory bird surveys have been conducted directly within the BCA. However, as habitats occurring within the nearest breeding bird survey route are similar to those present within the allotments considered here, it is assumed that similar trends in species composition and abundance would be expected in coinciding habitats within a relatively close proximity.

Observations made during field visits to the various pastures within the BCA indicate that migratory birds expected to occur in represented habitat types are present. Nesting habitat for birds that construct nests between or on top of rocks, in shrubs, or on the ground is present throughout the allotments where such habitat features are available. Foraging habitat for migratory birds is present and, as with nesting habitat, quantity and quality of available habitat is dependent on the type of forage being sought, the ecological condition of the site, and patch size of contiguous habitat.

3.7.2 *GRSG Environmental Consequences*

3.7.2.1 *GRSG Issue 1: How would the level, timing, and location of proposed livestock grazing and developments, affect areas of sagebrush remaining after the 2006 fire within the Mud Creek and Hardie Summer Allotments, and how would that affect GRSG and habitat recovery?*

Cattle do not typically forage on sagebrush unless the grass forage they prefer is unavailable. Given that Alternatives 1–4 do not allow for 100 percent utilization, preferred grass forage would be available when cattle are present, thereby making it unlikely that cattle would forage on sagebrush. Therefore, timing, level, and location of grazing would not be expected to have a negative impact on GRSG.

3.7.2.1.1 *GRSGI Alternatives 1–3*

The majority of the BCA occurs in GRSG breeding, early brood-rearing, and winter habitats where a multi-scale habitat assessment determined lack of sagebrush to be the primary limiting factor to obtaining habitat suitability (based on metrics described in Table 2–2). As cattle do not generally target sagebrush as a forage item the effects to sagebrush are not related to direct herbivory and would not be tied to any specific grazing management. Rather, sagebrush response would be tied to how grazing management affects sagebrush in terms of competition from other plants present that may be reduced by cattle.

Desired habitat conditions for GRSG include maintaining sagebrush cover of 11–31 percent in arid sites and 15–31 percent in mesic sites (Bureau of Land Management 2015a: 2–2). Currently sagebrush habitat not impacted by > 4 percent juniper cover occurs on 9,131 acres of the Mud Creek and Hardie Summer Allotments, and 2,029 acres (22 percent) of available sagebrush habitat meets desired conditions for GRSG habitat. Grazing could be beneficial to maintain desired sagebrush cover conditions by reducing perennial bunchgrass competition and reducing the risk of habitat loss resulting from fires carried by invasive annual grass within the sagebrush understory. The same grazing benefits apply to areas where sagebrush cover is below desired GRSG habitat conditions as a result of fire. However, hoof action from cattle can trample sagebrush seedlings and delay recovery and/or contribute to soil compaction, which may impede or reduce germination and limit sagebrush growth, particularly in areas where cattle congregate over long periods of time. Therefore, proper grazing management where lower numbers of cattle are rotated would likely indirectly improve sagebrush growth and recovery through reduced risk of catastrophic wildfires (Davies, Bates, Boyd, et al. 2021), though at congregation sites there would be a negative impact on sagebrush recovery.

In areas where sagebrush is present, grazing utilization during the growing season, at levels similar to utilization thresholds, has been shown to increase both production and vigor of existing sagebrush as well as sagebrush seedlings (Austin 2000). Utilization levels < 30 percent have been shown to result in a gradual shift to perennial grass and forb dominated plant communities (Austin 2000). Given the relatively low occurrence of sagebrush in the area, grazing that improves sagebrush vigor while maintaining residual perennial grass cover and utilization levels would benefit GRSG habitat. Proper grazing as proposed would assist in preventing further spread of invasive annual grasses, while allowing native vegetation, including sagebrush, to become established would improve sagebrush habitat over time, and effects to GRSG would be positive.

General grazing management described in Alternatives 1, 2, and 3 set utilization rates at 60 percent for crested wheatgrass seedlings and 50 percent for native plants, both of which are considered moderate, with 60 percent being at the top end of moderate. Moderate to heavy grazing of perennial bunchgrass has been shown to increase sagebrush abundance and vigor (Austin and Urness 1998). Utilization rates established for Alternatives 1, 2, and 3 would be beneficial in terms of reducing perennial bunchgrass competition and increasing sagebrush reestablishment and productivity, though the full benefit would not be seen since utilization would never be heavy under any alternative. While some sagebrush seedlings are present within existing crested wheatgrass stands, overall recovery of sagebrush in these areas has remained poor and seed sources for long-term colonization by sagebrush are limited to current plants. Moderate to heavy utilization within these seedlings would promote sagebrush establishment.

Grazing as prescribed in Alternatives 1 and 2 provides grazing rotations and periodic rest that are expected to improve the overall plant health over time (see Vegetation section) and reduce the threat of wildfire. Both of these expected outcomes would also benefit GRSG. While Alternative 3 maintains the same 50-60 percent utilization thresholds, it does not describe specific grazing rotations, seasons of use, or number of cattle present in an area at a given time. Assuming that under Alternative 3 livestock grazing would always reach the utilization thresholds (due to the

large increase in AUMs), this alternative may promote more sagebrush establishment, abundance, and vigor compared to the other alternatives (Austin and Urness 1998). However, since there is no grazing rotation provided, and no regular periods of rest are planned, this alternative would have negative effects on other components required for suitable habitat for GRSG, which would result in an overall negative impact to GRSG habitat. In addition, Alternative 3 would also allow for supplemental feeding, which could result in increased trampling of a sagebrush that is present in an area where feeding was to occur. This would also have a negative impact on GRSG habitat by further reducing sagebrush abundance.

Markers would be placed on newly constructed fence to improve fence visibility and reduce risk of collision within 1.2 miles of GRSG habitat. Utilizing models developed by Stevens (2011; 2013) to determine risk for collision within GRSG habitat and placing markers along fences has been shown to reduce risk of collision by 83 percent. However, GRSG mortality still occurred along fences fitted with markers resulting in one GRSG mortality resulting from collision, annually, on every 1.4 miles of marked fence within areas determined to be high risk for collision (Stevens et al. 2012). The addition of new fences could result in new trails being established, which may have a small impact on sagebrush within the BCA, although livestock will typically walk around mature sagebrush, rather than through it.

Alternative 3 would have slightly more risk to sagebrush (due to supplemental feeding and increased miles of fences) and GRSG habitat compared to 2, which would have a net reduction in fences and no supplemental feeding. Alternative 1 would not impact sagebrush but would have a slightly higher risk of GRSG collision compared to Alternative 2.

3.7.2.1.2 GRSG I Alternative 4

Alternative 4 includes a grazing utilization threshold of 30 percent, as well as a reduction in permitted AUMs, and a reduction in the annual authorization of AUMs in Mud Creek and Hardie Summer Allotments, where ecological objectives are not being achieved. While this level of utilization would maintain residual fall bunchgrass and increase the vigor of perennial bunchgrasses and forbs (Austin 2000), over time, utilization levels of 30 percent or lower would be expected to decrease sagebrush. Given that the 30 percent utilization threshold is at the upper end of grazing management that favors grasses and forbs, and the lower end of those that favor sagebrush, sagebrush recovery may still take place but at a much slower rate than would likely occur if competition from perennial bunchgrasses was reduced (Austin 2000). In addition, there would be an increase in residual fine fuels that would increase the risk of a catastrophic wildfire, which could remove the limited amount of remaining sagebrush. Therefore, this alternative would have a slightly more negative effect on the sagebrush component of GRSG habitat than would be seen under Alternatives 1–3 where higher utilization levels are allowed.

3.7.2.1.3 GRSG I Alternative 5

No grazing would be authorized; therefore, grazing schedules and rotations would have no effect on the persistence and recovery of sagebrush. As there are no proposed developments there would be no change in current GRSG risk from fences. Competition from uninhibited growth of

bunchgrasses may slow sagebrush recovery in burned areas. Accumulation of fine fuels within the sagebrush understory may increase the intensity and severity of future fire and increase the likelihood of habitat loss due to sagebrush mortality and loss of seed source for post-fire sagebrush recovery.

3.7.2.2 GRSB Issue 2: How would proposed livestock grazing in Mud Creek and Hardie Summer Allotments affect GRSB habitat, specifically concealment cover (residual grass height) and forb availability during nesting and brood-rearing season?

Grazing impacts to GRSB habitat can be positive or negative, depending on timing and level of grazing as described above (Beck and Mitchell 2000; Monroe et al. 2017). Grazing during the late spring nesting period can reduce cover and height of new perennial bunchgrass growth to below what is necessary to conceal hens on their nests (Gregg et al. 1994; Delong et al. 1995; Sveum et al. 1998). Grazing during the summer or fall, or grazing after most of the vegetation growth is completed, reduces the residual cover and height of the standing perennial bunchgrasses, which also provides important nesting season cover the following spring (Monroe et al. 2017). Early grazing can negatively impact growth of cool-season grasses, whereas similar levels of grazing late in the season can have some positive effects on population growth rates (Monroe et al. 2017). Hot season grazing in riparian areas and wet meadows would have a negative impact to late brood-rearing habitat as forbs present in mesic areas represent a major component of the GRSB chick diet during summer (Drut, Pyle, et al. 1994; Crawford and Carver 2000; Pyke et al. 2015), and riparian areas and wet meadows used for brood rearing are especially susceptible to grazing by livestock.

Improper early grazing (before peak of vegetation productivity), at levels above the allowable utilization, may result in lower habitat availability for GRSB chicks and result in increased brood mortality (Monroe et al. 2017). Improper grazing at levels above authorized would affect residual cover and height of standing perennial bunchgrasses that provide cover necessary for concealing nesting females and broods from predators the following spring. However, grazing management for all alternatives is designed to be proper grazing and leave adequate residual grass cover for GRSB. If grazing stimulated additional growth of grasses and forbs by the removal of standing dead vegetation, then grazing could have positive effects on GRSB nesting and brood-rearing habitat and subsequent GRSB population growth (Monroe et al. 2017). Grazing has limited effect on winter GRSB habitat unless use of sagebrush itself becomes severe, which is not expected to happen under proper grazing management.

A large portion of available sagebrush within the BCA was burned in the 2006 Grandd Fire. Nest site selection by GRSB and nest success are tied to both sagebrush cover as well as greater residual perennial grass cover and height (Holloran 2005). Additionally, GRSB nesting success is shown to be associated with greater grass density at the microhabitat scale where adequate sagebrush cover is also present (M.A. Gregg and Crawford 2009). Some burned areas within the BCA exhibit sagebrush recovery adequate to provide GRSB habitat. These areas of recovering native vegetation are generally located at higher elevations in areas historically dominated by big mountain sagebrush. There has been very little recovery of historic Wyoming sagebrush habitat

on the lower slopes of the burned area. These areas are often dominated by either invasive annual grasses or managed crested wheatgrass seedings.

GRSG nesting attempts in burned areas lacking adequate sagebrush recovery have been documented. However, these attempts usually occur only within the first year or two after an historical nesting area has burned and generally result in failure or predation of the nest as well as increased incidents of hen predation due to lack of both hiding and thermal cover (Anthony et al. 2020). Increased predation of GRSG nests, nesting females, and broods are also expected in areas dominated by annual or perennial grasses (Gregg et al. 1994; Delong et al. 1995; Connelly et al. 2000) instead of sagebrush.

While GRSG may travel through crested wheatgrass and utilize the areas incidentally, crested wheatgrass stands occurring within the BCA currently lack minimal vegetative indicator components necessary to provide “suitable” or “marginal” conditions for all seasonal habitats as described in the Table 2–2 of the 2015 GRSG ARMPA (Bureau of Land Management 2015a). As such, sites dominated by perennial bunchgrass lacking adequate sagebrush cover are currently considered “unsuitable” GRSG habitat and unlikely to provide GRSG habitat in the foreseeable future without considerable vegetation restoration efforts.

3.7.2.2.1 GRSG2 Alternative 1

General grazing management described in Alternatives 1, 2, and 3 sets utilization rates at 60 percent for crested wheatgrass seedings and 50 percent for native plants. Grazing native bunchgrasses would reduce the vertical vegetation cover in the short term (1 year). In portions of the pastures grazed with an early treatment, some bunchgrass may regrow. Fall green-up may provide some late season vertical cover. In areas grazed with a graze treatment, there would be some loss of concealment cover during GRSG nesting and early brood rearing due to livestock utilization as well as possible trampling of nests should any GRSG nest be under or near taller grasses. While livestock would not target forbs for grazing, some grazing on forbs would occur because of the coarse mouth structure of cattle (in contrast to sheep) and the inability to sort between herbaceous plants within a mouthful; the effect is considered to be negligible. Most forbs would not be consumed by livestock so GRSG would have forbs available for chicks and hens to utilize during early brood rearing. When defer grazing treatments occurred, GRSG nesting would be done by the time grazing is started, and there would be no effects to nesting success from the timing of grazing. Chicks and hens would have access to forbs before livestock are present and many of the forbs would be reaching maturity at the same time as grasses so palatability of forbs would decrease, and livestock would not utilize them as much.

As Alternative 1 would not increase AUMs in the Hammond Allotment, there would be an increase in herbaceous standing materials compared to Alternatives 2 and 3, within the managed crested wheatgrass seedings, which would provide for increased cover. However, this would result in a large amount of residual vegetation build up in the crowns of the plants, which would eventually result in wolfy plants or plants that lose vigor due to shading, which would eventually result in decreased cover for GRSG (see Vegetation section). Forbs may be promoted under reduced grazing, though reduced use would not be expected to delay the maturation of forbs or

extend their availability throughout the growing season (Anderson and McCuistion 2008). Grazing as prescribed in Alternative 1 would have a grazing rotation and periodic rest, which are expected to improve the overall plant health over time (see Vegetation section) and reduce the risk of catastrophic wildfire (Davies, Bates, Boyd, et al. 2021). Both of these expected outcomes would also be beneficial to GRSG.

It is not expected that proper grazing under this alternative would result in measurable impacts to GRSG.

3.7.2.2.2 GRSG2 Alternative 2

Grazing management, as described in Alternative 2, would be similar to Alternative 1, though there would be reduced residual grass cover in the Hammond Allotment compared to Alternative 1, where AUMs are increased. Under this alternative, grazing in the fall (defer treatment) would occur more often than under Alternative 1, due to an extended season of use, which is expected to improve the overall health of bunchgrasses over time, as would winter use. Improved overall health of bunchgrasses would be expected to increase production and would benefit GRSG. However, as residual grass cover is tied to both nest selection and chick survival, annually reduced residual grass cover during the breeding season would have a negative effect to GRSG.

The effects to vertical cover and forb availability that were discussed in Alternative 1 would apply under Alternative 2 for the Mud Creek and Hardie Summer Allotments. The main difference is under Alternative 2, there would be more options for grazing outside of the growing season by increasing opportunities for grazing in the early, defer, and winter grazing seasons.

Another difference is the decrease in acres in the Hardie Summer Allotment (58 percent of total Alternative 1 acres). The drop in acres is due to the changing of the allotment boundaries to move pastures that are predominantly private into the Hammond FFR. However, this only removes approximately 671 acres of BLM-managed land from within the Hardie Summer Allotment, and AUMs have been reduced proportionally.

The grazing management described under this alternative would generally follow Anderson and McCuistion's (2008) suggestion by including defer grazing treatments for at least part of each of the allotments every year. When a pasture is not grazed until later in the year, all grasses and forbs remain available for nesting and brood rearing. However, late season grazing would reduce residual perennial grass cover, which, as discussed above, may have a negative effect to GRSG during the breeding season, especially in years when grasses are slow to produce vegetation (such as in years with colder than normal springs).

Utilization thresholds would be the same as Alternative 1 for all allotments (except for in the Lower Field of Mud Creek Allotment), meaning the same amount of residual vertical cover would be left whether it was growing or dormant (standing dead) while grazing was occurring. In the Lower Field of the Mud Creek Allotment the initial utilization threshold has been set to 35 percent and may be increased to 50 percent if monitoring shows that GRSG vertical cover is not being negatively affected by livestock grazing. This alternative proposes conservative grazing

management within this pasture because it contains a lek. The required VOR monitoring would ensure that grazing management would not reduce perennial cover below what is recommended in GRSG ARMPA Table 2-2 (Bureau of Land Management 2015a) for perennial grass height to promote healthy GRSG habitat. If monitoring were to find residual vegetation was being decreased below that target height, utilization within that pasture would be permanently set at the last level that did not result in grass heights below 7". This would ensure protection of nesting and early brood-rearing habitat within that pasture, promoting GRSG habitat more than under Alternatives 1 and 3.

As moderate grazing is proposed, and livestock do not tend to actively target forb species for grazing, it is anticipated that livestock grazing under Alternative 2 would have an immeasurable effect to forb abundance, though grazing may delay forb maturation later into the season. Grazing utilization thresholds under Alternative 2 would be expected to leave enough residual cover to meet criteria described in Table 2-2 of the GRSG ARMPA (Bureau of Land Management 2015a), and effects of grazing to GRSG in this area are likely to be neutral.

3.7.2.2.3 GRSG2 Alternative 3

Impacts to perennial grasses and forbs from Alternative 3 are similar to Alternatives 1 and 2, as utilization thresholds are the same. In the Hammond Allotment, impacts would be closer to those described in Alternative 2, though impacts would be greater as AUMs would be authorized in all allotments. The increase in AUMs would result in the utilization thresholds being reached more often than under the other alternatives. While all alternatives would have the same utilization thresholds, the same amount of residual cover vegetation could be removed; however, utilization thresholds are expected to be met more often under this alternative due to increased AUMs. As estimated carrying capacity in Hammond and Mud Creek Allotments is lower than the permitted AUMs under this alternative, it is expected that utilization thresholds would be achieved annually, prior to all AUMs being utilized. In addition, there would be no reduced utilization and adaptive management following VOR monitoring under this alternative, resulting in increased risk that screening cover would be reduced below the 7" identified in the GRSG ARMPA Table 2-2 (Bureau of Land Management 2015a).

This alternative would have the same overall season of use as under Alternative 2 and would provide for opportunities to occur during all seasons. Periodic growing season rest would still be provided for; however, without a general grazing rotation, it is unknown when grazing would occur, how it would be rotated, and how often grazing season rest would occur. While the effects of utilization thresholds to GRSG would be the same as those described in Alternatives 1 and 2, given the lack of information with regard to where and how many cattle would be present in any given year or pasture, both direct and indirect effects of cattle presence to GRSG and seasonal GRSG habitat under Alternative 3 are difficult to determine, but would be expected to be more negative than Alternative 2. If we assume a worst-case scenario, grazing use in each pasture would occur almost every year in the early spring/summer and grazing would regularly reduce herbaceous cover to 50-60 percent during the nesting season. This would result in increased nest predation due to reduced cover and decreased nest success in the short term. If this pattern were repeated regularly in the long term, it could result in decreased GRSG population. In addition,

this alternative would have negative effects on perennial grasses and forbs, which would negate the improvement in habitat, resulting in less suitable habitat for GRSG.

3.7.2.2.4 GRSG2 Alternative 4

Alternative 4 has grazing utilization thresholds of 30 percent and decreased authorization of livestock grazing, including in areas of Mud Creek and Hardie Summer where ecological objectives are not achieved. This management would likely maintain residual fall bunchgrass and increase the vigor of perennial bunchgrasses and forbs (Austin 2000), which would be beneficial to GRSG in terms of hiding cover and brood-rearing conditions. Over time utilization of less than 30 percent may initially increase bunchgrass and forb communities, though bunchgrasses may be negatively impacted as residual vegetation shades the plant and reduces vigor and production (see Vegetation section). Given that the 30 percent utilization threshold is at the upper end of grazing management that favors grasses and forbs, and the lower end of those that favor sagebrush, sagebrush recovery may still take place but at a much slower rate (Austin 2000) due to increased competition with perennial grasses. Residual perennial grass and forb cover would be higher under this alternative compared to Alternatives 1, 2, and 3 while perennial grasses remained vigorous, but could decrease in the long term. However, increased residual perennial grasses would result in increased fuel loading, increasing the risk of catastrophic wildfire, which, if it occurred, would negatively impact perennial grasses, resulting in increased loss of perennials and increase and spread of annual grasses, both of which would have a negative impact on GRSG habitat (see Vegetation section).

3.7.2.2.5 GRSG2 Alternative 5

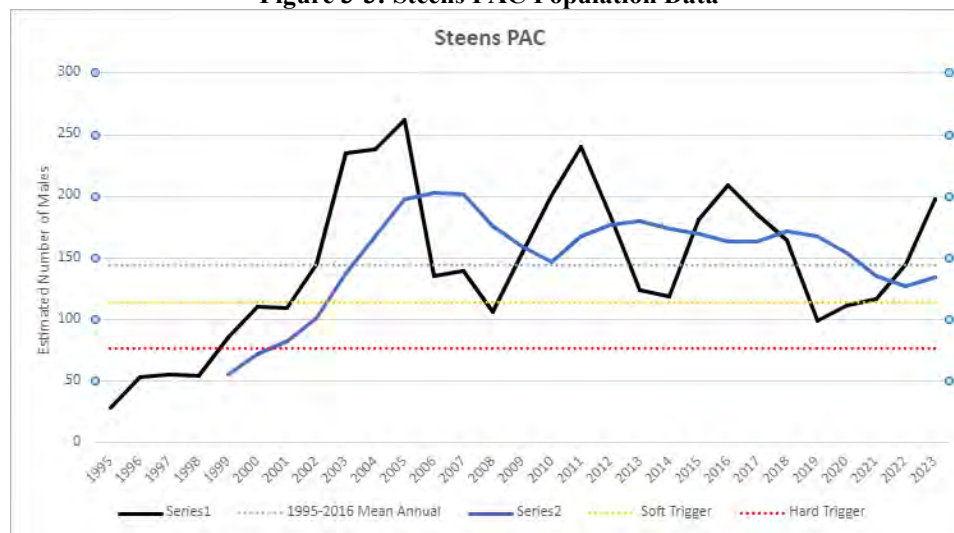
Alternative 5 would not allow grazing and, therefore, non-native perennial bunchgrasses (crested wheatgrass), native vegetation, and invasive annual grasses would not be directly impacted by cattle grazing. This may be beneficial in terms of vegetative cover available to GRSG but may increase the timeline for sagebrush recovery (Davies et al. 2013) compared to the other four alternatives. Under this alternative fire would pose the biggest risk to sagebrush recovery and GRSG habitat due to fine fuel accumulation occurring at a faster rate than under other alternatives. As the presence of fine fuels accumulate, fire is more likely to kill perennial grasses, and open the site up to increased establishment of invasive annual grasses (Davies et al. 2009). Annual grasses make restoration of sagebrush habitats extremely difficult and further increase the risk of future fires. Indirect effects related to accumulation of dry residual grasses may have a negative effect on the health and abundance of vegetation in the long term. Any long-term negative effects to vegetation would result in negative effects to wildlife habitat. See the Vegetation section for additional analysis.

3.7.2.3 **GRSG Issue 3: What is the current state of GRSG populations and how would proposed grazing impact GRSG populations, both locally and regionally?**

Current ODFW GRSG population data estimates 198 male GRSG inhabit the Steens PAC. The 2023 GRSG Adaptive Management Report (Bureau of Land Management 2024b) as well as the 2023 ODFW GRSG Population Report (Vold 2023), which are both informed by male lek

attendance surveys conducted by ODFW and BLM each spring, indicate a +35.2 percent population increase within the Steens PAC from 2022 to 2023. Since implementing the Oregon GRSG Adaptive Management Triggers in 2016, the Steens PAC has remained above trigger thresholds for both population and habitat availability each year with the exception of 2019, wherein a “soft trigger” for population decline was indicated. However, the 2019 lek survey effort was hampered by extremely difficult field conditions throughout the state, resulting in significantly reduced population monitoring data. As such, implementation of the 2019 “soft trigger” was delayed until more complete lek surveys became available in 2020. Improved field conditions in 2020 contributed to greater survey effort success with results indicating a population increase within the Steens PAC that placed it well above the 5-year average “soft trigger” threshold.

Figure 3-3: Steens PAC Population Data



GHMA habitat adjacent to the Steens PAC provides connectivity to four additional PACs (Folly Farm, Dry Valley/Jack Mountain, Pueblos/South Steens, and Beaty’s PACs). Population trends for GRSG within the connected PAC areas indicate population increases from 2021 to 2022 in the Dry Valley/Jack Mountain PAC and declines in the Beaty’s, Pueblos/South Steens, and Folly Farm PACs, with the Beaty’s PAC hitting a population “soft trigger.” Known factors that are likely contributing to GRSG declines in the region include habitat loss due to wildfire, habitat degradation resulting from juniper and invasive grass expansion, long-term drought, and the occurrence of wild horses with populations above appropriate management levels within both PHMA and GHMA. See Appendix J for more information.

3.7.2.3.1 GRSG3 Alternative 1

Utilization thresholds would still ensure 50 percent residual cover of grasses would remain in native areas, and 40 percent in crested wheatgrass seeding, which is expected to provide adequate concealment cover. However, loss of vertical cover, as well as the lack of sagebrush may increase the probability of predation of nests or chicks by ravens when compared to the No Grazing Alternative. As no NR AUMs would be authorized under this alternative, vertical cover

removed under this alternative would be less when compared to Alternatives 2 and 3, but more than Alternative 4.

When grazing treatments are defer or early, grazing would largely remove dry residual vegetation from the prior growing season. When there is a graze treatment, livestock tend to select green, growing vegetation, removing the current growing season's growth. In years where there are two or more graze treatments, consecutively, the grazed area would provide limited vertical screening cover as vegetation would not have a year to reach maximum heights and provide maximum residual vertical cover. In portions of the pastures grazed earliest, some bunchgrass may regrow providing some additional vertical cover. Fall green-up may provide some late season vertical cover that could hold over to the following spring. Grazing before and during GRSG nesting annually would reduce the vertical vegetation cover that is a key indicator of suitable nesting cover in the short term (1-year), which could have long-term effects on population over time. There would be some loss of concealment cover during GRSG nesting and early brood rearing due to livestock utilization, as well as possible trampling of nests should any GRSG nest be under or near taller grasses (Beck and Mitchell 2000). In alternate years, grazing would occur after seed set, allowing for maximum vertical cover during nesting and early brood rearing.

Defer treatments would result in forbs being available for use by GRSG without incidental livestock use. Because the season of use is after the bunchgrasses have completed their reproductive cycle, and since there would be a utilization threshold of 50 percent on native key species and 60 percent on desirable non-native key species, adequate residual vertical cover would be carried over to the next nesting season. In years with defer or winter treatments GRSG nesting would be done by the time grazing is started so there would be no effects to nesting success from the timing of grazing. Chicks and hens would have access to forbs before livestock are present and livestock would not utilize them as much. This would be true throughout the BCA when defer treatments occur. Within the Hardie Summer Allotment, sagebrush is the predominant cover, resulting in GRSG having sufficient hiding cover from predators even when livestock remove some vertical cover through grazing. Monroe and others (2017) found that when GRSG populations are stable "[i]ntermediate to low grazing levels," such as those required under all grazing alternatives per grazing thresholds, "irrespective of timing, did not differ from the overall population trend in any scenario."

Annual permitted livestock grazing at moderate use levels would reduce fine fuels and decrease the threat of severe wildfire, which would indirectly conserve GRSG habitat in the long term by protecting habitat conditions that limit predation. While grazing decreases vertical structure of individual grasses in the short term, it should not affect long-term population trends or chick survival as utilization limits ensure that enough residual vegetation is available to still provide protection to nests and chicks, minimizing impacts to populations. However, fire can remove all vegetation, including shrubs, and can take a long time to recover (often decades if at all) from, which result in long-term negative impacts to populations and increased risk of predation.

Under this alternative, it is not expected that grazing would have a measurable impact to GRSG populations locally or regionally.

3.7.2.3.2 *GRSG3 Alternative 2*

Grazing management, as described in Alternative 2, is similar to Alternative 1 with some differences. Under Alternative 2, vertical cover in the Hammond Allotment would be reduced more than under Alternative 1, due to increased authorized AUMs within that allotment. However, the same utilization thresholds would apply ensuring adequate vegetation remains in place to provide vertical cover and protect GRSG nests and chicks from predation. Alternative 2 utilization thresholds only differ for the Mud Creek Allotment Lower Pasture, which would have an initial utilization threshold of 35 percent, and could be increased up to 50 percent, or decreased, to ensure that even with grazing, vertical cover vegetation is meeting the desired condition of 7" grass height⁹² in years when grazing occurs before or during the breeding season. This adaptive management would ensure that GRSG that lek within the allotment would have adequate coverage to protect GRSG nests and chicks from predation. This would provide insurance that grazing would not negatively impact populations within the BCA and would result in more vertical cover from grasses being available in the Mud Creek Allotment Lower Pasture under Alternative 2, compared to Alternatives 1 and 3 while the utilization threshold remains under 50 percent within that pasture.

Another difference between Alternative 1 and Alternative 2 is the permitted season of use would be extended to allow for increased grazing flexibility and the ability to provide for improved grazing rotations under Alternative 2. These extended permitted seasons of use would allow for additional deferred and late season use, outside of nesting and early brood-rearing seasons within the annual grazing season.

Alternative 2 would also allow for the use of NR grazing to occur when full permitted use resulted in utilization levels under 35 percent. Not allowing NR grazing to occur when permitted use exceeded 35 percent would reduce the likelihood that additional NR AUMs would exceed the utilization thresholds. In addition, as NR AUMs would follow specific terms and conditions, grazing management, even in high production years, would still ensure adequate vertical cover remains in place within the nesting and early brood-rearing habitat as a whole.

While proposed changes to fencing would change acres, these administrative changes would not directly impact GRSG populations, especially as AUMs are appropriately modified and changes would not result in increased concentrated use. Under this alternative, more vegetation would be removed than under Alternatives 1 and 4, but less would be removed than under Alternative 3. Moderate grazing utilization under Alternative 2 would leave enough residual cover to meet criteria described in Table 2–2 of the GRSG ARMPA (Bureau of Land Management 2015a) (with monitoring to ensure that happens in Mud Creek Allotment's Lower Field), and effects of grazing to GRSG populations in this area are likely to be neutral. Under this alternative, it is not expected that grazing would have a measurable impact to GRSG populations locally or regionally. Grazing would only reduce grass cover during the breeding season periodically

⁹² The 7" grass height comes from Table 2-2 of the 2015 Oregon GRSG ARMPA (Bureau of Land Management 2015a), for Breeding, Habitat, including lekking, pre-nesting, and early brood rearing, typically between March 1 and June 30. Table 2-2 (Bureau of Land Management 2015a) provides "Habitat Objectives" for GRSG. These are ecological targets to aim for, on average, across a landscape, and it does not refer to individual grass plants.

(based on general grazing rotations). In years when grass cover is reduced during breeding habitat, the utilization thresholds would ensure that cover would not be reduced to a level below the range of desired perennial grass cover identified in Table 2-2 (Bureau of Land Management 2015a) (10-30 percent perennial grass cover). Therefore, grazing removal of cover would not be expected to increase nest or chick predation to a level that would result in changes to the GRSG population. In addition, grazing rotations would ensure that there are always areas that aren't grazed prior to or during the breeding season nearby, which would further reduce the risk of predation and impacts to populations.

3.7.2.3.3 *GRSG3 Alternative 3*

Alternative 3 is similar to Alternatives 1 and 2; however, impacts to GRSG populations from grazing would be less certain as no general grazing rotations are identified, but annual grazing would be determined prior to that grazing season. Periodic growing season rest would still be provided for in the grazing rotations by allotment under Alternative 3. However, without a general grazing rotation it is unknown when grazing would occur, how it would be rotated, and how often grazing season rest would occur. As the permitted season of use would be extended, impacts related to season of use would be the same as described under Alternative 2.

While utilization thresholds would remain at 50 percent for native and 60 percent on desirable non-native species within the BCA, this alternative would increase AUMs in some allotments above the estimated carrying capacity. With utilization thresholds as described under Alternatives 1 and 2 (with the exception of Mud Creek's Lower Field) residual vegetative cover minimums would remain consistent and should still provide adequate forage to protect nests and chicks from predation. However, under Alternative 3, it is more likely that the utilization threshold would be reached regularly, where under Alternatives 1 and 2, it is expected that use would occasionally be under these thresholds. Another difference under Alternative 3 is that non-renewable AUMs could be authorized in all areas anytime full permitted use of AUMs resulted in utilizations less than the threshold. This further increases the likelihood that grazing would remove more vertical cover under this alternative than under either Alternatives 1 or 2.

While the effects of utilization thresholds to GRSG would be the same as those described in Alternatives 1 and 2, given the lack of information with regard to where, when, and how many cattle would be present in any given year, both direct and indirect effects of cattle presence to GRSG and seasonal GRSG habitat under Alternative 3 are difficult to determine. However, if we assume a worst-case scenario, grazing use in each pasture would occur almost every year in the early spring/summer, and grazing would regularly reduce herbaceous cover to the utilization threshold during the nesting season. This would result in increased nest predation due to reduced cover, potential perennial grass abundance and vigor due to limited growing season rest (see Vegetation section), and decreased nest success in the short term. In the long term, if grazing use continued to occur up to utilization thresholds annually in each pasture, with little growing season rest, across the BCA, without providing areas of rest or deferred grazing, it could result in a decrease in GRSG population. This alternative, while still likely providing adequate vertical coverage to protect nests and chicks from predation due to utilization thresholds, would remove the most vertical cover when compared to all other grazing alternatives. As utilization thresholds

would be met more often, combined with a lack a grazing rotation, and terms and conditions related to NR grazing, there would be an increased risk that vertical cover removal would negatively impact nest success and chick survival. If the worst-case scenario were to continue into the long term, the risk that grazing management would impact populations locally or regionally would continue to increase, especially if objectives in Table 2-2 (Bureau of Land Management 2015a) were not regularly being met. However, if grazing management did not follow the worst-case scenario, but areas were provided regular periodic growing season rest, allowing for perennial bunchgrasses to remain abundant and vigorous, and rotations provided areas within the BCA met Table 2-2 habitat objectives for breeding (Bureau of Land Management 2015a), then it is not expected that this alternative would result in a measurable difference in population locally or regionally when compared to the other alternatives.

3.7.2.3.4 *GRSG3 Alternative 4*

Alternative 4 would have similar effects to GRSG populations as Alternative 1, despite the reduction in AUMs, as both would provide adequate cover for breeding habitat. Under this alternative AUMs would be half (or less due to no authorized grazing where ecological objectives are not achieved in the Mud Creek and Hardie Summer Allotments) when compared to Alternative 1 and the utilization threshold would be reduced to 30 percent in all areas, with no NR AUMs being authorized, resulting in utilization that is considered slight to light. Many of the bunchgrasses would remain ungrazed and would continue to provide the maximum amount of vertical cover for GRSG. Bunchgrasses that are grazed would be expected to have a residual vertical height taller than under moderate grazing, due to fewer bites being taken of each plant. This alternative would leave the most vertical cover when compared to all other grazing alternatives, allowing for the most nests and chick protection. Alternative 4, like the other grazing alternatives (with the potential exception of Alternative 3), would continue to achieve Table 2-2 (Bureau of Land Management 2015a) habitat objectives for breeding habitat. Therefore, even though vertical cover would be higher under this alternative, it is not expected that there would be a measurable difference in GRSG predation between the grazing alternatives. Under this alternative, as under Alternative 5, there is a risk that the BCA would have areas that would exceed the 10-30 percent perennial grass cover habitat objective from Table 2-2 (Bureau of Land Management 2015a). If this were to occur, there may be negative impacts to GRSG habitat and potentially to populations, though they may not be measurable. However, under this alternative there would be an increased risk of wildfire and a decline in perennial grass vigor due to shading (see Vegetation section); either of these could potentially result in a negative impact to GRSG populations if they were to occur over a large portion of the local habitat.

3.7.2.3.5 *GRSG3 Alternative 5*

As grazing is prohibited under this alternative, there are no grazing effects to concealment cover for GRSG. Vertical cover would not be reduced through grazing and this alternative would result in the maximum amount of vertical cover compared to the other alternatives, which may reduce predation, though as other grazing alternatives would continue to meet the Table 2-2 (Bureau of Land Management 2015a) habitat objectives for providing quality breeding habitat, the difference in predation is not expected to be measurable. As cover continues to build up, both

with residual vegetation from previous years and current year growth, there is a risk that perennial bunchgrasses would become shaded and demonstrate reduced vigor and abundance (see Vegetation section). Under this alternative, without disturbance to remove vegetation, there is a risk that areas within the BCA would exceed the 10-30 percent perennial grass cover habitat objective from Table 2-2 (Bureau of Land Management 2015a). If this were to occur, there may be negative impacts to GRSG habitat and potentially to populations, as it would suggest shrubs and forbs are being reduced due to competition, and insect populations may be indirectly reduced.

The increase in vertical cover, and therefore, fine fuels, would increase the risk of catastrophic wildfire removing vegetation (grasses, forbs, and shrubs), which would reduce protective cover in the long term (see Vegetation section). This loss of vegetation would have a negative, indirect impact on GRSG, including populations. A catastrophic wildfire would be expected to have larger, measurable impacts to GRSG populations locally, and potentially regionally, depending on the size and severity of fire. While there is a risk of catastrophic wildfire occurring, there is no way of predicting if or when a fire may occur.

While this alternative would allow for maximum vertical cover and protection from predations compared to all other alternatives, it could also result in negative impacts to breeding habitat by exceeding the perennial grass cover objective from Table 2-2 (Bureau of Land Management 2015a) and would also result in the largest risk of catastrophic wildfire.

3.7.2.4 GRSG Issue 4: How would the alternatives aim to maintain and restore GRSG connectivity corridors between leks within the Bridge Creek population, other leks within the Steens PAC, and leks adjacent to the PAC?

The HAF analysis of the third order area indicates breeding, summer, and winter ranges are well connected. The primary constraints to lek connectivity (linkage pinch points) are juniper, burn scars, managed crested wheatgrass seedings, agriculture, steep terrain, and roads. Since the TNC model (Jones 2015) was completed using data from the timeframe during which these allotments were being grazed, it would be expected that there would be no additional disruption to lek connectivity as displayed in the model. However, lek attendance rates may continue to decline (Foster and Vold 2020), leading to lek abandonment, if further loss of sagebrush cover by fire, spread of invasive annual grasses, and juniper encroachment within 3 to 11 miles of occupied leks occur (Knick and Hanser 2011). Proper grazing does not directly affect connectivity and was not a considered variable or layer in the TNC model. These trends would continue under all alternatives.

3.7.2.4.1 GRSG4 Alternative 1

Under Alternative 1, grazing would occur at a level and season consistent with what has occurred in the past; however, with fewer total AUMs in the Hammond Allotment since no NR AUMs would be authorized. Since no NR AUMs would be authorized, and there would be no increase in AUMs permitted under this alternative, the risk of wildfire due to increased fine fuel accumulation would be greater than under Alternatives 2 and 3, but less than Alternatives 4 and

5. While grazing would not be expected to impact connectivity (as grazing would follow utilization thresholds), a fire would. If a fire were to occur, accumulation of fine fuels would be expected to result in increased loss of perennial vegetation that would reduce connectivity.

3.7.2.4.2 *GRSG4 Alternative 2*

The increase in the number of AUMs allowed in this alternative would not have an effect on connectivity in the Mud Creek and Hardie Summer Allotments since there would be no increase in allowable use levels. The main increase in use would be in the Hammond Allotment, which has many of the managed crested wheatgrass seedings. This area is displayed in the TNC model as a low to moderate linkage pinch point, where current movement of GRSG may be restricted. This would continue to be the case under this alternative. Grazing at a higher level may remove more vegetation than under Alternatives 1 and 4; however, as grazing management would maintain a level of grass cover, on average, across the landscape, and would be required to remain below utilization thresholds, and grazing would not result in failure to achieve habitat objectives as described in Table 2-2 (Bureau of Land Management 2015a), then connectivity under this alternative would not be measurably impacted more or less negatively than the other alternatives. In addition, NR AUMs would be permitted if permitted AUM utilization was below 35 percent. While the increased AUMs would result in utilization closer to thresholds, slightly reducing available cover above Alternative 1, this alternative would have less fine fuel accumulation than Alternatives 1, 4, and 5, which would reduce the risk of catastrophic wildfire and reduce the buildup of residual vegetation in the perennial grass crowns, making them more resilient to fire (Davies, Bates, Boyd, et al. 2021). Perennial grasses that are more resilient to fire, have decreased mortality and can better protect the site from invasion by annual grasses following fire, therefore, better protecting connectivity.

3.7.2.4.3 *GRSG4 Alternative 3*

Under this alternative, more AUMs would be used when compared to all other alternatives. In addition to the increase in permitted use, NR AUMs could be authorized with few terms and conditions outside of the utilization threshold. Alternative 3 would have higher livestock use in the BCA than any other alternative, which would reduce vegetative screening cover over a larger section of GRSG habitat. However, use would still be limited by utilization thresholds, reducing the potential differences between alternatives, and the impacts to connectivity would not be expected to be measurable, as grazing management would still follow utilization thresholds and grazing would not be responsible for failure to achieve Table 2-2 habitat objectives (Bureau of Land Management 2015a). However, as use levels would be higher than under all other alternatives, there would be a higher risk of exceeding utilization thresholds, which could impact habitat conditions. In addition, in the Hammond Allotment, the increase in AUMs, plus the concentration of livestock in the allotment in the winter due to the proposed supplemental feeding (located at existing disturbed sites) would potentially create more or larger areas with higher than the 60 percent utilization on crested wheatgrass, which could result in trampling of limited shrub cover that is present. This would negatively impact the movement of GRSG and connectivity through the pinch point in this area identified in Jones and others (2015). However, this alternative would have the lowest risk of catastrophic wildfires since it would most

consistently reach the utilization thresholds across the allotments, and fine fuel loading would be reduced.

3.7.2.4.4 *GRSG4 Alternative 4*

Under Alternative 4, permitted AUMs would be reduced by half (annually authorized AUMs may be reduced more where grazing was not authorized due to not achieving ecological objectives in the Mud Creek and Hardie Summer Allotments). However, connectivity would not be measurably different than under other grazing alternatives as all grazing alternatives would still be limited by utilization thresholds, reducing the potential differences between alternatives, and the impacts to connectivity and grazing would not be responsible for failure to achieve Table 2-2 habitat objectives (Bureau of Land Management 2015a). However, as use levels would be lower than under all other grazing alternatives, this alternative would have the least amount of risk that grazing would impact habitat conditions as it would have reduced utilization thresholds. While this alternative would result in the most vertical cover compared to other grazing alternatives, as all alternatives would provide adequate cover for GRSG, it is not expected that the increase in vertical cover would directly correlate to an increase in connectivity.

There are no provisions in any of the alternatives to reduce juniper or reestablish sagebrush in burned areas or crested wheatgrass seedings, which would address current connectivity limitations, as those actions are planned outside of this EIS. Limited sagebrush and juniper encroachment are the major factors limiting connection in the BCA; as grazing would not impact sagebrush or juniper abundance, this alternative would continue to have the same level of connectivity as under other alternatives. This alternative would have less risk of catastrophic fire than Alternative 5, but more risk than all other grazing alternatives. Catastrophic wildfire would have a measurable negative effect on connectivity through removal of a larger amount of vegetation, and recovery may be limited, reducing the habitat quality in the long term.

3.7.2.4.5 *GRSG4 Alternative 5*

Although there would be no grazing in this alternative, the effects to connectivity would be essentially the same as other alternatives, since none of the alternatives considered in detail would be expected to have a measurable impact on connectivity. Although there would be an increase in vertical cover in the form of residual grass under this alternative, all alternatives would be limited by utilization thresholds, which ensure that enough vertical cover remains in place across the landscape to allow for connectivity. This alternative would have no risk that grazing would impact habitat (except in the case of trespass, which is not expected).

As under the other alternatives, concealment or hiding cover would still be limited due to lack of sagebrush, and connectivity would be further limited by the presence of juniper; actions to address these concerns are outside the scope of this EIS. This alternative would have the most risk for catastrophic fire and, if a fire were to occur, would be most likely to result in desirable perennial vegetation mortality, reducing site recovery and increasing areas susceptible to annual grass invasion. If catastrophic fire were to occur under this alternative, there would be negative effects to connectivity that would be larger than under other alternatives.

3.7.2.5 GRS5 Issue 5: How would the presence of predators, particularly corvids (mainly ravens), be affected by the alternatives and what impact would that have on GRS5?

3.7.2.5.1 GRS5 Alternative 1–3

Since the occurrence of predators is associated with cattle presence and is not tied to specific grazing management, the effects of allowing cattle to graze within the allotments would be the same for Alternatives 1–3. Coates and others (2016) found that the occurrence of corvids within occupied GRS5 habitat increased by 45.8 percent when livestock were present. In addition, the same research showed that ravens selected sites near GRS5 leks (presence of ravens decreased by 8.9 percent per kilometer of increased distance from a lek site). An increase in the presence of corvids attracted to the area by cattle could result in increased instances of GRS5 predation compared to no grazing (Coates and Delehanty 2010; Coates et al. 2020). Alternatives 2 and 3, with longer permitted seasons of use, may have corvids present more often throughout the year compared to Alternative 1.

While other predators such as coyotes and golden eagles are commonly observed within the BCA, they are not likely to prey on adult cattle, but presence of these predators may increase if cattle are turned out during the calving period. This is due to many predators such as coyotes, eagles, and corvids being opportunistic scavengers that would be attracted to afterbirth and carcasses in the event that cattle and/or calves die during the grazing period. However, most ranchers in Harney County calve on their base property, and it is not expected that calving in the allotments would be a regular occurrence. Due to elevation, it is expected that if calving were to occur, it would most likely be within the lower elevation Hammond Allotment. Though calving within the area is a low probability and would likely occur within crested wheatgrass seedings, should this occur near lek sites or in nesting/brood-rearing habitat, incidental predation of GRS5 eggs, chicks, or adults may occur at higher rates than would be expected if cattle were not present. Specifically, this would be an issue if calving were to occur in the Mud Creek Allotment, near the only known lek in the BCA. Alternative 3, with its flexibility in scheduling that does not provide a general grazing rotation, is the alternative that would most likely have this effect. The other alternatives follow a general grazing rotation that allows livestock grazing after ranchers typically calve in the area (graze/defer treatments).

3.7.2.5.2 GRS5 Alternatives 4

As Alternative 4 would not allow cattle to be present on the allotment during the nesting and brood-rearing seasons, when corvids can cause GRS5 mortality by predating on eggs and young broods, the effects of this alternative would be minimal. However, as grazing would still occur, livestock presence would still attract corvids to the BCA during other times of the year. This alternative would be expected to result in decreased presence of corvids throughout the year compared to other grazing alternatives due to a shortened season of use, but may increase predation above Alternative 5.

3.7.2.5.3 *GRSG5 Alternatives 5*

Alternative 5 would be expected to have no change in corvid presence compared to what is currently present within the BCA as currently there is no authorized grazing. While livestock would not be present within the BCA, corvids and other predators may be present as livestock and other actions that draw predators still occur in areas adjacent to the BCA. Under this alternative, there would be no increase in predation within the BCA.

3.7.2.6 **GRSG Issue 6: How would proposed livestock grazing be managed to minimize potential for degradation in quantity and quality of riparian and meadow habitat for GRSG?**

Most wet meadow areas that GRSG would use during late brood rearing are located on private land near the allotments or at higher elevations outside of the BCA. See GRSG summary and riparian assessment above for detailed mesic habitat availability and riparian vegetation issues and effects.

3.7.2.6.1 *GRSG6 Alternative 1*

GRSG use of riparian and meadow habitat occurs primarily during the summer brood-rearing season whereby chicks benefit from the abundance and diversity of forbs and insects that occur in these areas. Season of use rotation would allow for some regrowth of riparian vegetation by fall, including protecting streambanks during spring runoff the following year (see RWQF section for more information riparian conditions). Riparian and wet meadow habitat within these allotments would continue to provide quality habitat as grazing management would not reduce GRSG habitat quality or quantity (Monroe et al. 2017). Though grazing may remove a portion of riparian vegetation (typically herbaceous vegetation, though occasionally woody vegetation), the amount removed would be monitored and grazing would not remove or reduce riparian vegetation in the long term. As this alternative would return grazing as previously authorized, when monitoring found that with the exception of Krumbo Creek, streams in the allotment were stable, in balance with sediment, well vegetated, and capable of withstanding higher flow events, generally a prerequisite for achieving and maintaining quality habitat, it is expected that those conditions would continue to occur.

On the Steens Mountain, mesic habitat increases with elevation (Appendix J). As GRSG migrate from nesting and early brood-rearing spring habitat to late brood-rearing summer habitat, they would be moving to higher elevations on the Steens Mountain, where more extensive wet meadow complexes exist. Some of these wet meadows are private lands adjacent to the Hardie Summer Allotment while others are higher in elevation, outside of the allotments, on public and private lands. Within the existing grazing system that would be applied in this alternative, riparian areas and mid-high elevation meadow habitat occurring in summer habitat would be expected to maintain or improve in condition and would not affect the quantity of areas, as monitoring prior to 2014 (when grazing was occurring in the same way as is currently proposed under this alternative) found the creeks, with the exception of Krumbo Creek, were in PFC.

Creeks that would remain in PFC would continue to provide GRSG habitat. See RWQF section for detailed riparian information.

3.7.2.6.2 GRSG6 Alternative 2

The effects of this alternative on riparian areas and wet meadow habitat would be similar in scope to those in Alternative 1, with the exception of increased use by livestock in the Hammond Allotment, and the Bridge Creek drainage would be better protected by the water gap extension, leaving all resources for wildlife, including GRSG. The grazing rotation proposed, along with the riparian thresholds and responses based on scientific literature, would provide enough rest of riparian areas to maintain riparian conditions (see RWQF section). Riparian and wet meadow habitat within these allotments would continue to provide quality habitat as grazing management and associated thresholds and responses would not reduce GRSG habitat quality or quantity (Monroe et al. 2017). Though grazing may remove a portion of riparian vegetation (typically herbaceous vegetation, though occasionally woody vegetation), the amount removed would be monitored and limited by riparian thresholds, and grazing would not remove or reduce riparian vegetation in the long term. See RWQF section for more information on riparian conditions.

Residual vegetation would be present at the end of the growing season to maintain bank stability and withstand spring runoff the following year, as areas would be protected by grazing thresholds.

In the Hardie Summer Allotment, where the majority of riparian areas occur within the BCA, grazing would be similar to under Alternative 1. The fencing changes within Hardie Summer would result in smaller pastures, allowing for improved management within the allotment, including allowing for a full year of rest every third year in each pasture. Lake Creek would be moved into the Hammond FFR; however, use would be the same as under Alternative 1 since this change is due to adjusting boundaries and is not an increase in AUMs on the land. As with Alternative 1, GRSG would be moving to higher elevation wet meadows for late brood-rearing and summer habitat. While livestock and GRSG may be in the same areas at the same time under this alternative, they would share resources; monitoring, along with thresholds and responses, would ensure resources are available for both. Riparian area monitoring, thresholds/use indicators, and adaptive management incorporated into all grazing alternatives, as described in Section 2.1, would help ensure damage to riparian areas does not occur. Grazing in the Krumbo Creek Pasture of the Hammond Allotment would not receive any NR AUMs, and grazing use would be limited to every other year, which would improve riparian conditions along that creek. Grazing under this alternative would not be expected to reduce the quality or quantity of riparian areas and may improve conditions from Alternative 1, which does not include additional thresholds and responses.

3.7.2.6.3 GRSG6 Alternative 3

In this alternative, livestock AUMs would be increased in all areas on public lands, which could translate into increased use of riparian areas and wet meadows, as it would be expected that utilization thresholds would likely be reached annually through use of permitted and NR AUMs.

While GRSG may access some of these areas, the increase in AUMs and lack of a general livestock rotation could have a higher potential for degradation of riparian areas since it is assumed that use would be more likely to occur during the same time of year, with periodic rest occurring irregularly. The potential for negative impacts would be higher under this alternative, and more intensive monitoring would be required to reduce the risk of negative impacts, compared to other alternatives where general grazing treatment times and rest periods are defined and based on results of previous management.

Riparian areas in the Hammond Allotment such as Krumbo Creek, Webb Springs Creek, and Knox Spring would see increased use, up to utilization thresholds annually, which could reduce the amount of vegetation available for improvement or maintenance of riparian condition. This would be especially true for the Krumbo Creek as there would be no general grazing rotation to ensure regular rest, and NR AUMs could be authorized. While use would still be limited by additional thresholds and responses, as defined in the Adaptive Management and Flexibility section, and with monitoring and adaptive management, this use should still maintain and/or improve riparian areas, the degree of improvement for Krumbo Creek under this alternative would be less. Krumbo Creek is currently showing a negative trend in ecological conditions due to trespass livestock, and it is currently not achieving PFC (see RWQF section for more information). Under this alternative, there would be no period of rest to allow ecological conditions to improve and for substantial progress to be made for achieving S&Gs. Therefore, while conditions would improve over time under this alternative, assuming all thresholds and responses are followed, the improvement in conditions would be slower than under other grazing alternatives, which all have rest to allow for recovery in the grazing management. Habitat conditions for GRSG in Krumbo Creek would be marginal for a longer period of time under this alternative.

Under this alternative, the Bridge Creek water gap fencing would be removed. Since no general grazing rotation is provided, it is assumed that livestock would have access to the Bridge Creek drainage and associated riparian areas every year during the growing season through the hot months of summer, with only irregular rest as there is no general grazing rotation to follow. This would concentrate livestock in the riparian areas, increase use in this area above all other alternatives, and increase the risk for degradation of the riparian areas since protection of these areas would have to be limited to monitoring and associated thresholds and responses. In addition, riparian areas along Bridge Creek would allow use during the warmer months of summer, which is when livestock tend to congregate in riparian areas. Since none of the other alternatives would allow grazing within Bridge Creek, this alternative would be most likely to have a negative impact on the riparian area, though grazing thresholds and responses would still be in place and should minimize negative impacts, assuming monitoring occurred as described and grazing was removed prior to exceeding thresholds.

While utilization thresholds would still be set at 50 percent on native key species, under this alternative, it is expected that this utilization threshold would be reached annually (under other alternatives it is expected AUMs permitted would typically be used prior to the utilization threshold being achieved, in most years). Based on the potential increase in use (up to the

utilization threshold annually), the riparian condition would be at a higher risk of degradation compared to other alternatives.

Under this alternative, fencing changes would move more creeks into FFRs, where management is minimal, and many pastures would still include large areas of private land. When allowable use (utilization and riparian short-term indicators, Section 2.1.3 Adaptive Management) authorized on public lands has been reached, livestock could be moved to private lands within the FFR. Since there would be no physical barriers to livestock moving back onto public lands within the FFR any livestock that drift onto public land from private land could congregate in the riparian areas. While they would be considered in trespass, under 43 CFR 4100, damage may still occur in riparian areas if the trespass is not found and corrected. This alternative has the largest potential (risk) to negatively impact riparian areas important to GRSB when compared to other alternatives due to the increased potential of trespass and lack of general grazing rotations.

3.7.2.6.4 GRSB6 Alternative 4

The effects of this alternative on riparian areas and wet meadow habitat for GRSB would be similar in scope to those in Alternative 1, but with less use by livestock due to the reduction in permitted AUMs (and annually authorized AUMs may be reduced more where grazing was not authorized due to not achieving ecological objectives in the Mud Creek and Hardie Summer Allotments), and shortened season of use. However, as use would be later in the year, when livestock are most drawn to riparian areas, there would be less opportunity to utilize pastures with riparian areas earlier in the year when upland vegetation is green and livestock tend to water in riparian areas but not loaf there as often. Therefore, under this alternative there would be increased risk of livestock utilizing riparian areas heavier due to late season grazing, which increases the risk that livestock may over utilize these areas. However, thresholds and responses, along with reduced numbers, would still be expected to maintain and protect riparian areas from degradation by ensuring that proper grazing occurs in riparian areas. This alternative would be expected to protect riparian areas, allowing them to continue to provide quality habitat to GRSB.

3.7.2.6.5 GRSB6 Alternative 5

There would be no grazing by livestock under this alternative. Therefore, riparian area quantity or quality would not be impacted by livestock grazing.

Boyd and others (2017) found that in five years following exclusion of grazing in perennial spring drainages, the structure of the vegetation changed. While the increased litter in the system did not largely affect sedges, excluded areas were found to have a lower rush density, which are used by GRSB (Boyd et al. 2017). While the BCA has not shown this change in composition at this point, it would be a possibility under this alternative. While riparian vegetation in the BCA is showing good composition, abundance, vigor, and structure, and proper ecological functioning (with the exception of Krumbo Creek), monitoring has found that these areas were providing quality habitat and were properly functioning prior to the removal of livestock. Therefore, it is not expected that the lack of livestock grazing since 2014 is responsible for quality riparian areas, but that proper riparian conditions have continued in the absence of livestock grazing (see

RWQF section for more information). Riparian ecological functioning would continue to occur under this alternative in all riparian areas, including Krumbo Creek, as long as trespass grazing does not occur, and these areas would continue to (or begin to in the case of Krumbo Creek), provide quality habitat for GRSG.

With the decreased use allowed in the BCA under this alternative, there is an elevated risk that use on wet meadows and riparian areas on adjacent private lands would increase, as potential permittees try to find additional available forage. Increased grazing on private lands may degrade those important GRSG areas as private landowners may not apply monitoring thresholds and responses. However, if private landowners do apply grazing limitations on riparian areas, and utilize other feed, such as hay to support higher livestock numbers, this increased use in riparian areas may not occur. Increased use of riparian areas on private would not be expected to occur if livestock numbers by potential impacted permittees are reduced or if additional forage such as additional private property, a grazing lease or permit outside of the BCA is found. This alternative would have the least direct effect on riparian areas important to GRSG but could have a larger indirect effect if potential permittees increase use on riparian areas outside of the BCA.

3.7.2.7 GRSG Issue 7: How would the alternatives impact West Nile Virus (WNV) risk?

WNV was identified in the 2015 GRSG ARMPA (Bureau of Land Management 2015a) as a potential threat to GRSG. WNV is spread by mosquitoes that concentrate and lay eggs in and around features that maintain standing water during their summer breeding season (Garton et al. 2011; Hagen 2011). Occurrences of GRSG inoculation by WNV have been documented (Clark et al. 2006), and, when infected, mortality may be as high as 100 percent under some circumstances (Naugle et al. 2004). The virus was first detected in Oregon near Burns Junction in 2006 and then, later that same year, near Crane and Jordan Valley. From 2006 to 2010, ODFW tested 1,839 birds for WNV with one positive detection in 2008. The infected bird came from the Beulah Wildlife Management Unit, outside of the BLM Burns District's boundary (Dusek et al. 2014). No GRSG mortality associated with WNV has since been documented in Oregon. Given the low occurrence of GRSG inoculation by WNV in the area, the risk of virus spread, and subsequent mortality associated with livestock water developments, would be low.

3.7.2.7.1 GRSG7 Alternatives 1, 2, 4, and 5

No new water infrastructure would be constructed within the BCA under Alternatives 1, 2, 4, or 5. Therefore, there would be no effects to current or future risk of WNV spread.

3.7.2.7.2 GRSG7 Alternative 3

Under alternative three, some additional water troughs would be installed, and temporary troughs may be utilized in the proposed corrals. All temporary and permanent water infrastructure placed within the allotments for cattle would be in compliance with MD LG 8 (Bureau of Land Management 2015a: 2–20), requiring design to avoid standing pools of shallow water that may contribute to mosquito breeding. In addition, containing water for cattle in deep troughs or tanks largely avoids the creation of muddy areas where pooling within hoof prints can provide

breeding habitat for mosquitos and increase risk of WNV spread. As such, increased risk of WNV spread resulting from tanks and troughs placed for cattle would be the same or lower than many of the natural water features in the area. It is not expected that water developments proposed under this alternative would have a measurable impact to WNV spread.

3.7.2.8 GRSG Issue 8: How would the level, timing, and location of proposed livestock use impact grassland and sagebrush obligate migratory birds?

3.7.2.8.1 GRSG8 Alternative 1

Presence of cattle during the breeding/nesting season for migratory birds could reduce habitat through removal of cover and reducing hiding cover for ground nesting species resulting in increased predation, as described above for GRSG. Cattle present during this time may also trample nests, eggs, or nestlings of migratory birds, especially species that don't nest under shrubs. As grazing under this alternative includes rotation and rest, adjacent pastures without cattle present would provide habitat that excludes cattle during breeding/nesting season and limit the number of individuals negatively affected. It is not expected that there would be a measurable impact to migratory birds under this alternative.

3.7.2.8.2 GRSG8 Alternative 2

Impacts under this alternative would be similar to Alternative 1, though risk of predation and trampling would be slightly increased due to increased AUMs permitted within the Hammond Allotment. As NR AUMs would be permitted later in the season, it would not have a negative effect on migratory birds beyond the removal of some residual cover (up to the utilization thresholds). Updated grazing schedules would vary and provide annual growing season rest, either through full rest or deferred grazing treatments. This should ensure vegetation cover over time remains healthy and continues to provide nesting and hiding cover for migratory birds (see Vegetation section). It is not expected that this alternative would have any measurable impacts on migratory birds and effects would be the same as described for GRSG.

3.7.2.8.2.1 GRSG8 Alternative 3

While Alternative 3 increases available AUMs, the maximum utilization threshold remains the same as Alternatives 1 and 2, with the exception of the utilization threshold in Mud Creek Lower Field, which would not be reduced as described under Alternative 2. Grazing management for Alternative 3 does not include a general grazing rotation that specifies when cattle may be present within a given allotment or pasture in a given year or when rest or defer treatments would occur in individual pastures. While thresholds and responses would apply, grazing under this alternative would be at a high risk of reaching, and potentially exceeding thresholds before responses can occur. This would result in more vegetation being removed, which would result in less vertical cover for migratory birds, as described above for GRSG. In addition, rest would be expected to occur less frequently in any given pasture as it would be planned annually and not years in advance. Grazing vegetation consistently during the growing season without providing periodic rest at regular intervals would result in decreased vegetative health and vigor in the long

run. Alternative 3 would also have a higher number of cattle present to utilize the increased AUMs, which would increase the likelihood of nest trampling. Alternative 3 would have more direct negative impacts to migratory birds and other wildlife than other alternatives being considered but, assuming all thresholds and responses were followed, it is not expected that impacts would be measurable.

3.7.2.8.3 *GRSG8 Alternative 4*

Under this alternative, effects to migratory birds would be similar as under Alternative 1. However, the reduction in permitted AUMs (and annually authorized AUMs may be reduced further where grazing was not authorized due to not achieving ecological objectives in the Mud Creek and Hardie Summer Allotments), and reduction in livestock utilization thresholds would be expected to provide increased cover for bird and wildlife species in the short term since livestock would not be removing as much forage from the area, same as described above for GRSG. In the long term however, vegetation may build up in the crown of perennial grasses, which over time can reduce their vigor, which may reduce the cover. In addition, this fuel accumulation also increases the risk for wildfire, which would be more likely to kill the plant and reduce the site's ability to recover without intervention. This alternative would also have a shorter season of use than other grazing alternatives, with use starting later in the year after nesting. This would reduce potential conflict with ground nesting migratory birds. The effects to migratory birds under this alternative would be less than under other grazing alternatives but would not be expected to be measurable.

3.7.2.8.4 *GRSG8 Alternative 5*

As Alternative 5 does not permit grazing, there would be no effects from grazing on migratory birds. However, there would be effects to vegetation due to accumulation of residual dry matter and subsequent increased risk of large fires that would likely result in the loss of sagebrush and perennial grass, degrading habitat in the long term. Any action that would adversely affect the long-term vigor and abundance of perennial vegetation would have a long-term negative effect on habitat for migratory birds. See the Vegetation section for more details. This alternative would have the least direct effects on migratory bird habitat but could have larger indirect effects.

3.7.2.9 **GRSG Cumulative Effects**

The CEAA for GRSG and migratory birds is the Steens-Pueblo-S. Steens Fine Scale. The temporal scale will be more than 20 years. Past and present actions that have led to the current conditions of populations and habitat of resident and migratory birds within the BCA include current and historic grazing; range developments; noxious weed and invasive species establishment, spread, and treatments; fire; juniper expansion; juniper cutting; road maintenance; restoration seeding and planting; recreation activities; and drought. Continued restoration actions under the North Steens Ecosystem Restoration Project (Bureau of Land Management 2007e) and the South End Complex Emergency Stabilization and Restoration Plan (Bureau of Land Management 2006a) include the treatment and pile burning of juniper, followed by pile seeding,

as well as the planting of almost 2,000 sagebrush seedlings within the Mud Creek Allotment. These actions are expected to continue in the long term. As restoration actions occur, along with weed treatments, habitat conditions within the CEAA would result in improved habitat for many species within and adjacent to the BCA (Sage-Grouse National Technical Team 2011). Pile burning would remove perennial vegetation within the boundary of piles; however, it is expected that perennial vegetation in the interspaces would not be damaged. The vegetation in the interspaces, as well as seeding, would result in improved vegetation and habitat conditions in the long term. This is especially true for restoration activities that focus on the establishment of sagebrush, and that is a limiting factor in habitat currently. Breeding bird surveys conducted in the CEAA show a stable trend in species richness and abundance with changes to species composition in the area occurring in response to wildfires, which typically result in an increase of species favoring grassland habitats and a corresponding decrease in shrubland adapted species. Species composition has also changed in response to large-scale habitat restoration efforts that target juniper removal on the west slope of the Steens range. These changes are expected to continue.

Continued road maintenance, though not currently planned within the CEAA with the exception of the Steens Mountain Back Country Byway, would allow for better access into the CEAA for firefighters if a fire were to occur. Limiting the size and spread of fire would reduce negative impacts on habitat. While recreation activities, livestock, and wildlife would continue to spread invasive species, continued weed treatments would help counter spread of invasive species and reduce the risk of invasive species dominance if a fire were to occur. In addition, treatment of invasive species, especially invasive annual grasses, would provide perennial grasses that are present an opportunity to become established and increase vigor and abundance with reduced competition from annual grasses. This would also result in improved habitat conditions in the CEAA.

All actions that contribute to improved habitat would improve conditions for nest success and chick survival, having a positive impact on GRSG and migratory birds. Grazing in areas adjacent to the BCA within the CEAA would continue, which would continue to draw predators, including corvids, into the BCA, including during breeding and early brood-rearing. Annual spring presence of cattle in proximity to GRSG breeding and nesting habitat would have a negative effect to GRSG breeding and nesting success and contribute to lower GRSG survival and recruitment into the adult population within affected area at the PAC and third order range scales (the CEAA).

Livestock grazing in other areas of the CEAA would be required to achieve S&Gs, make substantial progress towards achieving S&Gs, or ensure that grazing is not a causal factor for non-achievement. Therefore, grazing within the CEAA would continue to improve or maintain GRSG habitat, or at least not have an additional negative impact on GRSG habitat. Wild horse use within the CEAA, as well as invasive annual grasses, and juniper expansion would continue to negatively impact conditions without active management or treatment. While range development maintenance would have no direct impact on GRSG, if any additional fences are constructed the risk of collision would be increased within the CEAA, and connectivity may be reduced. However, the opposite is also true, if additional fences within the CEAA are removed, it

would be expected that fence collision risk would be reduced, and connectivity may be increased. Any other new developments, such as troughs, may decrease habitat in the area immediately surrounding the trough; however, as this disturbance area is typically small (1-10 acres) compared to the size of the CEAA, it is not expected that new developments would have any large-scale impacts on habitat.

3.8 Lands with Wilderness Characteristics (LWC)

3.8.1 LWC Affected Environment

In 2002, Oregon Natural Desert Association (ONDA) submitted citizen-proposed wilderness characteristics areas, including the Bridge Creek LWC Unit,⁹³ which is adjacent to an existing WSA. A BLM IDT evaluated the unit in 2003 in preparation for the 2005 Andrews/Steens RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a). The evaluation indicated that there are 1,530 acres of the Bridge Creek Unit at the northwest end of the Hardie Summer Allotment that possess wilderness characteristics (Bureau of Land Management 2003a). The rest of the southern boundary of this unit is an un-named two track road and the eastern boundary is Bridge Creek Road (8243-FO). The Bridge Creek LWC Unit contains Little Bridge Creek and Big Bridge Creek, two ephemeral to intermittent riparian areas that feed the perennial Bridge Creek, which is located within the Bridge Creek WSA. Typically, to be recognized as possessing wilderness characteristics, a parcel must be greater than 5,000 acres, but since this parcel is contiguous with the Bridge Creek WSA, BLM determined it meets the wilderness characteristics size criterion (Bureau of Land Management 2003a; Bureau of Land Management 2004).⁹⁴ The Bridge Creek LWC Unit appears to be in a natural condition and have outstanding opportunities for primitive and unconfined solitude and recreation, when considered as a contiguous part of the Bridge Creek WSA (Bureau of Land Management 2003a). Supplemental characteristics such as cultural, scientific, educational, ecological, geological values may also be identified (supplemental values are not a requirement to be eligible as possessing wilderness character). In the 2003 LWC Inventory (Bureau of Land Management 2003a), it was determined that the topography consists of slopes, sometimes steep, and drainages, with vegetation of bunchgrasses, sagebrush, juniper, riparian areas along creeks, aspen groves, and a few small groves of grand fir, which are outside of the nearby Fir Groves ACEC; major uses included recreation and cattle grazing on the BLM-managed land, with small scale timber harvest on the adjacent private land. The wilderness characteristics of this unit from 2003 (Bureau of Land Management 2003a) were described as follows:

- *Naturalness*: This unit does have many unnatural features, primarily incurred through livestock operations. These features include reservoirs, ways, cabins, and fences. Also present are small scale logging slash and a SNOTEL weather station. However, these features are substantially unnoticeable in the unit as a whole when considering the units size and topography. Reservoirs are mostly small and screened by vegetation. Fences are, for the most part, screened by topography and vegetation, though some white top fences do exist. Cabins are mostly ruins and should disintegrate into the landscape over time.

⁹³ This is not the same as the Bridge Creek WSA (2-87), which is adjacent (to the north, west, and partially to the south) to the LWC unit.

⁹⁴ When combined with the Bridge Creek WSA, the total area would be 9,790 acres of BLM-managed land.

There are a couple of large juniper cuts that can be seen from a distance and appear unnatural. Most ways are vegetated and cannot be seen from a distance. This unit does generally appear to have been affected primarily by the forces of nature, with the imprint of people's work substantially unnoticeable.

- *Outstanding Opportunities for Solitude:* The area does provide outstanding opportunities for solitude similar to the Bridge Creek WSA. Opportunities for experiencing solitude in the Bridge Creek WSA are outstanding. Topographic and vegetative screening, as well as the size of the study area, provide areas where visitors can find a secluded spot, though this screening occurs less the farther east you are in the unit (Bureau of Land Management 1991). The presence of juniper in the eastern half of the WSA enhances the ability of the visitors to find solitude, especially where moderate to dense stands of juniper occur in the drainages (Bureau of Land Management 1991).
- *Outstanding Opportunities for Primitive and Unconfined Recreation:* The area does provide outstanding opportunities for primitive and unconfined recreation similar to the Bridge Creek WSA. The area provides outstanding opportunities for primitive forms of recreation, including day hiking, camping, backpacking, horseback riding, hunting and fishing (Bureau of Land Management 1991). Opportunities for hunting elk and deer are good in the eastern part of the unit where there is increased cover, though opportunities for hunting antelope are poor. Opportunities for hunting chukar are also good, especially along drainage rims.
- *Supplemental Values:* There is a remnant grand fir grove, which is extremely unusual for this area. The very scenic Bridge and Mud Creek canyons are also presently free from the juniper invasion, which has taken over sections of adjacent countryside. Large aspen groves are housed in this unit as well. This unit was found to contain ecological, geological, or other features of scientific, educational, or historic value.

The wilderness characteristics inventory for the Bridge Creek LWC Unit was updated in 2019 (Bureau of Land Management 2019b). At that time, additional background on the unit was provided. This unit was not evaluated in the 1980 Wilderness Inventories (Bureau of Land Management 1980) because at that time, the Bridge Creek LWC Unit was privately owned. The BLM acquired the parcel in 1995. At the time of the 2019 evaluation (Bureau of Land Management 2019b), wilderness characteristics were documented as seen below.

- *Naturalness:* The landscape is dominated by grasses, low-sage, and juniper stands. Elevation of the unit varies from 6,200 feet on the east side to 5,800 feet on the west side. Big Bridge Creek and Little Bridge Creek run east to west through the unit. Human activities in the unit are primarily livestock grazing and recreation. Unnatural features include: 3 waterholes, 1.5 miles of fence, and 1.5 miles of two-track road, cherry stemmed into the unit. The waterholes, fence, and two-track road are substantially unnoticeable. This unit does generally appear to have been affected primarily by the forces of nature, with the imprint of people's work substantially.

- *Solitude*: The juniper stands and the topography, which includes two drainages with elevation differences of up to 400 feet, provide numerous outstanding opportunities to find solitude. The contiguous boundary with the adjacent Bridge Creek WSA provides a seamless connection between the units. The area does provide outstanding opportunities for solitude similar to the Bridge Creek WSA.
- *Recreation*: This unit contains wildlife habitat, flowing water, and screening opportunities that provide solitude for both humans and creatures. Camping, hiking, hunting, horseback riding, wildlife viewing, exploration, and numerous other activities are available in this unit. The contiguous boundary with the adjacent Bridge Creek WSA increases the availability of recreational opportunities. The area does provide outstanding opportunities for primitive and unconfined recreation similar to the Bridge Creek WSA.
- *Supplemental Values*: This unit is within a PAC for GRSG. This unit was found to contain ecological, geological, or other features of scientific, educational, or historic value.

Since 2019, there have not been any substantial changes in the conditions of the LWC that have not already been considered in the wilderness characteristics inventory. Therefore, the BLM finds that the Bridge Creek LWC Unit continues to contain wilderness characteristics. The Bridge Creek LWC Unit was identified as a “Parcel with Wilderness Characteristics”⁹⁵ in the 2005 Steens CMPA RMP (Bureau of Land Management 2005a: RMP-81). In addition to the Bridge Creek LWC Unit, the Steens CMPA RMP (Bureau of Land Management 2005a) also found the High Steens LWC Unit and the Lower Stonehouse LWC Unit contained LWCs; these other units are located outside of the BCA.

An IDT met in October of 2023 to review the previous wilderness characteristics inventory for the Bridge Creek LWC Unit and all available information related to the 2002 citizen proposed units. The IDT determined that routes identified as the unit boundaries are still utilized by the BLM, permittees, and the public, and would be maintained as needed to allow for continued access by 4x4 vehicles. When the IDT considered wilderness characteristics for the Bridge Creek LWC Unit, which is contiguous with the Bridge Creek WSA, the IDT determined that this unit still possesses wilderness characteristics and should continue to be managed as described in the 2005 Steens CMPA RMP (Bureau of Land Management 2005a).

Lands (parcels) with wilderness characteristics are not provided special management status but are managed according to RMP direction (Bureau of Land Management 2005a) for surrounding non-WSA land. The protections afforded by the 2005 Steens CMPA RMP (Bureau of Land Management 2005a) (e.g., the mineral withdrawal, prohibition on cross-county motorized/mechanized vehicle use, ROW avoidance/exclusion areas, and VRM classification)

⁹⁵ During the development of the 2005 Andrews/Steens RMP (Bureau of Land Management 2005b; Bureau of Land Management 2005a), the BLM followed BLM Handbook H-6310-1 Wilderness Inventory and Study Procedures (Bureau of Land Management 2001b) and identified “Parcels with Wilderness Characteristics.” The term “Lands with Wilderness Characteristics” came into wide use with the 2012 publication of BLM Manual 6310-Conducting Wilderness Characteristics Inventory on BLM Lands (Bureau of Land Management 2012c). The terms “Parcels with Wilderness Characteristics” and “Lands with Wilderness Characteristics” have the same meaning.

were considered as providing sufficient protection to meet the goal/objective for parcels with wilderness characteristics (Bureau of Land Management 2005b: RMP-81).

For a more complete picture of the Bridge Creek LWC Unit, refer to the Grazing Management; RWQF; and Vegetation sections of this document.

3.8.2 LWC Environmental Consequences

3.8.2.1 LWC Issue 1: How would proposed livestock grazing and developments impact wilderness characteristics within the Bridge Creek LWC Unit?

3.8.2.1.1 LWC1 Alternative 1

Under this alternative, one or more grazing permits would be issued for ten years under the same terms and conditions as the 2004 authorization. The Bridge Creek LWC is located within the larger Hardie Summer Allotment, which would be permitted 407 AUMs, with a season of use from July 1 to September 30. No new developments would be constructed in the LWC.

Wilderness characteristics would likely remain substantially the same; however, as livestock grazing would be reinstated, conditions would be more similar to the 2002 inventory, when grazing was occurring regularly, as compared to the 2019 inventory, when grazing had only occurred in that year. Livestock grazing removes screening cover; however, it would not be expected to be enough to change the inventory determinations, especially since the original designation in 2005 occurred while grazing regularly occurred. As fire is a natural process, it does not directly impact naturalness. However, invasive annual weeds are detrimental to naturalness, though they may not impact the apparent naturalness. While invasive annual grasses are present within the Hardie Summer Allotment, they are not currently dominant. However, if a catastrophic wildfire were to occur, resulting in the loss of many perennial species, it is expected that annual grasses would increase, even if restoration efforts occurred. As such, the prevention of catastrophic fire is important in retaining naturalness within this LWC unit. Livestock grazing reduces fine fuels and decreases the risk of mortality during a fire, as described in the Grazing Management and Vegetation sections of this EIS. Conversely, vehicles and large animals, including livestock, have been shown to be vectors for dispersal of annual grass seeds, especially between July and October (Davies 2008). Spread of annual grass seed by livestock could occur under this alternative but would be a small risk as annual grasses are not dominant within this area and healthy understories with desirable vegetation currently protect the site from increased annual grass establishment (see Grazing Management and Vegetation sections). If annual grasses were to become dominant, which may occur following a catastrophic fire, livestock and other large animals would have increased chance of spreading seeds, and invasive annual grasses would negatively impact naturalness. Under this alternative, livestock would have access to Little Bridge Creek and Big Bridge Creek. Although neither of these streams are perennial, negative impacts from improper grazing could affect the natural characteristics in the form of severely denuded vegetation and unnatural looking wallows devoid of vegetation due to cattle congregation and trampling. However, under proper livestock grazing, which is proposed under this alternative, while livestock would have a short-term impact (vegetation removal during grazing), this impact would not be expected to negatively impact naturalness in any measurable

way. However, new permit terms and conditions, grazing rotations, or thresholds and responses for grazing would not be in place under this alternative, and no additional checks and balances for livestock grazing would be in place. Effects of livestock grazing under this alternative would be the same as what occurred in the past.

3.8.2.1.2 LWC1 Alternative 2

Under this alternative, the Hardie Summer Allotment, which contains the Bridge Creek LWC Unit would be permitted 364 AUMs, with a permitted season of use from July 1 to November 15. As under all alternatives, there would be no new fences or developments in the LWC unit. As livestock would be present for a longer period of time compared to grazing Alternatives 1 and 4, opportunities for solitude may be slightly reduced due to increased vehicle and human presence as the permittee moves and monitors livestock grazing. However, this effect would be temporary (when they are present) and would be small to the point of being immeasurable, as the area is quite remote, and opportunities for solitude would likely remain outstanding. While fewer AUMs are authorized under this alternative compared to Alternative 1, that is due to changes in the allotment boundaries. It is expected that livestock use within this area would be the same as described under Alternative 1, as would the effects. Under this alternative, there would be new terms and conditions associated with the grazing authorization, new general grazing rotations, and additional thresholds and responses. As these all work to ensure livestock grazing maintains or improves ecological conditions, it is expected that this alternative would protect naturalness within the LWC unit more than Alternative 1, but the effects are not expected to be measurable as all alternatives are required to conform to S&Gs and utilization thresholds.

3.8.2.1.3 LWC Alternative 3

Alternative 3 would authorize 408 AUMs within the Hardie Summer Allotment, with an authorized season of use from June 1 to December 31. While the number of permitted AUMs for this allotment is only 1 AUM different than permitted under Alternative 1, it is important to note that this alternative includes allotment boundary adjustments. Under Alternative 3, the 408 AUMs would be utilized on 3,705 acres of BLM-managed land (compared to 5,976 acres of BLM-managed land under Alternative 1). That results in a 9.1 acres/AUM stocking rate, compared to a 14.7 acres/AUM stocking rate under Alternative 1 and a 14.6 acres/AUM stocking rate under Alternative 2. A higher stocking rate (fewer acres per AUM) would be expected to increase livestock use (concentration) on each acre within the Hardie Summer Allotment, including within the Bridge Creek LWC unit. While this alternative would have similar terms and conditions compared to Alternative 1, and would follow thresholds and responses, the increased stocking rate and ability to request and authorize NR AUMs whenever utilization was found to be below the utilization threshold after permitted grazing would increase the risk that livestock grazing could exceed the thresholds prior to monitoring determining the thresholds had been reached. Exceeding the thresholds could move grazing from the proper to improper grazing category and may result in increased impacts to wilderness characteristics compared to the other grazing alternatives. If thresholds are not exceeded, it is not expected that grazing under this alternative would have measurable effects on wilderness characteristics.

As the permitted season of use under this alternative is longer than under other alternatives, it would have increased opportunities for temporary reduction in solitude while permittees are managing livestock. However, it is not expected that there would be a measurable change in solitude within the unit. There are no fences or developments proposed within the LWC unit under this alternative. However, the presence of additional water troughs near the southern border of the LWC unit may improve livestock distribution within the unit.

Impacts to fine fuels would be similar to Alternatives 1 and 2; however, fine fuels would be further reduced due to the increase in AUMs and the use of NR AUMs anytime permitted grazing utilization was less than 50 percent. A larger reduction in fuel loading would result in the decreased risk of catastrophic fire, which would further protect wilderness characteristics, specifically naturalness, following fire (see Grazing Management and Vegetation sections for more details).

Under this alternative, there would be new terms and conditions associated with the grazing authorization and additional thresholds and responses, which would work to ensure livestock grazing maintains or improves ecological conditions. Therefore, it is expected that this alternative would protect naturalness within the LWC unit. However, there would be more risk of impacting wilderness characteristics under this alternative compared to Alternatives 1, 2, and 4, as there are no general grazing rotations, increased use, and increased potential for exceedance of thresholds. Overall, the effects are not expected to be measurable as all alternatives are required to conform to S&Gs and utilization thresholds.

3.8.2.1.4 LWC Alternative 4

Under this alternative, the Hardie Summer Allotment would be permitted 203 AUMs, approximately half of what would be permitted under Alternative 1, and annually authorized AUMs would be less as livestock grazing would not be authorized in areas that are not achieving ecological objectives. In addition, the permitted season of use would be from August 1 through November 30, which would be more restrictive than other grazing alternatives and allow only for defer grazing treatments. Under this alternative, the stocking rate would be much lower than under other alternatives (lower concentration). This would result in acres within the use areas being used less than under other alternatives, especially since the utilization threshold would also be reduced a maximum of 30 percent.

Impacts to solitude would be similar to those described under Alternative 2 but would be less as livestock would not be in the allotment for as long of a season of use and there would be reduced AUMs. This alternative does not include any proposed developments. However, the impact is not expected to be measurable.

Impacts to fuel loading and potential risk of catastrophic fire (resulting in negative effects on wilderness characteristics) would be similar as described under Alternative 2. However, there would be an increased risk of catastrophic fire as fuels would not be removed as much as under all other grazing alternatives.

3.8.2.1.5 *LWC Alternative 5*

Under Alternative 5 (No Grazing) there would be no livestock present within the LWC unit. The lack of grazing management and permittee activities would result in opportunities for solitude consistent with what has occurred since 2014 (with the exception of 2019). However, recreation and vehicles associated with recreation would still occur. There are no developments proposed under this alternative.

As there would be no grazing, there would be no reduction in fine fuels under this alternative. Fine fuels would be allowed to accumulate in place, which can reduce the vigor of desirable vegetation, and increase the risk of mortality in the case of fire (see Grazing Management and Vegetation section). Therefore, this alternative would result in the highest risk for catastrophic fire, which, if it occurred, could result in increased annual grass dominance, along with removal of screening cover, and negative impacts on naturalness.

Overall, the impacts to naturalness may be slightly improved under this alternative compared to grazing alternatives (and without a catastrophic fire). However, the improvement to naturalness is not expected to be measurable.

3.8.2.2 *LWC Cumulative Effects*

The CEAA is the designated Bridge Creek LWC Unit, located within the BCA boundary. This is an appropriate geographic unit for assessing effects to lands with wilderness characteristics because these are the lands that are included in the proposed AMP EIS area. The temporal scale is 20 years for restoration as this is the timeframe for which actions would be implemented and for the vegetation community to respond to changes, and 10 years for livestock grazing actions as grazing permits expire within a 10-year time frame.

In addition to the effects to LWC from past and ongoing actions outlined in the affected environment section, and the effects to LWC from the alternatives described immediately above, there are multiple RFFAs that will occur in the BCA that could affect LWC to some extent. The RFFAs include weed treatments, recreation activities, and juniper treatments, with fire being a continued risk in the area.

Weed treatments within the area would work to increase naturalness through improvement of ecological conditions within the LWC unit. As weeds within the LWC are currently minimal, it is not expected that these treatments would result in a measurable improvement in naturalness. While solitude may be negatively impacted during treatments, these actions would be short term and would not impact solitude in the long term; when considered in combination with the proposed actions, it is not expected that there would be measurable cumulative effects.

Recreation activities under all alternatives are expected to continue occurring as are currently happening. While these activities may slightly reduce solitude in the short term, recreation activities are not expected to increase in number, and there would not be an overall impact to the

solitude or recreation characteristics. Even when combined with proposed actions, changes to the wilderness characteristics of the LWC are not expected.

Juniper treatments within the LWC unit would occur under the North Steens Ecosystem Restoration Project EIS (Bureau of Land Management 2007e). Treatments would be expected to be juniper cut and hand piling, followed by pile burning after 1-2 years; these actions would only occur in areas where the understory is healthy enough to recover following juniper removal. All treatments would follow PDEs, and BMPs from the previous EIS (Bureau of Land Management 2007e), as well as the Steens CMPA RMP (Bureau of Land Management 2005a), as amended by the 2015 ARMPA (Bureau of Land Management 2015a). Cutting of juniper trees would have a short-term negative impact on naturalness as the remaining juniper trunks would be visible to the casual observer and would clearly have been cut utilizing chainsaws. However, as surrounding vegetation increases in abundance and vigor, and as the cut faces age, these treatments would become less noticeable, and naturalness would be improved. Areas where pile burning occurred would be initially noticeable; however, they would be seeded, and vegetation should increase over 2-5 years, resulting in these areas returning to inventory levels of naturalness. In addition, treatments would not be expected to occur on all acres within the LWC unit. While cutting juniper could reduce some vegetative screening, the changes in topography, as well as the fact that not all acres would be cut, would not result in measurable changes to solitude. Therefore, even when considered with proposed actions in this EIS, it is not expected that these actions would result in long-term changes to naturalness that would result in changes to the wilderness characteristics inventory.

While fire cannot be predicted, wildfire is a natural occurrence and is expected to occur within this area at an undetermined time in the future. Fire that burns within healthy systems, where perennial species have high vigor and abundance and fine fuels are not accumulating within the crown, are more likely to survive fire. In addition, fire behavior in these systems is typically more mosaic, leaving unburned areas. Any fire that occurred under these conditions would not be expected to negatively impact wilderness characteristics in the long term, though in the short term there could potentially be signs of fire suppression activities and an initial increase in weeds, specifically invasive annual species, but as desirable perennial vegetation returns to the site and burned plants increase in vigor, these annual species would not be expected to dominate the site and would not be noticeable to the casual observer in the long term. This would be most likely to occur under alternatives that ensure S&Gs are met while reducing fine fuel loading. As fine fuel loading increases (or under alternatives that have less fine fuel removal), fires are more likely to be catastrophic, where desirable perennial species have high mortality rates and fires burn more completely (leaving fewer islands, less of a mosaic). Under these conditions, invasive annual grasses would be expected to take advantage over increased availability of resources and dominate all or part of the burned areas. This dominance would have a negative effect on naturalness, and be noticeable by the casual observer, until such a time that the site recovered naturally or following successful restoration actions that reduced invasive annual grasses and increased desirable vegetation. Areas burned through wildfire also result in a reduction of screening cover and may reduce solitude and recreation opportunities until desirable vegetation is reestablished or increases in vigor.

3.9 Recreation (R)

3.9.1 Recreation Affected Environment

The 2005 Steens RMP/ROD (Bureau of Land Management 2005a) set the goal for the CMPA, which includes the BCA, to “Provide developed and undeveloped recreation opportunities, while protecting resources, to manage the increasing demand for resource-dependent recreation activities.”

Highway 205, the East Canal Road, and the Steens Mountain Back Country Byway (also known as the Steens Loop Road) provide multiple public access points to the BCA. Public access provides opportunity for dispersed recreation. The BLM has a magnetic vehicle counter installed at the base of Steens Mountain along the Steens Mountain Back Country Byway. This road is typically accessible from June to November annually, dependent upon weather and snowpack. Below are the vehicle counts recorded from 2020-2022. Table 3-34 provides an idea of visitation, not an exact figure.

Table 3-34: Vehicle Counts Recorded on the Steens Mountain Back Country Byway

YEAR	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
2020	No Data	3,806	3,187	2,730	No Data
2021	2,487	2,681	2,738	2,735	2,128
2022	No Data	2,681	2,738	2,873	No Data

Based on this data, average monthly vehicle traffic is 2,800 vehicles. If we assume 6 months of road access a year, this equates to 16,800 vehicles annually. If we assume two persons/vehicle, this equates to 33,600 visitors. If we assume three persons/vehicle, this equates to 50,400 visitors.

This data represents a best estimate of recreationists traveling near the project area. Steens Mountain Back Country Byway provides the primary access to Steens CMPA recreation, including the BCA area. The BCA presents opportunities for dispersed recreation, including (but not limited to) day hiking, fishing, hunting, camping, horseback riding, photography, and wildlife viewing. The BCA is part of ODFW’s Steens Mountain Hunting Unit.

3.9.2 Recreation Environmental Consequences

3.9.2.1 R Issue 1: How would proposed livestock grazing and developments affect dispersed recreation?

3.9.2.1.1 R1 Alternative 1

Under this alternative, grazing management would continue as it was authorized on the previous 2004 grazing authorization. No developments are proposed under this alternative. Developments would be limited to existing infrastructure. Potential for direct or indirect conflict between livestock and permittees, and visitors, would be the same as occurred under the previous grazing permit and would be more than under Alternatives 4 or 5, but less than under Alternatives 2 or 3.

Effects to dispersed types of recreation would remain unchanged. Public recreational access would remain unchanged.

3.9.2.1.2 RI Alternative 2

Under this alternative, 6.2 miles of new fence would be constructed, a small portion of which would be used to decrease opportunities for cattle to access Bridge Creek drainage. This represents a potential positive for dispersed recreation in that area, particularly for fishers and other solitary recreationists, by reducing risk of stray cattle in the drainage, which may impact the individual's experience, though whether this was positive or negative would depend upon the individual. Livestock grazing may displace visitors that do not appreciate the presence of livestock (direct conflict), including making popular camping areas undesirable (indirect conflict through vegetation removal and presence of dung), and damage trail tread. The amount of conflict would vary by individual, with some visitors being negatively impacted and others being positively impacted.

As the grazing season of use would be longer than under Alternative 1, there would be more opportunities for conflict between livestock and permittees.

While new fence would be constructed, approximately 8.7 miles of fence would be removed. The majority of the fencing projects would be related to allotment boundary adjustments; therefore, there would be a net decrease in the miles of fence within the BCA. This would make access slightly easier for recreation as there would be less fence to navigate via gates or by climbing through. Other effects to dispersed types of recreation would remain unchanged. Public recreational access would remain unchanged.

3.9.2.1.3 RI Alternative 3

This alternative proposes removal of the Bridge Creek water gap and associated fences. The water gap fence removal would represent a potential negative impact to dispersed recreation. Gap fence removal would allow cattle into Bridge Creek drainage, and, under this alternative, there would be no general grazing rotation for recreationists to consult prior to travelling to the area. Depending on the individual, cattle presence may have a negative or positive impact.

Under this alternative, approximately 7.6 miles of new fence would be constructed, and 5.6 miles of fence would be removed. This would result in a net increase in fence miles within the BCA. While visitors can navigate fences, either through use of gates or climbing through, over, or under them, this would make accessing areas within the BCA slightly more difficult.

As the grazing season of use would be longer than under Alternatives 1 or 2, there would be more opportunities for conflict between livestock and permittees, both direct through animal or permittee presence, and indirect through vegetation removal and increased presence of dung. As all authorized use would be considered proper, assuming all terms and conditions, and thresholds and responses were followed, other effects to dispersed types of recreation would remain unchanged, as would public recreational access.

3.9.2.1.4 *RI Alternative 4*

Under this alternative, permitted AUMs would be reduced to 50 percent of what is analyzed in Alternative 1 (and annually authorized AUMs may be reduced further where grazing is not authorized due to not achieving ecological objectives in the Hardie Summer Allotment), the grazing season would be shortened, and utilization thresholds would be decreased to 30 percent. Therefore, this alternative would have less potential for conflict between recreation visitors and livestock or the permittee(s), either direct through presence of livestock or permittee(s), or indirect through the reduction of vegetative cover and horse dung.

No developments are proposed under this alternative. Developments would be limited to existing infrastructure. Effects to dispersed types of recreation would remain unchanged, as would public recreational access.

3.9.2.1.5 *RI Alternative 5*

The removal of livestock grazing would remove the potential for conflict (direct and indirect) between dispersed recreation activities and livestock and permittee operations. However, for those visitors that like seeing livestock, this alternative may negatively affect their visit. Public recreational access would remain unchanged.

3.9.2.2 **R Cumulative Effects**

The CEAA for recreation would be the CMPA, as visitors in the BCA are likely to visit other portions of the Steens Mountain as well. RFFAs they may impact recreation include livestock grazing, weed treatments, road and recreation facility maintenance, restoration actions including seeding and juniper treatments, fire, and rockfall along the Steens Mountain Back Country Byway.

Within the CMPA livestock grazing is commonly seen by visitors in the areas outside and adjacent to the no livestock grazing area of the Steens Mountain Wilderness. As livestock grazing is designed to achieve (or not be a causal factor if not achieving) S&Gs, livestock grazing would not have any negative impacts to ecological conditions, which could reduce quality of recreation activities, in the long term, though removal of vegetation, livestock and permittee presence, and associated livestock sign that would exist when livestock are present or shortly afterwards. If grazing were permitted within the BCA, the only areas within the CMPA where no grazing would be authorized would be within the no livestock grazing area. All other areas within the CMPA would have livestock grazing periodically, dependent upon grazing rotations and grazing management factors. As grazing is managed following rotations, livestock would not be present within all areas of the CMPA at the same time. Visitors that feel negatively impacted by livestock grazing would be able to find areas within the CMPA where livestock are not currently being grazed, including the no livestock grazing area, which provides similar, if not better, opportunities for recreation activities. For visitors that are positively impacted by livestock presence, the BCA would provide an increase in areas where they may find livestock within the CMPA.

Maintenance activities on roads and facilities would result in long-term maintained or improved conditions for visitors, including access to different parts of the CMPA. These activities may result in temporary and short-term impacts to recreation when activities are occurring as there would be an increase in equipment within the CMPA, and areas may temporarily be closed.

Fire, though not predictable, is a natural part of the ecosystems found within the CMPA. When fire occurs, there are numerous negative impacts to recreation that may include area closures, increased equipment and firefighter presence, as well as a decrease in visibility and air quality. Following fire, impacts to wildlife and vegetation would make the area less desirable for recreation activities, though these areas would increase in desirability as areas recover. If fire was to be larger, with fewer mosaics, and higher in severity (more plant mortality), recovery is often limited, and invasive annual grasses are more likely to become dominant. A catastrophic wildfire would be expected to have a longer-term negative impact on recreation. Livestock grazing can help reduce the impact of fire through fine fuel removal (Davies, Bates, Boyd, et al. 2021). Authorizing livestock grazing within the BCA would contribute to fine fuel reduction within the CEAA. No livestock grazing within the BCA would result in an increased risk of catastrophic wildfire within the CMPA.

Rockfall on the southern part of the Steens Mountain Back Country Byway is a common event. Typically, these rockfalls result in a small number of rocks and associated material accumulating on the road; the material is removed annually when road maintenance occurs prior to the road being opened each year. In spring of 2023, a larger rockfall destabilized the hillside above the road, rendering it unsafe, and a portion of the Loop Road remained closed. The Loop will remain closed until the hillside is stable enough to allow for vehicle passage. Activities are currently underway to determine the best course forward. Until the entire loop is opened, visitors must select either the north or south access, and return the same way. In 2023, the north access point saw an increase in visitors.

Weed treatments and restoration activities, including juniper treatments would have a negative short-term impact to recreation while implementation is occurring. This would be seen in areas that may be temporarily closed, as well as an increase in traffic, equipment, and human presence. In the long term, it would be expected that these efforts would improve ecological conditions within the CMPA and result in long-term maintenance or improvement in recreation activities, especially when habitat is improved as a result of treatments.

Due to the size of the CMPA compared to the BCA, when the actions described above are considered cumulatively with proposed actions, and impact to recreation is not expected to be measurable.

3.10 Riparian/Water Quality/Fisheries (RWQF)

3.10.1 RWQF Affected Environment

The four allotments affected by this AMP EIS are all within the Donner und Blitzen Sub-basin (4th field HUC). Streams in these allotments ultimately drain to the Donner und Blitzen River. In

total, there are 28.4 miles of perennial streams and 82 miles of intermittent or ephemeral streams in these allotments. Of these, 13.8 perennial stream miles and 64.2 intermittent stream miles cross BLM- or USFWS-managed lands. The remainder of the stream miles are on privately owned land. See Table 3-35 for details about streams by allotment and pasture.

Table 3-35: Streams within the BCA

ALLOT	CURRENT PASTURE	CHANNEL NAME	STATUS
HARDIE SUMMER	Bridge Creek	Little Bridge Creek	Intermittent. Approximately 2.0 miles on BLM.
		Big Bridge Creek	Ephemeral above and below the intermittent section where the reservoir is located. Intermittent for approximately 900 feet from the pasture/private property boundary to the reservoir, not representative of pasture. Approximately 4.3 miles within the allotment, 2.2 miles on BLM and 2.1 miles on private.
	Sylvies	Lake Creek	Perennial, approximately 400 ft on BLM and 0.8 mile on private.
		Fish Creek	Perennial, 0.5 mile (entirely on private lands)
	Cabin	Fence Creek	Ephemeral with the upper section on BLM. Intermittent lower section (below private). Approximately 2.8 miles within the allotment, 1.6 on BLM and 1.2 on private. Within Hammond FFR, approximately 0.3 mile on BLM and 0.6 mile on private.
		Big Fir Creek	Mostly perennial with spatially intermittent sections. Approximately 3.1 miles within the allotment, 1.8 miles on BLM and 1.4 miles on private.
		Little Fir Creek	Spatially intermittent, dry by July 30. Approximately 2.7 miles, 1.3 miles on BLM and 1.4 miles on private.
HAMMOND	Krumbo Creek	Krumbo Creek	3.5 miles perennial, 0.7 mile intermittent. Approximately 2.1 miles on BLM and 2.1 mile on MNWR. Within Hammond FFR approximately 0.1 mile on BLM and 0.1 mile on private, all intermittent.
	Webb Springs	Webb Springs Creek	Upper reach is perennial, lower reach ephemeral. Approximately 2.8 miles on BLM and 0.3 mile on private. Within Hammond FFR, approximately 1.1 miles on BLM and 1.4 miles on private.
	Knox Springs (West of Water Gap)	Bridge Creek	Perennial below Bridge Creek water gap and spring feeding the creek. Approximately 2.5 miles all on BLM.
MUD CREEK	Lower	Bridge Creek	Perennial but not regularly accessible to livestock other than at water gap (currently). Approximately 0.2 mile on BLM.
		Mud Creek	Perennial but only accessible to livestock at the Mud Creek water gap. Approximately 0.1 mile on BLM. Within the Hammond FFR no miles on BLM and approximately 2.3 miles on private.
		Lambing Creek	Ephemeral: there is a spring below Granddad Reservoir that feeds it. Approximately 6 miles on BLM. Within the Hammond FFR approximately 0.5 mile on private.
	Upper Field	Big Bridge Creek	Intermittent, follows between the boundary with Krumbo Mountain Allotment. Approximately 1 mile on BLM.
		Unnamed Creek	Intermittent tributary of Mud Creek. Approximately 6 miles on BLM.

Stream elevations across these allotments range from 7,000 feet near the top of Steens Mountain in the Hardie Summer Allotment to as low as 4,200 feet where Krumbo Creek leaves the Hammond Allotment and enters the Malheur National Wildlife Refuge. Average annual precipitation on the Steens ranges from nearly 50 inches at the summit of Steens Mountain to less than 15 inches in the lower elevations. Waters on the Steens Mountain are mostly derived from precipitation in the form of winter snowpack melt and groundwater re-emerging in streams

and springs from infiltration of melt water through the uplands (Gingerich et al. 2022). Spring and fall rains, as well as summer thunderstorms, also contribute to the total annual precipitation.

The stream potential across these allotments varies based on elevation, gradient, topography, and depth to the water table. The third order, or headwater streams, which are mostly located at the higher elevations in Hardie Summer Allotment, are primarily intermittent or ephemeral. The exception to this is Lake Creek,⁹⁶ which is perennial. The degree of intermittency or flow duration differs in each of these headwater streams with some streams supporting riparian communities and others supporting little to no riparian vegetation. The National Hydrography Dataset (NHD) layer depicts Big Fir Creek and Little Fir Creek as perennial; however, recent observations indicate otherwise (Bureau of Land Management 2019a). In 2019 and 2020, Little Fir Creek was dry by July 30, as indicated by photo monitoring and continuous temperature data collection. Big Fir Creek has also been observed as intermittent, with photo monitoring showing the stream was no longer flowing in August of 2018. In 2019, perennial flow appeared to have continued longer into the season, but continuous temperature data collected in the stream indicates that Big Fir Creek was likely spatially intermittent in 2019 and 2020 as well. However, in 2021, water temperature monitoring data indicates Big Fir Creek remained flowing throughout the summer season.

The perennial second order streams in the allotments are Krumbo Creek, Bridge Creek, and Mud Creek. Fish Creek is also a second order stream within the Hardie Summer Allotment; however, it flows only on private land. With the exception of small livestock watering gaps, livestock have primarily not been authorized to graze along the perennial second order streams in these allotments. Bridge and Mud Creeks have been excluded through a combination of topographical and geographic features and fencing, though some livestock have been able to get around the Bridge Creek water gap and into the drainage periodically. Since 1993, Krumbo Creek has received periodic early season use (only authorized to be grazed seven times from 1993 to 2019).

Riparian vegetation communities are influenced by landform, water availability, soil, elevation, and climate, as well as disturbance factors. These communities may consist of herbaceous or woody vegetation, or a combination of these two vegetation types. Presence and dominance are associated with the species' obligation or sensitivity to saturation, as well as the circumstances and conditions during which opportunities for establishment occur. Progression of a riparian community following changes in the physical characteristics of the site, particularly large changes in soil or water status, may result in a different potential natural community (Bureau of Land Management 2015d). Riparian vegetation communities across these allotments range from dominant woody tree/shrub species associated with moderate gradient streams, to sedge or rush community associated with low gradient stream reaches. Commonly observed woody riparian plant communities include aspen-willow, alder, alder-willow, and mixed willow. These communities may exhibit further diversity with additional shrub or herbaceous species associated with colonization opportunities, such as localized bank disturbance or canopy openings. Herbaceous communities such as grasses, rushes, and sedges are often associated with finer textured soils found on lower gradient reaches with species composition associated with the

⁹⁶ Only a small portion of Lake Creek is on public land. Approximately 430 feet total of the entire stream cross's public land.

duration of saturation and disturbance regimes. Aspen within the riparian areas is considered stabilizing riparian species and are given the same protection as other riparian woody species, such as willows. The presence of adequate riparian vegetation can increase retention of water within streams.

Riparian and channel conditions in these allotments have been assessed a number of times over the years for proper functioning condition (PFC). PFC is a qualitative assessment that considers hydrology, vegetation, and soil/landform attributes and rates riparian function as in PFC, functional at risk (FAR) with a trend of upward (if improving) or downward (if worsening), or nonfunctioning. PFC does not necessarily equate to potential natural community, advanced ecological status, or desired future condition. Rather, PFC demonstrates the level of resilience required for a system to function and allow for maintenance and recovery of desired values such as water quality and fish habitat. For example, a system in PFC has a high likelihood of withstanding a moderately high flow event.

PFC assessments in 2022 within the Hammond Allotment on Krumbo Creek indicate riparian vegetation is at PFC on the downstream reaches on BLM-managed land, and the upper end of the creek was found to be at FAR with an upward trend due to removal of juniper and the associated improving riparian condition. The 2022 assessments also found that the middle reaches and a tributary were at FAR with a downward trend, associated with the presence of upstream migrating headcuts, bank erosion due to historical instability, juniper expansion in the riparian area, and evidence of heavy unauthorized (trespass) grazing use. However, this 1.1-mile reach had been in an upward trend since the BLM changed grazing management in the 1980s. At some point in the past, this stream downcut and is reestablishing a new floodplain within the incised channel downstream from the active headcuts. Once incision occurs, the natural tendency of a stream is to then balance its slope with that of its valley and build a new floodplain (Rosgen 1996). To do that the stream must progressively increase sinuosity, which can only happen through a process of lateral extension (Rosgen 1996). Until this channel evolution process plays out, this reach would continue to see the instability noted in the PFC assessment. The role of BLM in management of fish and other aquatic resources is to provide quality habitat (riparian and upland) that supports these resources. Aquatic habitat values are products of attributes and processes of properly functioning riparian and aquatic systems at a desired ecological status. Therefore, maintenance, restoration, or improvement of aquatic habitat is supported by management that allows for proper functioning condition of streams.

PFC assessments in 2019 on Little Bridge Creek, Fence Creek, and Lake Creek indicate that those creeks are at PFC, finding the riparian vegetation at potential or expanding, streambanks stable, and no signs of excessive erosion. Photo trend monitoring at multiple locations within Big and Little Fir Creeks between 2019 and 2023 show that the streams are stable and well vegetated with a diverse riparian vegetation community. This photo monitoring indicates that those streams are continuing to achieve a PFC rating.

Quantitative measurements of riparian and channel conditions were also collected on a sub-sample of streams within these allotments in 2019. This data includes information collected through BLM's AIM Strategy for wadeable lotic systems (Bureau of Land Management 2015g;

Bureau of Land Management 2020a), as well as the MIM protocol(Bureau of Land Management 2011a). This quantitative data supports the findings of the PFC assessments. Generally, streambank stability was high, riparian vegetation was late seral, and bank overhead cover was high on assessed stream reaches. Krumbo Creek was the exception to this with mid-seral, mid-stability, and moderate bank overhead cover ratings.

The EPA delegated authority to ODEQ to implement the Clean Water Act (CWA). To that end, ODEQ develops water quality standards to support the most sensitive “beneficial uses” of a particular water body. In these allotments, redband trout, a bureau SSS, is designated as the most sensitive use and to which the standards in these allotments are based. Water bodies that fail to attain standards are considered “water quality limited” and are identified as such on the State’s 303(d) list. Streams administered by the BLM Burns District within these allotments and larger Donner und Blitzen subbasin that are identified as water quality limited, exceed the numeric temperature standard of 68°F during the summer season for redband trout (Oregon Administrative Rule (OAR) 340-041-0028). Mud Creek and Fish Creek are also listed for exceeding the rearing temperature standard of 64°F. The numeric standard is defined as the 7-day moving average of the daily maximum temperatures (OAR 340-041-0028). The origin of this is a nonpoint source and presumably is associated with attributes and processes of riparian vegetation and/or channel geometry (Foster et al. 2001) that provide thermal buffering.

Bridge Creek (and its tributary Little Bridge Creek), Mud Creek, Fish Creek, and Krumbo Creek have all been identified by ODEQ as water quality limited and placed on their 303(d) list of impaired streams for exceeding water temperature standards for salmonids. Bridge Creek is also listed by ODEQ as water quality limited for iron from its mouth to river mile 3.1, which is downstream from BLM-managed land.

The BLM has assessed water temperature on all the perennial second order streams as well as several of the third order headwater streams. In these allotments, Mud Creek and Krumbo Creek were the only monitored streams on BLM-managed land that were not achieving State water quality standards. While Bridge Creek and Little Bridge Creek are also on the 303(d) list of impaired waters, Bridge Creek is meeting the water temperature standard on BLM-managed land, remaining below the 68°F standard in 2017, 2018, and 2021. The recent warmest temperature recorded in Bridge Creek was 63°F in June of 2017. Water temperature has not directly been measured in Little Bridge Creek because it is an intermittent stream. However, data on Bridge Creek indicates that BLM management upstream, including Little Bridge Creek, allowed for water quality standards to be met on Bridge Creek. There is no recent data on Fish Creek, which was 303(d) for exceeding summer rearing temperatures.

BLM temperature data supports the ODEQ designations on Mud Creek and Krumbo Creek. Water temperature data was collected by the BLM for a total of 5 years in Mud Creek. In all years, the temperature standard was exceeded from approximately mid-June to mid-September. Temperatures on Krumbo Creek have also exceeded the standard in 7 of the 8 years data was collected. However, water temperatures in Krumbo Creek were indicating improvement over time. Water temperatures peaked in 2015 when they exceeded the 68°F standard for 52 days with a seasonal high of 74.3°F. In 2020, the creek exceeded the standard for only 3 days, with a

seasonal high of 68.8°F. In 2019, temperatures were exceeded for 15 days with a seasonal high of 70.7°F. In 2018, the standard was met. Although in 2021, water temperatures exceeded standards for 40 days with a seasonal high of 72.4°F, which may be attributed to the loss of shading riparian vegetation from the unauthorized grazing that has been evident the last few years.

Cattle and other grazing animals generally prefer riparian areas (Clary and Webster 1989) due to the abundance of high quality, palatable forage and available water. Because of this, cattle have been found to spend between 5 and 30 times more time in riparian areas than in adjacent uplands (Clary and Webster 1989). Selection for riparian areas over uplands is highest in July through September when upland plants are going dormant and riparian species are still green and palatable (Gresswell et al. 1989: 95–102). However, grazing conflicts with riparian-dependent resources were usually not severe in type A stream channels or in most type B stream channels (Rosgen 1996); generally, these stream channels are in narrow valleys occupied by woody species and are armored by rocks providing resistance to erosion and trampling damage (Clary and Webster 1989). Proportionally, much of the channel types in Hardie Summer are B channels, with sections of A, meaning they are higher gradient streams with less flat meadow ground and are less appealing for livestock to loaf in.

Livestock grazing can have important impacts on riparian vegetation (Armour et al. 1994). Schulz and Leininger (1990) studied the effects of cattle grazing on riparian vegetation in the Sheep Creek watershed in Colorado and found considerable differences in the riparian vegetation between grazed and ungrazed areas. For example, they found considerable differences in the composition of some plant species between grazed and ungrazed areas and also found that vascular vegetation provided 26 percent more ground cover in ungrazed areas. They observed about five times as much bare ground in grazed areas compared to ungrazed areas and found that the mean standing crop of vegetation was 2,410 kg/ha in ungrazed areas but was only 1,217 kg/ha inside caged plots within the grazed areas. Clary (1999) studied the effect of livestock grazing on riparian vegetation on Stanley Creek in Idaho. They evaluated the response of riparian vegetation when grazing was changed from season long, heavy use (60-65 percent utilization in dry meadows) to either grazing in late June with medium use (35-50 percent utilization in dry meadows), grazing in late June with light use (20-25 percent utilization in dry meadows), or no grazing at all. They found that there was a significant increase in late seral species in both lightly grazed and ungrazed areas whereas late seral species decreased in the areas with medium use.

Livestock grazing can also have a pronounced impact on woody species. For example, Schulz and Leininger (1990) found 5.5 times more shrub cover and 8.5 times more willow cover in ungrazed areas compared to grazed areas. They also found that willows were older and larger in ungrazed areas compared to grazed areas. Clary (1999) found that willow cover increased by 29 percent in areas with medium use, 37 percent in areas with light use, and 56 percent in areas that were not grazed at all. Hubert and others (1985) compared sections of a Wyoming stream that were grazed with those that had not been grazed for four years and found that while woody vegetation was abundant in both grazed and ungrazed areas that cottonwoods were not present in the grazed area but were present along the ungrazed sections of stream. Gunderson (1968)

studied the effects of livestock grazing on riparian and stream habitat in Rock Creek, Montana and found that stream cover provided by overhanging brush was twice as high in ungrazed areas compared to grazed areas.

Improperly managed grazing can have adverse effects to streams and riparian areas (Clary and Webster 1989; Belsky et al. 1999). These effects can include streambank damage, removal of shade-providing vegetation, widening of stream channels, introduction of fine sediment, and channel incision. A variety of conservation measures can be implemented to minimize or eliminate potential grazing related effects to fish and their aquatic and riparian habitats.

Improper livestock grazing can modify stream temperatures (Platts 1991; Armour et al. 1994). Stream temperatures are controlled by a complex interaction between stream shading, width:depth ratio, ground water input, water volume, air temperature, and source water temperature and through these mechanisms they can impact stream temperatures. Subsequently, summer stream temperatures are often higher in grazed areas compared to ungrazed areas (Platts 1991). Isaak and Hubert (2001) found that cattle density was inversely related to maximum summer stream temperatures.

Livestock wading through streams can step on salmonid redds (egg beds) (Ballard and Krueger 2005a; Ballard and Krueger 2005b; Gregory and Gamett 2009). This process has been referred to as redd trampling (Gregory and Gamett 2009) and may result in the death of eggs and alevins that are developing in the gravel and have limited mobility. Even with low rates of trampling, Peterson and others (2010) found that there could be an impact on population resiliency.

Availability of water in the Steens is driven by season and year-to-year climatic conditions, so that the effects from grazing or lack thereof would likely have no significant impact on water levels in the streams within the BCA.

Macroinvertebrate communities are also an indicator of the biological condition of waterbodies. ODEQ uses biological community assessments as an indicator for aquatic life beneficial use support. This falls under the biocriteria parameter for water quality (Oregon Department of Environmental Quality 2018). To assess the macroinvertebrate community, ODEQ developed a model for comparing reference areas to sampled sites. ODEQ considers streams to be impaired if there is a 50 percent or more difference between reference and sampled reaches. If there is less than 25 percent difference, the stream is considered to be attaining the criteria. Between these two ratings, ODEQ considers it to be potential concern - insufficient data, where additional replicate data is needed. ODEQ has not listed any of the streams in these allotments for the biocriteria. In 2019, the BLM collected macroinvertebrate data from Krumbo and Bridge Creeks and ran it through the ODEQ model. In Bridge Creek, 87 percent of the expected taxa were present; therefore, it is attaining the standard. In Krumbo Creek, 72 percent of the expected taxa were present; therefore, it would fall into the potential concern category.

Native fish are found in all the perennial second order streams and several of their headwater tributaries. Within the BCA, there are approximately 18.8 stream miles with verified native fish presence. Of this, 11.4 miles are on public land (BLM or USFWS). The only native fish species

found in the streams in these allotments are Great Basin redband trout (*Oncorhynchus mykiss newberrii*) and Malheur mottled sculpin (*Cottus bairdii*), but only the redband trout is a BLM sensitive SSS. In addition, ODFW also stocks non-native, sterile rainbow trout in Grandad Reservoir when conditions allow. Krumbo Reservoir is also stocked with rainbow trout, although the dam is a barrier to fish passage up and downstream and separates the Krumbo Creek fish populations from the Blitzen system.

Malheur mottled sculpins are found in the lower reaches of Mud Creek and Bridge Creek, within the Mud Creek and Hammond Allotments. Similar to redband trout, Malheur mottled sculpins require colder water with high dissolved oxygen and low turbidity. Consequently, the likely effects from land management practices on Malheur mottled sculpin populations and habitat would be essentially the same as those for redband trout, so they will not be discussed further.

Of the 18.8 miles of stream within the BCA that contain fish, 2.8 miles (15 percent) are excluded from livestock grazing.⁹⁷ An additional 5 miles (27 percent) have mostly been excluded from grazing over the past 35 years (only periodic authorized grazing vs. regular authorized grazing).

Redband trout, a sub-species of rainbow trout, occupy a wide array of habitats (Scott and Crossman 1973). In desert streams, redband trout presence has been associated closely with shaded reaches of stream that allow less solar input and produce cooler stream temperatures (Meyer et al. 2010). Rodnick and others (2004) found strong support that redband trout have an enhanced capacity to function and flourish at warmer temperatures than most salmonids in a study on high desert populations of redband trout in southeastern Oregon. According to Behnke (1992), redband trout in the desert basins of western North American have been thought to have evolved adaptations for warmer water tolerance. Behnke (1992) reported that redband trout from eastern Oregon had optimum growth efficiencies at temperatures >19°C, while other rainbow trout stock growth rates were decreasing for temperatures above 16°C (Oregon Department of Fish and Wildlife 2018).

Redband trout in the allotments are part of what ODFW has deemed the Blitzen Population of the Malheur Lakes Basin Species Management Unit (SMU). The streams in this SMU flow into a closed basin and have no hydrological connection to other water bodies outside the basin. Within the BCA, redband trout are found on public land in Krumbo Creek and its unnamed tributary, Mud Creek and its tributaries (Little Fir Creek and Big Fir Creek), Lake Creek, and Bridge Creek. ODFW also lists Big Bridge Creek, an ephemeral headwater tributary of Bridge Creek, as presence of redband trout suspected, but not verified.⁹⁸

ODFW assessed the status of redband trout populations across the entire Malheur Lakes SMU (which includes the Blitzen population) in their 2018 Draft Malheur Lakes Redband Trout

⁹⁷ These figures do not account for Mud Creek, which is also excluded from grazing, but is no longer considered part of the Mud Creek Allotment.

⁹⁸ Big Bridge Creek is an ephemeral channel, which limits the potential for fish use. Trout could only use this reach during periods when water is present within the channel. BLM does not have any information on the duration or frequency of flow in this stream. However, this stream supports little to no facultative wetland or obligate wetland species. Because water is not present, even in the soil, long enough to support this type of vegetation, it is assumed that periods of flow, and any potential fish use, would be very short lived.

Conservation Plan⁹⁹ (ODFW 2018). The ODFW Draft Conservation Plan (2018) includes a population risk assessment that determined the Blitzen population to be at a low risk of extinction (ODFW 2018). Fish abundance and productivity data were scored as high. The 2008 population estimate exceeded the abundance viability benchmark by two orders of magnitude. Population data indicated high intrinsic productivity and long-term survival (ODFW 2018). The 2018 ODFW Draft Conservation Plan (ODFW 2018) states that the Blitzen population is the most robust in the Oregon portion of the Great Basin. While stream temperatures have exceeded water quality standards on some streams within the BCA, population estimates conducted by ODFW have shown the system has a healthy population of redband trout present.

The condition of fish populations is highly dependent on the quantity and quality of available habitat. The quality of available habitat is dependent on the integrity of the stream channel, floodplain, and adjacent riparian vegetation. Riparian vegetation moderates water temperature, adds structure to the banks to reduce erosion, and provides overhead cover for fish. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Well-established riparian woodlands also supply woody debris to the stream channel, an important component in developing habitat complexity in stream channels. Since riparian vegetation and fish habitat are ecologically interconnected, the condition of riparian habitat is an indicator of the condition of fish habitat. The majority of perennial and intermittent stream reaches on BLM-administered land in the BCA have been assessed for PFC, which demonstrates the level of resilience required for system function and allows for maintenance and recovery of various values (e.g., water quality and fish habitat) after disturbance. All verified fish bearing streams on BLM-managed land have been assessed for PFC. Approximately 76 percent of the fish bearing streams were rated at PFC and contain the attributes necessary for riparian maintenance or recovery, 6 percent were rated functional-at-risk with an upward trend, while 18 percent were rated at functional-at-risk with a downward trend.

3.10.2 RWQF Environmental Consequences

3.10.2.1 RWQF Issue 1: How would proposed livestock grazing (specifically AUMs and season of use) impact redband trout and aquatic/riparian systems, vegetation (including willows), water quality (including temperature, defecation, and pollution), water levels, and aquatic habitat along creeks, and at springs, seeps, and wet meadows, within the allotments?

The BCA has not been grazed since 2014, with the exception of some limited grazing in 2019. The lack of grazing has resulted in a buildup of residual vegetation and allowed riparian ecosystems to continue to maintain or improve in ecological functioning, with no short-term impacts from livestock grazing. However, with the exception of Krumbo Creek, all other perennial riparian systems were at PFC and considered to be in functioning condition prior to 2014. Therefore, it is assumed that had grazing continued past 2014, riparian conditions would have continued to improve or remain stable and properly functioning. The removal of livestock grazing in 2014 has not resulted in systems “recovering” from grazing as BLM monitoring had

⁹⁹ This plan has been withdrawn from ODFW to work through stakeholder concerns; however, the population data within the plan remains valid (pers. comm. with Dave Banks, ODFW Fish Biologist).

previously found livestock grazing was consistent with functional perennial ecological systems, which were already in PFC (with the exception of Krumbo Creek). These systems have continued to remain in PFC following the non-renewal of the grazing permit in 2014.

While the impacts to riparian systems following improper management are clear and would result in negative impacts, proper livestock grazing and management is compatible with riparian systems and can result in riparian systems maintaining or improving in ecological conditions. As the BLM is required to achieve S&Gs and ensure livestock grazing is not a causal factor if they are not achieved, the BLM does not expect any of the alternatives to result in improper livestock grazing. Therefore, there is no risk that proper grazing management, which follows required terms and conditions, would have a long-term negative impact on ecological functioning. Riparian systems would have short-term impacts from livestock grazing under grazing alternatives, which would remove some of the residual and current year's vegetation but would not have long-term negative impacts on ecological functioning. However, the BLM does recognize that any improper grazing (which would be unauthorized or trespass grazing) could result in negative impacts to ecological conditions, including riparian functioning. For more discussion of changes in riparian vegetation both prior to and after 2014, please see the BCA LHA, which is incorporated by reference.

3.10.2.1.1 RWQFI Alternative 1

Under this alternative, permits would be issued under the same conditions as before grazing was suspended in 2014. Under previous management practices, most streams within the BCA were evaluated as being in PFC and have summer water temperatures below established standards for salmonids. The PFC rating indicates that a stream is stable, in balance with sediment, well vegetated, and capable of withstanding higher flow events, and is generally a prerequisite for achieving and maintaining quality habitat.

Only Krumbo Creek was not in PFC, but ongoing monitoring showed an upward trend in condition. However, recent assessments in 2022 within Krumbo Creek showed several areas having a downward trend in condition, which was attributed to unauthorized grazing use. It is assumed that under the previous management (and with BLM working to resolve unauthorized use¹⁰⁰) streams in the BCA would return to or continue meeting PFC rating or show improvement in those areas where the streams are functional-at-risk.

The streams not meeting water quality standards on BLM-managed lands were Krumbo and Mud Creeks due to exceeding summer temperatures for salmonids. Mud Creek has been excluded from grazing, and cattle are not a cause of the failure. Krumbo Creek has only received periodic early season grazing since 2004 (the Krumbo Creek Pasture was used for trailing only from 1984 to 2003). Because management under Alternative 1 would continue this type of use, water temperatures are anticipated to continue to improve with appropriate livestock use. With proper

¹⁰⁰ Unauthorized livestock use, also referred to as trespass use, is outside of permitted or authorized livestock grazing, and can be done by permittees and non-permittees. In the instance of Krumbo Creek, the BLM is still working to determine who is trespassing; all this unauthorized use is outside of any permitted use. There is always potential that decreasing permitted use for a permittee could result in an increase in unauthorized or trespass use; however, as livestock grazing is not currently authorized within the BCA, this risk is not further discussed. When trespass occurs, the BLM will follow the regulations in 43 CFR 4150.

grazing management, water quality issues attributed to livestock defecation/pollution on rangelands have been found to cause only short-term, minor, local reductions in water quality when cattle were present (Gary et al. 1983).

As mentioned in the affected environment, any livestock grazing could result in the trampling of redband trout redds, resulting in the death of eggs and alevins. However, as riparian areas that support redband trout are largely excluded from livestock grazing (through topography or fences) under this alternative, trampling would only occur in water gaps on Bridge Creek and Mud Creek, and along Krumbo Creek. As Krumbo Creek would be grazed early under this alternative, the risk of trampling redds would be higher than under Alternatives 2 and 4. As livestock grazing would allow riparian areas to remain stable or improve in condition, livestock grazing would not be expected to result in increased temperatures due to vegetation removal. Any impacts to streambanks would be temporary in nature and would not have long-term impacts to redband trout habitat.

3.10.2.1.1.1 RWQF1 Alternative 2

This alternative includes adaptive management options to aid in maintaining and improving rangeland health, which include flexibility in rest rotation, timing of season of use, and adjustable livestock numbers (Section 2.1.3 Adaptive Management and Flexibility). Allowable use by livestock grazing in riparian areas, as measured by short-term indicators, is detailed in the same section under thresholds and responses. These tools would improve the BLM's ability to maintain and improve riparian conditions within the BCA to meet or continue to meet standards for rangeland health. The alternative also includes modifications to the water gap fence on Bridge Creek, which would help prevent livestock from entering into the excluded portions, providing additional protection for the riparian area.

Krumbo Creek is not currently achieving PFC (rated as FAR) with several reaches showing a downward trend that has been associated with unauthorized livestock use. The PFC rating indicates that the stream is stable, in balance with sediment, well vegetated, and capable of withstanding higher flow events, and is generally a prerequisite for achieving and maintaining quality habitat. The FAR rating recognizes the reach as functional but at risk of becoming non-functional due to an observed condition (unauthorized livestock grazing) that could impact the reach in the future. Under Alternative 2, only trailing/crossing would be authorized following terms and conditions described in Section 2.1.6 Crossing Permits, until "significant progress" is made toward achieving S&Gs within this pasture and it is determined that grazing as described in the general grazing rotation would not limit continued improvement in riparian condition. This would help the riparian areas recover without any livestock use occurring, which would allow for more riparian species to become established, and species present to increase in vigor without vegetative removal by livestock. Once monitoring shows progress towards achieving S&Gs, grazing would occur within the "graze" season (May 1 to mid-July) for one year, with full rest the following year. May to mid-July grazing is during a period when upland grasses are more green and more palatable, and higher stream flows make conditions less favorable for livestock to linger within the creek; these factors would reduce livestock use of riparian areas and promote continued upward trends. Removal of livestock by mid-July would allow time for adequate

regrowth of hydric herbaceous species to protect streambanks during high flow periods the following spring. The planned full rest from livestock grazing every other year would further promote continued upward trend in condition. Management to allow for riparian recovery in Krumbo Creek would move conditions within the creek toward PFC (upward trend) and would decrease water temperatures as shading vegetation recovers toward the standard of 68°F or less, as desirable by redband trout. Livestock grazing could result in the trampling of redband trout redds, resulting in the death of eggs and alevins. However, as many of the riparian areas that support redband trout are excluded from livestock grazing (through topography or fences) under this alternative, this would only occur in water gaps on Bridge Creek and Mud Creek, and along Krumbo Creek. As Krumbo Creek would be rested until riparian conditions are improved, and then grazed only every other year with a graze treatment, the risk of trampling redds under this alternative would be less than under Alternatives 1 and 3. As livestock grazing would allow riparian areas to remain stable or improve in condition throughout the BCA, livestock grazing would not be expected to result in increased temperatures due to vegetation removal. Any impacts to streambanks would be temporary in nature and would not have long-term impacts to redband trout habitat.

Crossing permits where livestock would cross riparian areas would use active trailing (livestock are not allowed to drift), which would prevent livestock from congregating at streams or wetlands. Trailing would only be authorized in uplands (outside of riparian corridors), though crossing of riparian corridors would be permitted when needed. Livestock may browse while passing through the pasture, but grazing would not occur at a level that would impact the health or vigor of the riparian vegetation. The stream crossing locations would be impacted by hoof impact, which would cause temporary stream bank alterations along a narrow (likely less than 200-foot-wide) section of the stream. Trailing would be authorized annually, so if monitoring shows that impacts of this action are causing degradation to the riparian habitat it may not be authorized in following years.

Adaptive management options to aid in maintaining and improving rangeland health would improve water quality. With proper grazing management, water quality issues attributed to livestock manure and urine inputs on rangelands have been found to cause only minor, local reductions in water quality when cattle were present (Gary et al. 1983). As Mud Creek is excluded from livestock grazing, and livestock grazing is not a causal factor for non-attainment, this alternative would not impact water quality in that creek. However, as changes in management of Krumbo Creek would occur, it would be expected that water quality would also improve with that reach.

NR AUMs could be authorized under this alternative; however, Krumbo Creek Pasture would be excluded. As no additional AUMs would be authorized in that pasture, NR AUMs would not have any additional effects. In the rest of the BCA containing creeks, NR AUMs could be permitted from July 15–February 28, but would only be authorized after all permitted AUMs have been exhausted. Although NR use is included in this alternative, the allowable use on riparian short-term indicators as described in the Adaptive Management section still applies. While the availability of AUMs has been increased with NR, the allowable use (amount that can be taken by livestock) has not been increased. Since the normal season of use outlined in

Alternative 2 includes deferred grazing, which would be from July 1–October 31, NR grazing would not come into effect until later in the grazing season. NR grazing authorized, particularly during the hot season in late July and August, may be more time limited than NR use during other grazing seasons (early, graze, part of defer, and winter) especially where the riparian areas are accessible to livestock and if livestock use reaches the utilization thresholds. Intermittent portions of Lambing Creek, Webb Creek, Little Fir Creek, Fence Creek, and Big and Little Bridge Creeks within the BCA are generally seasonally dry during this period, and the available water resources within the pastures are provided by water developments. During later use, the cooler temperatures would reduce livestock's need for water, which, aided by the use of supplements, could lead to better upland livestock dispersal and decrease the time livestock spend by the channel. Many of the upper reaches of these streams in the Hardie Summer Allotment are intermittent and heavily armored by rock and mature riparian hardwoods, which limits streambank damage.

Under the proposed fence adjustments in the Hardie Summer Allotment, livestock AUMs would be reduced to account for the move of pastures into the Hammond FFR. There would not be any increase in permitted AUMs within this allotment. Therefore, riparian use by livestock would be the same in Little Bridge Creek as would occur under Alternative 1.

As thresholds and responses would be in place, even with NR AUMs, it is not expected that livestock grazing would have a long-term overall negative impact on these resources under this alternative.

3.10.2.1.2 RWQFI Alternative 3

This alternative proposes increased AUMs across all of the allotments, not just adjustments due to changes in fence, the removal of water gap fencing on Bridge Creek (located in the Mud Creek Allotment), and development of a spring and installation of pipeline and troughs to provide off-site water for livestock. The spring is located on private property, but the pipeline and troughs would be located on public lands within the Hardie Summer Allotment. There is no general grazing rotation for any allotment under this alternative, which makes anticipating effects from livestock grazing on riparian conditions difficult and puts creeks at higher risk for damage.

The removal of the water gap fencing would provide livestock access to the perennial riparian areas of Bridge Creek, with the season of use the same as the Lower Field in the Mud Creek Allotment. Under Alternative 3 the grazing rotation is not specific on which pasture would be used during each grazing season other than there would be periodic growing season in each pasture. Because there would be no general rotation for any allotment under this alternative, the season of use on the Lower Field Pasture of the Mud Creek Allotment, where the water gap fence is located, is unknown. If the proposed use were graze/defer, hot season grazing, with no rest or recovery periods for riparian vegetation, livestock use could become detrimental to aquatic systems. It has been shown that annual repeated grazing throughout the hot season is nearly always detrimental to riparian vegetation (Bureau of Land Management 1997b). When livestock use riparian areas during this time, they are more inclined to move into riparian areas

during the hot weather for water, more palatable vegetation, and cooler temperatures. Improper management of livestock in riparian areas can result in removal of woody vegetation, over-utilization of streamside vegetation, soil compaction, increased soil erosion, and reduced water quality, as well as streambank degradation (U.S. Forest Service 1979; Nader et al. 1998). This would result in negative impacts on riparian vegetation, water quality (including temperature), and aquatic habitat (including that of redband trout) within Bridge Creek. Through the use of riparian grazing thresholds/use indicators described in Section 2.1 (under Goals, Objectives, and Actions Common to all Grazing Alternatives), the threat of unmanaged grazing on riparian systems may be minimized; however, it would require intensive monitoring throughout the year to ensure those thresholds were not at risk. Under this alternative, the risk to riparian areas, fisheries, and water quality would be highest as there are no overarching grazing rotation plans that establish proper livestock grazing to follow.

Livestock grazing under this alternative could result in the trampling of redband trout redds, resulting in the death of eggs and alevins. While most of Mud Creek (except for the water gap) would remain excluded from livestock grazing, the risk of redd trampling in Mud Creek would be minimal. However, as livestock grazing would be allowed within Bridge Creek (including the water gap and areas currently excluded from livestock grazing), and AUMs across the BCA would increase, the risk of trampling redds would be greater under this alternative compared to all other alternatives. As Krumbo Creek Pasture would not be rested under this alternative, and as there is no general grazing rotation, the risk of trampling redds in Krumbo Creek would be increased within Krumbo Creek. As livestock grazing would allow riparian areas to remain stable or improve in condition throughout the BCA, livestock grazing would not be expected to result in increased temperatures due to vegetation removal. Any impacts to streambanks would be temporary in nature and would not have long-term impacts to redband trout habitat. However, with increased AUMs and no general grazing rotation, this alternative would have the highest risk of livestock grazing occurring outside of terms and conditions, and thresholds and responses, which could have the potential to negatively impact riparian and fisheries systems in the future.

Spring development and pipelines/troughs in Hardie Summer would provide reliable water sources off creeks and rivers, so livestock are less likely to put large amounts of pressure on the riparian areas (Delcurto et al. 2000; Bailey 2004; DelCurto et al. 2005). Parsons and others (2003) state off-stream water development achieves more uniform cattle distribution than only using streams for watering. Off-stream water development improves cattle performance (weight gains) and distribution (Delcurto et al. 2000; Porath et al. 2002). DelCurto and others (Delcurto et al. 2000) found cattle with access to off-stream water and supplements displayed a more even average distance from streams than those without off-stream water, which moved closer to the stream throughout the day. Research suggests alternative water sources were over 99 percent effective in attracting the grazing animals away from the riparian areas during the period when thirst was the driving factor for animals (instead of hunger or loafing) and that they were over 89 percent effective in drawing animals away from the stream for loafing purposes (Miner et al. 1992). It is expected that a portion of these results were due to other factors, such as off-stream water temperature, the presence of dry, firm ground at the alternative water source, and the location of the alternative water source in an easily accessible area as compared to a stream located in a canyon (Miner et al. 1992; George et al. 2011). A research review indicated that

water developments outside of riparian areas reduce both grazing use and the amount of time spent in riparian areas (George et al. 2011). Godwin and Miner (1996) also found that off-stream water can decrease not only the time livestock spend in riparian areas, but it can reduce water quality impacts caused by grazing of livestock. It is expected that additional water sources would result in the effects described by this research, including reducing livestock pressure on creeks within the pastures where the pipeline would be constructed.

Livestock AUMs would be increased across public lands in the BCA under this alternative. In addition, NR AUMs could be authorized throughout the BCA, up to 50 percent utilization with few additional terms and conditions. Without limits on livestock use, this increase in grazing intensity would likely have a negative impact within riparian areas. However, under all grazing alternatives livestock use would be limited through utilization and other use-based thresholds and monitored. Therefore, while the risk of exceeding thresholds is highest under this alternative, which would result in higher riparian impacts compared to other alternatives, assuming all thresholds and responses are followed, impacts to riparian vegetation and water quality would be similar as described under Alternative 2.

Due to an increase in both AUMs and livestock use in the Bridge Creek corridor, this alternative would have the largest direct and indirect effects on fisheries, and the highest risk of trampling redds.

Under the proposed fence adjustments in the Hardie Summer Allotment, livestock use would increase as more AUMs would be authorized in an area that is smaller than the current Hardie Summer Allotment. It is expected that riparian use by livestock would be increased in Little Bridge Creek and Big Bridge Creek. This same number of AUMs in a smaller pasture and, potentially during the hot season (graze and defer treatment), would be expected to negatively impact riparian condition. Livestock would likely spend more time in riparian areas as they often provide diversity, shade, and loafing areas, making them desirable locations for grazing animals (Myers 1989). However, headwater streams, mostly located at the higher elevations in Hardie Summer Allotment, are primarily intermittent or ephemeral and well armored by a boulder substrate and woody species, and generally do not hold water past July. Hot or late season use would likely maintain PFC on these streams, where appropriate, unless livestock use turned to heavy browsing of woody riparian vegetation. Although the upland and riparian threshold/use indicators would apply to Alternative 3 as well, the riparian use indicators would likely be achieved more readily under this alternative where the pasture is smaller, therefore, affecting the ability of the permittee to utilize the full AUMs allocated. Regular herding of livestock out of stream drainages could potentially reduce the amount of time spent in riparian areas and increase the ability to utilize all permitted AUMs, but there would be an additional labor cost to the permittee, and livestock would be drawn back to the riparian area due to the benefits it provides. The newly created Hardie Summer FFR would contain Big Fir Creek, Fence Creek, and Lake Creek. The AUMs authorized in this new FFR could increase use in the riparian areas and could potentially degrade the existing riparian condition as described above.

3.10.2.1.3 RWQFI Alternative 4

Under this alternative, permitted AUMs would be reduced to 50 percent of what is proposed in Alternative 1 (and annually authorized AUMs may be further reduced where grazing was not authorized due to not achieving ecological objectives in the Mud Creek and Hardie Summer Allotments), with a more restrictive season of use. These modifications would continue to ensure periodic growing season rest in all pastures and incorporate actions common to all grazing alternatives (Section 2.1). Effects to RWQF under this alternative would be similar to Alternative 1, with a further decrease in potential risk that grazing would have a negative impact on RWQF. Riparian areas that are impacted by grazing would see reduced effects from previous full grazing practices, which would result in improved riparian habitat and water quality compared to Alternative 1. On Krumbo Creek, changes to the season of use are proposed, from an early season of use to a three-year rotation of graze, defer, then rest. This would result in increased cattle presence within the creek during warmer periods in some years; however, the rotation of the season of use, fewer AUMs, and the year of rest would likely allow for current conditions within the creek to be maintained or improved. This alternative would still have to meet thresholds and responses defined in the Adaptive Management section and would have the lowest risk of meeting or exceeding these compared to other grazing alternatives.

Reduced AUMs and use rotation would aid in maintaining and improving rangeland health and would improve water quality. Livestock grazing could result in the trampling of redband trout redds, resulting in the death of eggs and alevins. However, as authorized livestock grazing would only occur under a defer or winter grazing treatment, trampling of redds would not be expected under this alternative. As livestock grazing would allow riparian areas to remain stable or improve in condition throughout the BCA, livestock grazing would not be expected to result in increased temperatures due to vegetation removal. Any impacts to streambanks would be temporary in nature and would not have long-term impacts to redband trout habitat. This alternative would have the fewest impacts to redband trout, and their habitat, compared to all other grazing alternatives. However, as riparian vegetation would have short-term impacts due to livestock grazing, this alternative would still have a risk of negative impacts to habitat if grazing does not conform to the terms and conditions (which would be considered unauthorized or trespass use).

3.10.2.1.4 RWQFI Alternative 5

Removing livestock from the BCA would result in a continued upward trend in those riparian areas not currently meeting Standards 2 (Watershed Function), 4 (Water Quality), and 5 (Native, Threatened and Endangered (T&E), and Locally Important Species) for redband trout. Livestock were not a causal factor for non-achievement of any standard during authorized use; however, the upward trajectory of trend may be more readily realized without the presence of livestock and associated short-term impacts. Livestock exclusion from degraded riparian areas has often resulted in rapid vegetative recovery (Bureau of Land Management 1997b). Cessation of livestock grazing on the nearby Hart Mountain National Antelope Refuge resulted in dramatic improvements in riparian vegetation conditions, even without replanting or other active restoration efforts (Batchelor et al. 2015). However, Van Horn (2012) found that long-term

“grazing exclusion may decrease nutrient retention in some streams, a process that is commonly considered a valuable ecosystem service”. As livestock grazing would not be authorized within the BCA, monitoring activities would be limited to those required for other resources, which would increase the risk that trespass grazing would not be identified in a timely manner and resolved. If trespass grazing were to occur under this alternative, it would continue to put those creeks at risk of ecological damage.

This alternative would have the fewest direct impacts to redband trout and associated habitat as livestock grazing would not be authorized so there would be no risk of redband trampling occurring and no vegetation would be removed in the short term due to livestock grazing, which would maximize shading along the creeks. However, continued lack of livestock grazing could result in changes to the riparian composition in the future.

Indirectly, under this alternative, there would be an increase in fine fuel loading across the BCA, which could result in a catastrophic wildfire, which would remove desirable perennial vegetation, including woody riparian species. Any removal of these woody species would have negative impacts on the proper functioning of the impacted creeks and redband trout and associated habitat.

3.10.2.2 RWQF Issue 2: How would proposed livestock grazing affect the riparian vegetation that has grown while grazing has not been authorized and there has been little to no livestock use, including impacts on the current recovery of willows on creeks within the Hardie Summer Allotment?

3.10.2.2.1 RWQF2 Alternative 1

Under this alternative, livestock grazing permits would be issued with conditions that are identical to those from before non-renewal of the grazing authorization. Livestock would resume grazing in riparian areas under the same practices as those found before. Areas excluded from grazing on Bridge and Mud Creeks would be maintained, and any growth over the previous five years would remain ungrazed within those areas. In riparian areas that are accessible to livestock, continuing previous grazing practices would likely result in a return to riparian vegetation conditions similar to those found before 2014. An exception to this would be in areas where willow growth has exceeded 1.5 meters in height, which would no longer be easily browsed by cattle and allow for continued growth (Shawl and Clary 1996). The overall result of following previous grazing management practices could be a reduction in riparian vegetation that has grown over the last 5 years, where grazing is allowed. However, this would largely be removal of herbaceous species, which would either regrow the same year, or would grow again the following season. Since there would be no additional thresholds and responses beyond the utilization thresholds for upland species, the riparian resources under this alternative would be impacted more than under other alternatives where new thresholds and responses would apply.

3.10.2.2.2 RWQF2 Alternative 2

Under Alternative 2, new thresholds and responses for riparian resources would maintain or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and associated structure, function, process, and products. Under this alternative, through flexibility in rest rotation, timing of season of use, and adjustable livestock numbers, riparian vegetation would be maintained at the current levels and/or allow for continued expansion over time. Monitoring, including but not limited to woody browse use on willow species, is scheduled to take place at the end of the grazing season in riparian areas and would be used to direct management the following year. Cattle use of riparian areas generally results in loss of vegetative growth to grazing and trampling, and there would be expected to be some grazing on vegetation that has grown since grazing has not been authorized. However, thresholds and responses would limit the impact, and it is not expected that vegetative removal would occur at a high enough level to result in a permanent loss of newly established riparian vegetation.

The alternative also includes improvement to the water gap fencing on Bridge Creek, further restricting livestock access to riparian areas and protecting the newly established woody species along this stream reach. This alternative would be expected to protect riparian vegetation more than under Alternatives 1 and 3, but the same or less than Alternatives 4 and 5.

3.10.2.2.3 RWQF2 Alternative 3

This alternative proposes increasing AUMs across all the allotments in the BCA. Having a higher stocking rate would result in use of riparian areas being higher, which would result in thresholds being met sooner, as riparian areas often are grazed more intensely than other areas of an allotment (Elmore and Beschta 1987). Although a livestock grazing rotation would be determined annually prior to use, and would still require periodic growing season rest, it is difficult to assess the impacts to riparian areas, specifically willow species under this alternative as specific seasons of use are not identified and grazing impacts can vary. Depending on the timing and duration of use in each pasture, sometimes riparian areas are unaffected by strategic grazing strategies. However, worst case scenario, annually repeated grazing throughout the hot season is nearly always detrimental to riparian vegetation, especially in large pastures with small riparian areas that are not managed as riparian pastures (Bureau of Land Management 1997b). In the later part of the hot season, woody species utilization must be carefully monitored because use on those species often begins during this time period (Bureau of Land Management 1997b). Increased numbers of livestock during the hot season would likely slow willow establishment and infilling along those streams capable of willow communities, such as willows along stream A, B, and C channels and occur on Little Bridge Creek, Little Fir Creek, Fence Creek, and Big Fir Creek. The last five years of growth could be retained through required adaptive management practices and establishment of thresholds and responses; however, under this alternative, the risk that these would be exceeded would be higher than under all other alternatives. Without those thresholds and management responses, losses with this increased use and associated degradation of riparian areas from livestock would occur under this alternative.

In addition, the removal of water gap fencing on Bridge Creek, the perennial portions of which have been historically excluded from grazing with the water gap fencing, would lead to increased cattle presence and grazing within the perennial section of the creek. This introduction of livestock access to the riparian areas of Bridge Creek and potential continual hot season of use, would be expected to lead to a reduction in newly established vegetation and overall riparian condition in the creek as thresholds would likely be reached annually.

This alternative would put riparian resources at the highest risk compared to other alternatives.

3.10.2.2.4 RWQF2 Alternative 4

Under this alternative, the reduction in permitted AUMs (and annually authorized AUMs may be further reduced where ecological objectives in the Mud Creek and Hardie Summer Allotments are not achieved), and a more restrictive season of use, would reduce the amount of time livestock could access riparian areas. With the reduction of use, it is likely that current vegetation would be maintained or allowed to further recover, including willows within Hardie Summer. On Krumbo Creek, in the Hammond Allotment, changes to the season of use are proposed, from an early season of use to a three-year rotation of graze, defer, then rest. This would result in increased cattle presence within the creek during warmer periods in some years; however, the rotation of the season of use, fewer AUMs, and the year of rest would likely allow for current conditions within the creek to be maintained. There would be less risk of removal of newly established vegetation under this alternative, when compared to other grazing alternatives.

3.10.2.2.5 RWQF2 Alternative 5

Under this alternative, grazing permits would not be authorized, and cattle would no longer be present on public lands within allotments. Implementation of this alternative would provide for continued growth of riparian vegetation without influence from livestock use, leading to the further establishment and recovery of riparian vegetation and stabilizing woody species across all allotments. As an example, cessation of livestock grazing on the nearby Hart Mountain National Antelope Refuge resulted in dramatic improvements in riparian vegetation conditions, even without replanting or other active restoration efforts (Batchelor et al. 2015). This alternative would provide the most protection to newly established riparian vegetation. However, without monitoring associated with grazing management, unauthorized livestock grazing would be more likely to occur unnoticed, which could put riparian areas at risk until unauthorized grazing was addressed.

3.10.2.3 RWQF Issue 3: How would proposed livestock grazing affect BLM's ability to be in compliance with State water quality standards, until the Total Maximum Daily Load and/or water quality restoration plans are prepared for the planning area?

3.10.2.3.1 RWQF3 Common to all Grazing Alternatives

Under all proposed grazing alternatives, the BLM must demonstrate that management practices are not a contributing factor to the degradation of water quality to any water quality limited

waterbody or stream, until such a time that a Total Maximum Daily Load and water quality restoration plans are published. Management goals include meeting rangeland health standards; Standard 4 of those is achieving compliance with water quality. When management practices or levels of grazing use are determined to be significant factors in failing to achieve the rangeland health standards, BLM is required to take appropriate actions (43 CFR 4180.1(c)). Within the BCA AMP, 303(d) listed streams not meeting water quality standards were found to be in exceedance of temperature. This often indicates a loss of riparian vegetation cover, possibly due to grazing, but may be influenced by other factors such as wildfire and natural conditions such as low summer flow and beaver presence. Continued monitoring would be used to determine if standards are being met within those streams on BLM-managed land, whether livestock are a causal factor for any failures, and required adjustments to grazing would be applied to meet 43 CFR 4180 requirements.

3.10.2.3.2 RWQF3 Alternatives 1, 2, and 4

Under Alternative 1, impacts would be the same on water quality as what occurred under livestock grazing management prior to 2014. Under Alternatives 2 and 4, riparian vegetation would be expected to be maintained or improved throughout the BCA, due to thresholds and responses, which would provide positive impacts to water quality. It is expected that grazing would be compatible with all requirements under these three alternatives.

3.10.2.3.3 RWQF3 Alternative 3

Achievement of water quality standards within the BCA is highly dependent on the presence of adequate riparian vegetation cover. This alternative proposes the removal of the Bridge Creek water gap, allowing livestock to access Bridge Creek, as well as increased AUMs (both permitted and NR). Proposed management would lead to increased livestock presence within the perennial Bridge Creek and other riparian areas. While thresholds and responses would be in place, the risk of exceeding these would be highest under this alternative, which could result in the loss of riparian vegetation and make it more difficult to remain in compliance with water quality standards.

3.10.2.3.4 RWQF3 Alternative 5

Under this alternative, grazing would not be authorized, and cattle would not be present on public lands within the BCA. Implementation of this alternative would provide for continued maintenance or improvement in riparian vegetation and therefore water quality, barring a catastrophic wildfire (which has the highest risk of occurring under this alternative).

3.10.2.4 RWQF Cumulative Impacts

The RWQF CEAA area is the Donner und Blitzen Sub-Basin 4th field HUCs that incorporate and extend beyond the BCA boundary. This covers 505,297 acres of which 314,448 (62 percent) acres are BLM-managed land. The BLM chose this analysis area because the direct and indirect effects of proposed actions on riparian and watershed resources could impact streams outside of

the BCA. In addition to livestock grazing, RFFAs within this area include weed treatments, road maintenance, recreation activities, restoration actions including juniper removal and shrub planting, fire, and the Page Springs weir removal, which was mentioned in the Steens Act and is currently being analyzed. There is also an effort underway to complete an aquatic restoration environmental assessment for the OR/WA BLM, which would allow for restoration efforts to occur on Krumbo Creek and other creeks outside of the BCA.

Riparian areas throughout the CEAA have received PFC assessments. Of the 152 miles of streams surveyed, approximately 118 miles were in PFC, 23.6 miles were functioning at risk with an upward trend, five miles were functioning at risk with no apparent trend, 3.8 miles were functioning at risk with a downward trend, and 1.2 miles were non-functional.

Livestock grazing occurs throughout the CEAA. However, 27 percent of the BLM-managed land in the CEAA is excluded from livestock grazing; this amounts to 17 percent of the entire CEAA. In addition, private lands account for 25 percent of the CEAA. Stocking levels, grazing intensity, and management plans on private lands could cumulatively affect water quality and riparian and wetland conditions in the CEAA, however, quantitative effects are unknown. Livestock grazing on public lands in the CEAA is managed to meet S&Gs in accordance with 43 CFR 4180.2(c). Therefore, while improper grazing could have cumulative negative effects to this resource, it is expected that proper livestock grazing management would occur and result in maintained or improved riparian conditions throughout the CEAA cumulatively.

Cumulative effects to redband trout from the above-described actions include increased energy expenditure of fish, trampling, disturbance of spawning fish, trampling of redds, and displacement of juvenile fish. Direct grazing disturbance effects to redband trout spawning were not analyzed in detail because of the limited effect proposed grazing management would have on redband trout populations, cumulatively. With redband trout population survey data from 2008 (during active grazing) finding that the species was thriving, with high productivity and long-term survival (Oregon Department of Fish and Wildlife 2018), it is expected that the proposed grazing under all alternatives, but especially under Alternatives 1, 2, 4, and 5, with the set adaptive management, monitoring, and thresholds and responses would have these same (or better) results. The potential for conflict between spawning and grazing in the BCA is limited. Typical spawning times of redband trout are March through May, but by mid-May, most redband trout spawning has concluded (peak is in April-early May). Incubating redband trout generally emerge from streambeds approximately 3 weeks after spawning, depending on water temperatures. During the overlap between grazing and spawning/incubating periods, livestock tend to spend less time in the riparian areas, due to flooding of riparian areas and presence of highly palatable forage on the uplands. Cumulatively, it is not expected that grazing under any alternative would result in measurable impacts to these populations, including through trampling of redds. The only alternative that would result in new direct impacts from cattle on redband trout, is Alternative 3 with the removal of the water gap fencing on Bridge Creek, where fish are likely to be present during the summer months and increase the risk of redd trampling, which could impact populations. As survey data has shown during the previous period of active grazing, direct impacts on the fish do not appear to be a threat to the species.

RFFAs are largely focused on providing quality ecological conditions and opportunities, within the CEAA, with the exception of expected fire. Alternatives 1, 2, 4, and 5 would continue to make progress towards PFC and would improve the stream reaches that are functioning at risk in the CEAA and continue the upward direction of trend to a small extent when considered cumulatively with other RFFAs. Alternative 3, with the proposed water gap fencing removal would potentially cause a downward trend in riparian conditions within Bridge Creek, which is currently rated as PFC, and could result in cumulative measurable negative affects downstream if thresholds are regularly met or exceeded.

Ongoing weed treatments would be occurring throughout the CEAA. If standard operating procedures (SOP) for stream buffering and chemical application are followed there would be no measurable cumulative effects to water quality, fish, and wetlands/riparian areas.

Ongoing juniper treatments are occurring within the CEAA, as funding allows. Those juniper treatments within the CEAA, as well as restoration seeding and planting, would contribute positively to watershed health. These treatments are making progress towards achievement of Standards 1 and 3 in the CEAA and reducing chronic delivery of sediment to affected streams.

The removal of the Page Springs weir, if it is selected to move forward, would result in impacts the CEAA; however, there would be no additional cumulative impacts due to BCA proposed actions.

3.11 Socioeconomics (SE)

3.11.1 SE Affected Environment

The socioeconomic planning area is Harney County.¹⁰¹ A majority of the land is managed by the Federal government, nearly 72 percent of the county, with the BLM managing 61 percent of the lands in Harney County. Harney County is the largest county, by acreage, in Oregon.

In 2017, the population of Harney County was 7,289, about 5 percent lower than the population in 2000. Per capita personal income in 2017 was \$39,093 in Harney County, substantially lower than the statewide average of \$49,293.¹⁰² Non-labor income comprised about 52 percent of personal income in 2017, higher than the statewide 39 percent. Of non-labor income, 22 percent comes from interest, dividends, and rent, and an additional 18 percent from age-related payments (social security and Medicare), which is higher than the statewide 10 percent. This reflects Harney County's older population, which has a median age of 46 compared to age 39 statewide. Harney County residents also have higher rates of hardship-related payments such as Medicaid, welfare, and unemployment benefits. In 2017, 17.5 percent of those in Harney County were living below the poverty level, higher than the statewide level of 14.9 percent. About 19 percent of the population age 25 or older have a bachelor's degree or higher level of education in Harney

¹⁰¹ Unless otherwise specified, information in this section comes from the Demographics and Summary reports of the Economic Profile System, which uses Federal data sources, including the Bureaus of Economic Analysis, Census, & others (Economic Profile System Harney County Oregon 2022).

¹⁰² State of Oregon Employment Department, using data from U.S. Bureau of Economic Analysis (Oregon Employment Department 2024).

County, compared to 32 percent statewide. The unemployment rate in 2018 was 6.2 percent, about the same since 2016 and a substantial drop from over 16 percent in 2009; still, it remains higher than the statewide average of 4.2 percent.

The Harney County economy differs somewhat from that of the State as a whole, with a lower proportion of jobs in the service sector (47 percent compared to 71 percent statewide) and a higher proportion of non-services related jobs (29 percent compared to 18 percent statewide). Of the non-services jobs in 2017, about 64 percent were in the farm sector, reflecting the continuing importance of farming and ranching activities in the local economy. About 23 percent of the jobs in Harney County are in the travel and tourism-related sector, compared to 16 percent statewide (these include establishments that also serve local residents, such as restaurants).

In 2018, the annual salary of jobs in the non-services sector average about \$34,500, compared to \$27,400 in the services sector. Annual wages in the service sector varied widely, from a low of \$14,400 in leisure and hospitality jobs, to a high of \$37,500 in information services and \$36,500 in business and professional services.

As is the case in many rural areas, government employment is a major contributor of jobs in Harney County, comprising 40 percent of wage and salary employment in 2018. Of this, about 67 percent were local government jobs, 10 percent were State jobs, and 23 percent Federal jobs. All three categories of employment paid more than private sector jobs, with average annual wages of \$42,000 for local government, \$58,000 for State government, and \$66,000 for Federal government.

Livestock raising and associated feed production industries are major contributors to the Harney County economy. About 19 percent of the jobs in Harney County are in the farm sector, much higher than the statewide level of just over 2 percent. In 2017, there were 532 farms in the County, comprising about 1.56 million acres. Livestock raising and associated feed production industries are contributors to the economy of Harney County; of the \$83 million market value of agricultural products sold in 2017, about \$53 million (65 percent) came from livestock sales and about \$30 million from crops sold (U.S. Department of Agriculture 2019). The market value of agricultural products sold was an average of \$155,000 per farm, compared to the average farm production expenses of \$129,000 per farm; 314 farms had net losses in 2017. About 144 farms used hired labor, with the 526 workers earning a total payroll of \$7.4 million. Although the number of farms in 2017 increased slightly from 2012, the market value of agricultural products sold and the number of farms showing a profit both decreased.

Livestock grazing has economic and social importance in the BCA, and though the BLM does not attach a monetary value to public land grazing permits, economists recognize there is an associated value tied to them (Rimbey et al. 2007). Grazing supports agricultural jobs and income as well as the ranching way of life for many families. Communities surrounding the BCA have deep rooted historical ties to agriculture. For many residents, ranching is more than just a form of employment; it is a way of life and supports long-standing family traditions. One social impact that is occurring and likely to continue is social conflict, as reflected by BCA litigation that has occurred since 2014, when the BLM did not renew the previous grazing permit, and

removed the permittee’s grazing preference, due to findings that the permittee did not have a satisfactory record of compliance.

The “social cost of carbon,” “social cost of nitrous oxide,” and “social cost of methane” – together, the “social cost of greenhouse gases” (SC-GHG), are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year.

On January 20, 2021, President Biden issued Executive Order (E.O.) 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (Biden, Jr. 2021 Jan 21). Section 1 of E.O. 13990 establishes an Administration policy to, among other things, listen to the science; improve public health and protect our environment; ensure access to clean air and water; reduce greenhouse gas emissions; and bolster resilience to the impacts of climate change (Biden, Jr. 2021 Jan 21). Section 2 of the E.O. calls for Federal agencies to review existing regulations and policies issued between January 20, 2017, and January 20, 2021, for consistency with the policy articulated in the E.O. and to take appropriate action (Biden, Jr. 2021 Jan 21).

Consistent with E.O. 13990, the Council on Environmental Quality (CEQ) rescinded its 2019 “Draft National Environmental Policy Act Guidance on Considering Greenhouse Gas Emissions” and issued interim National Environmental Policy Act (NEPA) Guidance on Consideration of Greenhouse Gas Emissions and Climate Change (Council on Environmental Quality 2023). This guidance, effective upon publication, builds upon and updates the CEQ’s 2016 Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. While CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change effects including recommending that agencies provide additional context for GHG emissions through the use of social cost of GHG estimates (Council on Environmental Quality 2023).

Regarding the use of social cost of carbon or other monetized costs and benefits of GHGs, the 2016 GHG Guidance (Council on Environmental Quality 2016) noted that NEPA does not require monetizing costs and benefits. It also noted that “the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations.”

Section 5 of E.O. 13990 (Biden, Jr. 2021 Jan 21) emphasized how important it is for Federal agencies to “capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account” and established an Interagency Working Group on the Social Cost of Greenhouse Gases (the “IWG”). In February of 2021, the IWG published *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (Interagency Working Group on Social Cost of Greenhouse Gases 2021). This is an interim report that updated previous guidance from 2016.

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

For Federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the social cost of carbon dioxide (SC-CO₂), methane (SC-CH₄), and nitrous oxide (SC-N₂O) developed by the IWG on the SC-GHG. Select estimates are published in the technical support document (Interagency Working Group on Social Cost of Greenhouse Gases 2021).

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

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

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

3.11.2 SE Environmental Consequences

3.11.2.1 SE Issue 1: How would issuing grazing permits and implementing proposed developments affect the local economy?

Under all alternatives, actions that would result in improved recreation opportunities would be expected to benefit socioeconomics, while actions that would negatively impact recreation opportunities would have negative impacts to socioeconomics. For discussion on impacts to recreation, see the Recreation section of this EIS.

3.11.2.1.1 SE1 Alternative 1

This alternative would analyze issuing one or more grazing permits on all four allotments for ten years with the standard BLM Burns District Office and BLM-wide terms and conditions. This would continue grazing management as it was authorized on the previous grazing authorization. No new developments would be constructed.

This alternative would result in the BLM issuing grazing permits for 1,500 AUMs. A rough estimate of how this would translate into jobs and labor income was developed using estimates from the Jarbidge RMP/Final EIS (Bureau of Land Management 2015h). That analysis estimated that each BLM AUM generated 0.00186 jobs and \$31.47 in labor earnings. However, the authors noted that when BLM forage is used as part of an overall grazing system, these values, from the perspective of total ranch production, increased to 0.00407 jobs and \$68.92 in labor earnings per AUM; these numbers and associated analysis are therefore incorporated by reference.¹⁰³ As a result, the 1,500 AUMs could be expected to generate at least 6 jobs and \$103,380 in labor earnings (\$115,553 in 2020 dollars). There would be no potential additions to the local economy through developments.

3.11.2.1.2 SE1 Alternative 2

This alternative was developed by a BLM IDT based on scoping and in coordination with requests from applicants for grazing preference within the BCA. One or more 10-year livestock grazing permits would be issued for Hammond, Hardie Summer, and Mud Creek Allotments, and Hammond FFR.

This alternative would result in the BLM issuing grazing permits for 2,940 AUMs. Using the assumptions described under Alternative 1, these AUMs would be expected to generate at least 12 jobs and \$202,625 in labor earnings (\$226,484 in 2020 dollars).

Developments would be made, including 8.15 miles of fence removal and 5.1 miles of new fence construction. Assuming that the new fences are 4-wire fence with steel posts, the BLM estimates

¹⁰³ These employment and labor income estimates include direct, indirect, and induced economic effects, as were measured in the Jarbidge analysis using the input-output model IMPLAN. Direct employment is generated in the grazing sector. Indirect effects occur when affected ranchers purchase services and materials, and induced effects occur as ranchers spend their earnings within the local economy.

the cost (materials and labor) at \$16,500 per mile, for a total cost of \$84,150. Fence removal is estimated to cost \$4,000 per mile, for a total of \$32,600.

Considering both fence removal and construction, Alternative 2 would result in a total of \$116,750 in labor and materials. These costs to hire a contractor would be paid by the BLM; if the contractor is a resident who purchased supplies in the area, there would be local economic benefits, although this cannot be guaranteed and would depend on the contracting process results.

3.11.2.1.3 SEI Alternative 3

This alternative was developed in coordination with an applicant for grazing preference within the BCA. This action includes issuing one or more 10-year livestock grazing permits for Hammond, Hardie Summer, and Mud Creek Allotments, and Hammond FFR, as well as the proposed Hardie Summer FFR.

This alternative would result in the BLM issuing grazing permits for 4,485 AUMs. Using the assumptions described under Alternative 1, these AUMs would be expected to generate at least 18 jobs and \$309,106 in labor earnings (\$345,504 in 2020 dollars).

Developments would be made, including 13.38 miles of fence removal, 7.63 miles of new fence construction, three new corrals, three new troughs, and 2.64 miles of water pipeline. Assuming that the new fences are 4-wire fence with steel posts, the BLM estimates the cost (materials and labor) at \$16,500 per mile, for a total cost of \$125,895. Fence removal would add another \$53,520. The estimated costs of the water troughs (\$2,100 each) would be \$6,300, and the water pipeline (at \$15,900 per mile for labor and materials) would be \$41,976.

Considering all of these developments, the total cost would be \$227,691. These costs to hire a contractor would be paid by the BLM; if the contractor is a resident who purchased supplies in the area, there would be local economic benefits, although this cannot be guaranteed and would depend on the contracting process results. This is over \$100,000 more than the developments anticipated under Alternative 2.

3.11.2.1.4 SEI Alternative 4

Under this alternative, permitted AUMs would be reduced to 50 percent of what is analyzed in Alternative 1, and annually authorized AUMs may be further reduced in areas of the Mud Creek and Hardie Summer Allotments not achieving ecological objectives). In addition to this, the permitted season of use would be more restrictive, which would in turn modify livestock grazing.

This alternative would result in the BLM issuing grazing permits for 751 AUMs. Using the assumptions described under Alternative 1, these AUMs would be expected to generate at least three jobs and \$51,759 in labor earnings (\$57,854 in 2020 dollars). There would be no potential additions to the local economy through developments. There would be some economic benefit, but much less than would occur under Alternative 2, and far less than under Alternative 3.

3.11.2.1.5 SE1 Alternative 5

This alternative would not result in the BLM issuing a grazing permit(s) for the BCA allotments. No new developments would be constructed, and existing rangeland developments would not be maintained unless needed for other resources.

This alternative would result in the BLM issuing grazing permits for zero AUMs; permitted livestock grazing would be completely removed from all BLM-managed land within all four allotments and no new developments would be constructed unless needed for another resource. No jobs or labor earnings would be generated by the AUMs, and there would be no potential additions to the local economy through developments.

3.11.2.2 SE Issue 2: How would proposed livestock grazing and developments affect lifestyles in local ranching communities?

3.11.2.2.1 SE2 Alternative 1

Ranching has an intimate connection to the overall culture in and around the project area. Reductions in public land grazing can negatively affect rural communities, counties, households, and ranchers; “the livelihoods of families and communities in the West depend on livestock grazing on public lands with livestock production remaining as a core sector of commerce” (Lewin et al. 2019). Because there would be no reductions in grazing permits, there would be no direct negative social impacts. However, as NR AUMs were previously allowed, but would not be allowed under this alternative, there could be perceived negative impacts to ranching as benefits from grazing within the BCA would be reduced from what occurred prior to 2014.

3.11.2.2.2 SE2 Alternative 2

Under this alternative, effects would be similar to those described under Alternative 1. Because there would be an increase in grazing permits, there would be an increase in the magnitude of positive social impacts on the ranching community. The increase could have a positive social effect as it would be perceived as beneficial to the ranching community, especially as permitted AUMs under this alternative would more closely align to use that occurred prior to 2014, including increase AUMs in Hammond Allotment as well as the ability to use NR AUMs.

3.11.2.2.3 SE2 Alternative 3

This alternative would propose a substantial increase in permitted AUMs, resulting in impacts described under Alternative 2, with an even larger increase in magnitude of positive effects to ranching. There would be no negative social impacts. The increase could have a positive social effect as it would be perceived as beneficial to the ranching community, especially since the number of permitted AUMs would exceed those used pre-2014, the Bridge Creek drainage would be opened to grazing, and NR AUMs would be available in all areas with few new terms and conditions. This alternative would also provide the most flexibility and control to the permittee(s) as there would be no general grazing rotations.

3.11.2.2.4 SE2 Alternative 4

Under this alternative there would be a substantial decrease in permitted AUMs and may be a further decrease in annually authorized AUMs in the Mud Creek and Hardie Summer Allotments, where ecological objectives are not currently achieved; the potential would exist for there to be negative social impacts to the ranching community, as the change would be perceived as detrimental. The extent of this impact can't be quantified, but the inability to utilize these public lands for grazing for most of the past 10 years likely forced ranchers to adjust their operations accordingly, and these losses would continue under this alternative, though to a lesser extent than Alternative 5.

3.11.2.2.5 SE2 Alternative 5

Alternative 5 would have impacts similar to Alternative 4, but they would have larger negative impacts to the ranching lifestyle as no grazing would be authorized, carrying forward all the losses to the grazing community seen since 2014, with the exception of 2019. These permanent losses would be perceived as detrimental to the ranching community. The extent of this impact can't be quantified but would be greater than that under Alternative 4. Without the prospect of using the BCA for grazing in the future, any adjustments in operations would have to be permanent. Ranching communities would perceive this as unfair given that the BLM found in the 2023 BCA LHA (Bureau of Land Management 2023a) and determination (Bureau of Land Management 2023b) documents that Standards are achieved, or where not achieved, livestock grazing authorized on the pre-2014 grazing permit was not a causal factor. Given that this EIS is making decisions about a very small percentage of the 164,125 billed AUMs in Harney County in 2022, the ranching community would be negatively affected, but not to the extent that it would have lasting effects on County communities and infrastructure.

3.11.2.3 SE Issue 3: What is the social cost of greenhouse gas emissions?

The SC-GHG estimates below for livestock grazing follow the IWG recommendations. While this table provides estimates of direct impacts to GHG emissions, it does not account for indirect impacts related to carbon storage, which has been found to be increased on rangelands with proper grazing and where there is reduced catastrophic wildfire risk. Carbon storage that occurs on rangelands would offset the social cost of GHGs; however, science to allow for estimations of carbon storage, and associated reduction of GHGs, is still being developed.

6188 3.11.2.3.1 Alternatives 1, 2, 3, and 4

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6190

Table 3-36: Social Cost of GHG in 2020 Dollars¹⁰⁴

	AVERAGE VALUE, 5% DISCOUNT RATE	AVERAGE VALUE, 3% DISCOUNT RATE	AVERAGE VALUE, 2.5% DISCOUNT RATE	95 TH PERCENTILE VALUE, 3% DISCOUNT RATE
ALTERNATIVE 1				
CH ₄ (18.5MT annually)	\$127,000	\$296,000	\$381,000	\$786,000
N ₂ O (9 MT annually)	\$517,000	\$1,692,000	\$2,503,000	\$4,476,000
ALTERNATIVE 2				
CH ₄ (29.8 MT annually)	\$205,000	\$477,000	\$631,000	\$1,266,000
N ₂ O (12.9 MT annually)	\$741,000	\$2,246,000	\$3,588,000	\$6,416,000
ALTERNATIVE 3				
CH ₄ (53.3 MT annually)	\$356,000	\$853,000	\$1,128,000	\$2,264,000
N ₂ O (18.6 MT annually)	\$1,068,000	\$3,497,000	\$5,173,000	\$9,251,000
ALTERNATIVE 4				
CH ₄ (10.8 MT annually)	\$74,000	\$173,000	\$229,000	\$459,000
N ₂ O (1.1 MT annually)	\$63,000	\$207,000	\$306,000	\$547,000

6191

6192 Under Alternative 4, these numbers may be further decreased annually as no livestock grazing
6193 would be authorized in portions of the Mud Creek and Hardie Summer Allotments where
6194 ecological objectives are not currently achieved.

6195

6196 3.11.2.3.2 Alternative 5

6197

6198 Under this alternative no grazing would occur within the BCA. Therefore, there would be no
6199 direct GHG emissions from authorized livestock released from this allotment and no associated
6200 social costs. However, it is unknown whether these livestock would still be releasing emissions
6201 in another location, such as on private property, or not. Therefore, it should not be assumed that
6202 by not permitting livestock grazing within the BCA the entire associated social costs are fully
6203 eliminated but would be impacted by livestock numbers associated with potential permittees and
6204 their response to not receiving a grazing permit within the BCA.

6205

6206 3.11.2.4 SE Cumulative Effects

6207

6208 The CEAA for SE is Harney County. The RFFAs for this resource include continued livestock
6209 grazing, weed treatments (including invasive annual grass treatments), road maintenance,
6210 recreation activities, restoration seeding, restoration of shrub plants, and juniper treatments, such
6211 as those analyzed in the North Steens Ecosystem Restoration Project EIS (Bureau of Land
6212 Management 2007e), and reviewed in the Mud Creek Restoration DNA (Bureau of Land
6213 Management 2023c) and Adjacent (Non-WSA) North Steens Ecosystem Restoration DNA
6214 (Bureau of Land Management 2024a). None of these are expected to interact with this current
6215 decision to result in additional impacts to the local economy.

¹⁰⁴ While this table provides estimates of direct social cost of GHG related to livestock grazing under each alternative, it is important to note that it does not incorporate the carbon storage that occurs through healthy ecosystems that are part of proper grazing management areas, or the reduction of catastrophic fire risk associated with grazing.

However, other recent BLM actions have affected grazing availability on Federal lands in the area, which would combine with actions that could be taken in the BCA. These include GRSG management, ACEC management, and wilderness study area management. Future actions that could result in further grazing restrictions and add to economic impact include the forthcoming Lakeview RMP and the forthcoming GRSG EIS, which in Oregon could restrict grazing availability in research natural areas depending on which alternatives are chosen. It is difficult to measure the economic impact associated with these cumulative actions, but it would be negative to the ranching community.

3.12 Traditional Native American Practices (TNAP)

3.12.1 TNAP Affected Environment

The affected environment is located within the traditional lands of the Northern Paiute peoples. The traditional homeland of the Northern Paiute included central and southeastern Oregon, east-central Idaho, Nevada, and east-northeastern California. These lands were, for the most part, geologically and geographically characteristic of the High Lava Plains, and the Basin and Range Physiological Provinces.

Contemporary descendants of the Northern Paiute people are members of the Burns Paiute Tribe, Confederated Tribes of Warm Springs Reservation of Oregon, Fort McDermitt Paiute Shoshone, and Shoshone Paiute Tribes of the Duck Valley Reservation. They were a semi-nomadic people where individual bands occupied certain areas, but the boundaries of these areas were fluid and overlapped. The bands were often named after prominent food resources. The band that occupied the BCA was the *Wadatika*, named after *wada* (*Suaeda* sp.), which is a plant with small black seeds that grow along riparian and lake areas. Accordingly, campsites were focused along lakes, streams, and rivers with access to water as well as the resources that provided, and still provide, their material, spiritual, and medicinal needs.

Although no traditional cultural properties (TCP) have been recorded within the BCA, ancestral use of the area is documented by both ethnographic and archeological records; therefore, TCPs are not fully analyzed.

3.12.2 TNAP Environmental Consequences

3.12.2.1 TNAP1: How would the alternatives impact Traditional Native American Practices, including those of spiritual (religious) and cultural practices, such as gathering of chokecherries or other traditional plants in the area?

3.12.2.1.1 TNAP1 Alternative 1

Grazing permits would be issued with the same terms and conditions to the previously issued permits and no new developments would be added to the project area. As livestock grazing would occur as it had pre-2014, effects to TNAP would be the same as what occurred at that time. Any grazing would result in potential for conflict between livestock grazing and TNAP that

could include animals being present near TNAP sites, or livestock use on traditional plants. However, as utilization would be limited and grazing rotations would be in place, ensuring livestock achieve, or are not a causal factor in not achieving, S&Gs, there would not be a measurable impact to TNAPs. Grazing would remove and reduce future fine fuels within the BCA, decreasing the risk of catastrophic fire. While fire is a natural process that doesn't inherently take away from TNAP, catastrophic fire that has high mortality on vegetation species important to TNAP would result in long-term negative impacts to TNAP.

3.12.2.1.2 TNAPI Alternative 2

Effects under Alternative 2 would be similar to those described under Alternative 1 with a few small variations. Alternative 2 would have improved general grazing rotations that would increase the periodic growing season rest vegetation is receiving and add additional thresholds and responses, which would further ensure proper ecological functioning and health and vigor of desirable species, including those that are important to TNAP. The extended season of use may also result in a decrease in invasive annual species, which tend to take away from TNAP, and an associated improvement in desirable perennials where they may exist, improving TNAP. Grazing under this alternative would remove more fine fuels, and, therefore, decrease the risk of catastrophic fire compared to Alternative 1. As more AUMs would be permitted under this alternative, there would also be an increase in potential for conflict between livestock and grazing management and TNAP compared to Alternative 1.

3.12.2.1.3 TNAPI Alternative 3

Under this alternative, effects would be similar to those described under Alternative 2. However, while this alternative would conform to all S&G by providing periodic growing season rest to all areas of the BCA, the increase in AUMs, and the reduction in associated terms and conditions, would increase risk to vegetation and conditions under this alternative compared to Alternatives 1, 2, and 4. In addition, the potential for conflict between livestock and TNAP would be increased under this alternative compared to other alternatives as grazing would be reintroduced into the Bridge Creek drainage. However, this alternative would result in the most fine fuel removal and, therefore, would have the lowest risk of catastrophic fire, which would protect the BCA and TNAP in the long term. Though effects to TNAP would not be measurable, this alternative would have the largest risk for negative impacts.

3.12.2.1.4 TNAPI Alternative 4

Under this alternative, the BLM would permit AUMs at 50 percent of what is analyzed in Alternative 1, and no livestock grazing would be authorized in portions of the Mud Creek and Hardie Summer Allotments where ecological objectives are not currently achieved. While impacts would be similar to what was described under Alternative 1, there would be fewer AUMs for a shorter season of use, which would result in reduced opportunities for conflict with TNAP. However, there would be less removal of fine fuels under this alternative compared to other grazing alternatives, resulting in the most risk of catastrophic fire of grazing alternatives.

3.12.2.1.5 TNAP Alternative 5

Under this alternative, livestock grazing would not occur. There would be no conflict between livestock and grazing operations and TNAP. However, without livestock grazing to remove fine fuels in a measurable amount, it is expected that vegetation may become decadent due to shading (see Vegetation section), resulting in plant mortality, and the risk of catastrophic fire would be largest under this alternative compared to all the others.

3.12.2.2 TNAP Cumulative Effects

The CEAA for TNAP would include the Steens Mountain, which is known to play a prominent role in local TNAP. RFFAs that may impact TNAP include continued livestock grazing, weed treatments, road maintenance, recreation activities, fire, and restoration actions including juniper removal. All of these RFFAs would increase opportunities for conflict with TNAP as they would increase the presence of people and animals within TNAP areas. However, the size of the Steens Mountain, and the ability for people and animals to spread out prevent any one use from dominating the entire Steens Mountain at a given time. Therefore, while RFFAs may impact TNAP in the short term, when activities are occurring or being implemented, there are also adjacent areas that would be available. It is not expected that any of these actions would have a measurable impact on TNAP when considered cumulatively with proposed actions in the BCA.

3.13 Vegetation/Annual Grasses/Fuels (VAGF)

3.13.1 VAGF Affected Environment

The Western Regional Climate Center houses data from the remote automated weather stations (RAW); the nearest stations to the allotments are the station on P-Hill (4,860 feet elevation), near Frenchglen and Moon Hill (6,100 feet elevation), east of the allotments (Western Regional Climate Center 2024). The BCA builds in elevation from the west to the east, on the west side of Steens Mountain. The elevation ranges from 4,200 feet in the lower portion of the Hammond Allotment to 5,900 feet in Mud Creek and 7,200 feet in Hardie Summer. Due to this elevational change, the average precipitation within the BCA from 1990 to 2019 has ranged from 6.55 inches at the west end to 25.93 inches on the east end, per the nearest weather station data. Most of the precipitation comes in the winter in the form of snow and in the spring in rainstorms. Temperatures range from a low of 0°F in the winter to a high of 106°F in the summer, with average daily ranges of 21-40°F in the winter and 55-77°F in the summer. Although these data can collapse into simple numbers or ranges, the climate of the BCA is highly variable from month to month and year to year, in terms of both temperature swings and precipitation amounts. This has been documented as being the case on the Steens Mountain since the late 1960s (Bureau of Land Management 1967) and in the Northern Great Basin since 1937 (Johnson et al. 2019). Regardless of the annual weather fluctuations, the precipitation and the form it comes in (rain or snow), combined with temperature, drives the spatial patterns of vegetative communities. Vegetation matures earlier in the Hammond Allotment and Lower Field of the Mud Creek Allotment than it does in the Upper Field of the Mud Creek and Hardie Summer Allotment. Because of how the Hammond FFR sits on the landscape in two parts, one near the Hammond

Allotment and other by the Hardie Summer Allotment, it spans all elevation, precipitation, temperature, and plant growth timing patterns present within the BCA.

Aspect plays an important role in vegetative communities because it can result in changes in temperature that impact vegetation in semi-arid environments where precipitation is limited. Aspect affects the amount of moisture retained on a site as a result of sunlight and its intensity interacting with the landscape. In the summer, north and east facing slopes tend to retain more moisture and are less exposed to intense mid to late day sunlight. South and west facing slopes, while they may receive the same amount of precipitation, tend to be hotter and drier because they get much longer, higher intensity mid to late day sun, which has a drying effect on soils and vegetation. In the winter, north and east facing slopes may retain more snow, whereas south and west facing slopes' snow may melt off faster during the summer season. Within the BCA, regardless of ownership, the most abundant aspect is south and west facing (about 70 percent). North and east facing slopes account for about 30 percent of the area, with solely east facing slopes only accounting for 2 percent. Hammond, Hardie Summer, and Hammond FFR allotments follow these general proportions. The Mud Creek Allotment has more of south and west facing slopes (83 percent) than north and east slopes (17 percent).

The amount of slope, displayed in a percentage, also has influence on past and present land management within the BCA. In studies related to the topic, analysis pointed out slope gradient as the physical factor most consistently associated with cattle use of the landscape (Gillen et al. 1984). In relationship to the BCA, the increase in elevation from west to east is gradual, which is reflected in the slope gradients. For simplicity, slope ranges have been broken into four categories, 0-10 percent slope, 11-30 percent slope, 31-60 percent, and 60 percent slope and greater. Within the BCA, on BLM-administered land, about 73 percent are in the 0-10 percent slope category, 24 percent in the 11-30 percent slope category, 3 percent in the 31-60 percent, and less than 1 percent is in the over 60 percent slope category. Livestock use is negatively related to slope, meaning that the higher the slope gradient (steeper), the less time livestock spend or forage there. In similar vegetation types, studies have shown that livestock routinely use areas with 20 percent or less slope and favored areas with 10 percent slope or less (Mueggler 1965; Ganskopp and Vavra 1987). Steeper slopes, over 60 percent, have been shown to receive little to no use by cattle (Holechek 1988). For slopes between 21-60 percent, the science varies on how much or little livestock use them. There is agreement they do get used to a lesser extent than gentler slopes, but at the same time they are not considered "ungrazable." Other factors, such as type and availability of forage, season of use (spring versus summer), water (amount and distribution), salt and mineral location, protein supplementation location, breed, livestock behavior and familiarity with the area, and active herding likely play a role in the level of livestock use in areas of 20-60 percent slopes. Most of the acreage within the Hammond, Mud Creek, and Hardie Summer Allotments is considered usable by livestock from a slope standpoint (see figure 3-3) and, therefore, vegetation could be affected by the grazing alternatives.



Photo 3-2: Aerial View of Part of the Mud Creek and Hardie Summer Allotments, looking east¹⁰⁵

Slope gradient is also important from a drill seeding standpoint; all the areas seeded to crested wheatgrass between the 1960s and 1980s have been in the 0-10 percent slope category. This is likely due to deeper soils, the inability of the planting equipment to negotiate steeper slopes, and the presence of a higher large rock component in steeper sloped sites, making them impassable or damaging to equipment. Many of these areas were identified for seeding because they were known to be degraded from heavy historical use with little herbaceous understory prior to being seeded (Griffith 1902; Hedrick et al. 1969).

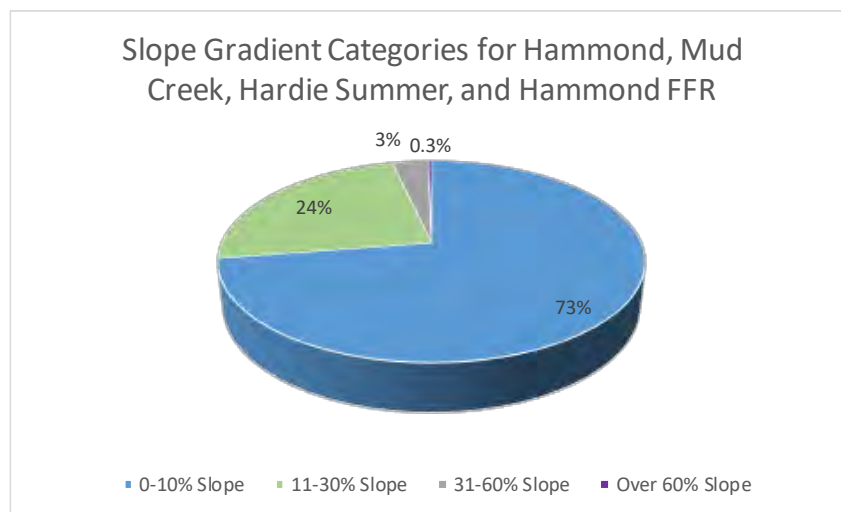


Figure 3-4: Slope Gradients for Allotments¹⁰⁶

Disturbances are events that change the vegetation and can be considered natural or human caused. Disturbances can include, but are not limited to fire, seeding and planting activities, grazing by wildlife and domesticated animals, drought, outbreaks of pests and disease, and other

¹⁰⁵ Note gradual elevation gain and slope gradients from east to west up the Steens Mountain. Mud Creek is the drainage on the photo right. The elevation gain has precipitation driven vegetation cues at about 5,000 feet, a transition to Wyoming sagebrush dominant (with juniper encroaching) in the foreground to mountain sagebrush in the midground. The drier south and west facing aspects in the lower elevation foreground are visible with a higher juniper abundance, and the aspen in the north facing slopes and shrub/grass communities on the south facing slopes in the higher elevation mid ground. The top of Steens Mountain is in the background, although outside of the BCA, the “gunsight” or “notch” is visible on the skyline and is a well-known local landmark visible from many areas.

¹⁰⁶ Blue and green indicates percent of area routinely useable by livestock, gray is area that may have limitations to livestock use, purple is area that is considered typically low use or unusable by livestock.

human activities. As with many places in the American west, this area has a rich history of natural and human influenced disturbances. The following is a brief overview of the main disturbances within the BCA, focusing on the post-European settlement time. Looking at history lends information to why the current condition in the allotments differs from the expected vegetation.

Wildfire is the primary natural disturbance and one of the main drivers to vegetation change within the BCA, historically and more recently. Fire (wildfire and human caused) has occurred within and across BCA allotment and pasture boundaries. Table 3-37 shows acres within a fire boundary per allotment since 1980, in ten-year increments. Some areas burned in the 1980s and again in the 2000s. For some of the fires there were unburned areas or patches within the fire boundary. Generally, most wildfires have been suppressed by humans since the homesteading and stockman era (starting in the 1870s), and more seriously since the early 1900s, as a way to protect property and forage.

Table 3-37: Total Acres¹⁰⁷ Burned in BCA Allotments since 1980 by Decade

ALLOTMENT	ACRES	1980-1990	1990-2000	2000-2010	2010-2020	TOTAL
HAMMOND	13,598	8,635	1,385	3,567	0	13,587
HARDIE SUMMER	8,143	45	431	9,621	40	10,137
MUD CREEK	9,723	1,179	295	8,206	151	9,832
HAMMOND FFR	7,514	1,601	0	3,251	216	5,069
TOTAL	38,978	11,460	2,111	24,645	408	38,624

Historical grazing has also been a disturbance in this area and can be linked indirectly to fire history. After the abundant forage resources of the area were discovered in the 1870s, stockmen started bringing in large groups of sheep and cattle to graze the area. A gentleman by the last name of Meldrum, a government surveyor who surveyed the area on the western base of the Steens Mountain in 1880, commented on the abundance of good bunchgrass in most of the township (Beckham 1995a; Beckham 1995b). About twenty years later in 1902, David Griffith was assigned by the U.S. Department of Agriculture to inventory forage conditions in the region between Winnemucca, Nevada, and Ontario, Oregon. The current day BCA was included in his route as part of the “Steins Mountains” investigation. In his report he describes his current day Steens Mountain as the most “closely pastured” area of the entire trip, meaning the most heavily grazed (Griffith 1902). Of the uplands this is a summary of his impressions: “The public ranges of the region are in many places badly depleted... this is directly traceable to overstocking. The large stretches of county, especially in Steins Mountains, cleared all semblance of forage during past summer...will become less and less productive with each succeeding year” (Griffith 1902).

¹⁰⁷ Acreages are across all ownerships within allotment boundaries.



Photo 3-3: 1901 Photo of the Steens Mountain, in the Vicinity of the BCA¹⁰⁸

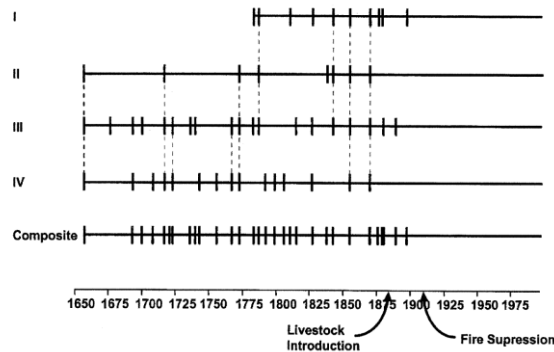
Although the expansion of western juniper into its current range had already taken place by about 3,000 years ago, with the earliest documentation of juniper near the BCA at Diamond Craters 4,800 years ago, there have been a series of expansions and contractions of juniper woodlands within the range as a result of cooling and warming periods (Miller et al. 2005). The end of the Little Ice Age, about 150 years ago, was a wet and cool period that grew the grass which fueled fires, keeping the western juniper expansions at a minimum. This period nearly coincided with the European settlement, the beginning of unrestricted livestock grazing, and the suppression of wildfires.

The unregulated, heavy livestock grazing that occurred between the 1870s and early 1900s resulted in fewer fine fuels to spread wildfire. Heavy livestock grazing also increases sagebrush cover in some areas, which creates safe sites in which western juniper saplings are protected and can thrive. The suppression of wildfire by settlers and stockman limited the very fire intolerant young western juniper to rocky outcroppings that did not burn during a wildfire (Miller and Rose 1995: 3–5). Figure 3-5 (Miller and Rose 1995) shows the time chronology of heavy livestock grazing being introduced and fire suppression being implemented, in relationship to fire scars observed from old living trees. The pattern shown was also true for the Steens Mountain area, and wildfires that would have kept juniper in check all but ceased after 1900. The combined result was the accelerated opportunity for western juniper to encroach into deeper soiled sites from the “scattering” of western juniper Griffith observed in 1902 (Griffith 1902), on the western side of the Steens Mountain, becoming a more continuous stand. Since fire suppression is still commonplace for a number of management, life, and property protection reasons, western juniper encroachment continues to be a land management issue for overall land health and wildlife within and surrounding the BCA. To summarize a complex ecological relationship,

¹⁰⁸ Moderately grazed in 1902 is defined differently than in current day. This photo shows heavy grazing use by today’s definitions.

when western juniper encroaches into deeper soil sites left untreated by fire or cutting, over time the western juniper outcompetes the other native vegetation, such as shrubs and grasses, for resources such as water and nutrients. As western juniper dominates the site, the shrubs and grasses slowly disappear, leaving an overstory of western juniper and the soil surface exposed to soil erosion and invasive species such as invasive annual grasses.

Figure 3-5: Comparison of Livestock Introduction and Fire Suppression as they Relate to Western Juniper



Expansion (Miller and Rose 1995; Miller and Rose 1999: 1)¹⁰⁹

The other major factor affecting western rangelands, not unique to the BCA, is the introduction and presence of non-native invasive annual grasses. Invasive annual grasses have been present in the area since at least 1902 at the time of Griffith's reporting. He discussed the suite of introduced annual bromes, including what is now known as cheatgrass (*Bromus tectorum*). The amount and distribution of annual bromes he observed in the Steens Mountain at that time is unknown, he simply stated they were introduced in "considerable quantity" and were believed to have come from California in livestock feed (Griffith 1902). Annual invasive grasses are a problem because they compete with native vegetation, influence the wildfire cycle and fire behavior, reduce the quantity and quality of wildlife and livestock habitat and forage, and indirectly affect the potential for soil erosion.

Since the 1902 assessment of the area by Griffith (Griffith 1902), when livestock grazing was essentially "first come, first served", the grazing management on western rangelands, and in particular the BCA, has changed dramatically. The Taylor Grazing Act of 1934 (TGA) provided the foundational legislative authority for livestock grazing on public land, with provisions for protection of the land from degradation and for orderly use and improvement of public rangelands. The TGA also established a system for allotment of grazing privileges to livestock operators based on grazing capacity and use priority, and for delineation of allotment boundaries, as well as standards for rangeland developments. This system, generically referred to as adjudication, was largely completed in the current day BCA by 1965. The Federal Land Policy and Management Act of 1976 and Public Rangelands Improvement Act of 1978 mandated management of public land for multiple-use and sustained yield. Specifically, regulations implementing these acts call for rangeland management strategies that provide for forage for

¹⁰⁹ Master fire chronology for the mountain big sagebrush steppe community in the upper Chewaucan River basin. Fire history extends from 1601 to 1996. Each horizontal line represents a sample composite for each collection site with the bottom line being a composite for all fire scar samples across the sites. Each vertical line designates a fire occurrence. Dashed lines connect collection sites where fires occurred across two or more sites in the same year.

economic use, as well as for maintenance or restoration of watershed function, nutrient cycling, water quality, and habitat quality for SSS and native plants and animals. These acts led to the Andrews Grazing Management Program Plan approved April 13, 1984 (Bureau of Land Management 1984), which defined management objectives and the grazing frequency, season, and intensity in the BCA. This was the first BLM analysis formally considering proper grazing in regard to vegetation. The next major development was the S&Gs, which became part of the BLM livestock grazing regulations (43 CFR 4180). The S&Gs specific to Oregon/Washington were adopted in 1997 (Bureau of Land Management 1997a). In 2005, the BLM Burns District went through the planning process to develop the AMU/Steens CMPA RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a), which provided direction to include the S&Gs, and continued the direction to manage for maintenance or improvement of rangelands.

While grazing management in the BCA has improved substantially since 1902, the legacy impacts of management decisions made during the turn of the last century still present management challenges for today. The two main management challenges from an upland vegetation standpoint are related to western juniper encroachment and invasive annual grasses abundance and distribution, which are summarized below and discussed on a more site-specific basis in the 2023 BCA LHA (Bureau of Land Management 2023b).

Monitoring has occurred within the BCA over numerous decades, at differing levels of intensity. The most recent IIRH assessments were completed in 2018 and 2022 within the BCA. The majority of the 36 quantitative plots within the project area were most recently read between 2018 and 2022, although four plots were read earlier (2014 and 2015). By allotment, between 2018 and 2022, the BLM collected plot data on two trend, five AIM, and two LMF plots in the Mud Creek Allotment. During the same time period in the Hammond Allotment there were seven trend/photo plots, eight AIM plots, and two LMF plots read. Hardie Summer had three trend plots, five AIM plots, and two LMF plots read. These assessments and quantitative plot data were analyzed and used to support the 2023 S&G Assessments, Evaluations and Determinations for the BCA Allotments (Bureau of Land Management 2023b; Bureau of Land Management 2023a). The plot data reflects the existing vegetation classification patterns discussed in the following section. These plots are also utilized in completing Habitat Assessment Framework reports and analysis of GRSG habitat, as they monitor vegetation height, allowing for comparison of data to the habitat objectives outlined in Table 2-2 of the 2015 GRSG ARMPA (Bureau of Land Management 2015a).

Landscape position including elevation, aspect, and slope paired with underlying geology (what materials exist that break down to create mineral soil) and expected precipitation drives what vegetation grows where, and why. Annual changes in weather patterns and spatial variation in site characteristics, along with historic and recent disturbances, create many different and intertwined vegetation communities (Johnson et al. 2019). Vegetation and the status of its health in the Great Basin can be classified, discussed, and displayed in many ways. The below discussion is a hybrid approach that combine a discussion of threat-based management¹¹⁰ to

¹¹⁰ For more detailed discussion of Threat Based Management, a review of the Threat Based Management in the Northern Great Basin: A Manager's Guide PNW 722 September 2019 (Johnson et al. 2019) is recommended.

supply the broad overview at the allotment (management) scale, then a discussion of ecological sites as they apply to disturbance response groups (DRG) (Appendix H: Predominant Ecological Sites and Appendix I: Disturbance Response Group Characteristics). DRGs are groupings of ecological sites based on a similar response to disturbances (Appendix I). Ecological sites are the smallest unit of discussion by site. It is worth noting that there is considerable overlap in the information, concepts, and discussion between the broad overview look and more site-specific look, indicating that the approaches are complimentary rather than competing. Threat-based management concepts excel at communicating and visualizing threats to the health of rangelands at a management scale (allotment scale for livestock grazing), which is based off current, on the ground, modeled data, whereas DRGs excel at identifying a desired condition based off landform, geology, soils, and climate characteristics. Both methods rely on science-based information and discuss impacts from disturbances (such as wildfire and grazing), and specific management measures that can improve rangeland conditions, with threat-based management being more general in nature and DRGs being more detailed.

Threat-based management concepts are based on the Northern Great Basin landscape. It is a process built on the basis that three primary ecosystem threats (annual grass invasion, conifer (western juniper) encroachment, and wildfire) need to be an assessment and a management priority where thresholds have not been crossed. The process involves six main steps, which are detailed in the Manager's Guide (Johnson et al. 2019) and are considered through the management plan process.

Functional groups of vegetation within the BCA are large perennial bunchgrasses, such as Idaho fescue, bluebunch wheatgrass, Thurber's needlegrass, squirreltail, and crested wheatgrass; small perennial bunchgrass such as Sandberg's bluegrass; invasive annual grass such as cheatgrass, medusahead rye, and ventenata; annual forbs; perennial forbs; sagebrush and other shrubs; and conifers such as western juniper.

Due to the combination of abiotic factors (landscape position, elevation range, soils, precipitation timing/distribution) and biotic factors (vegetation) the BCA, when considered together, have all three primary ecosystem threats to consider. To quantify the states, and show the pattern spatially across the allotments, a GIS model was built for BLM Burns District-administered lands. The model was built using an iterative process from data based on satellite imagery, on-the-ground high resolution photography, and on-the-ground knowledge of BLM resource specialists and multiple agency partners.¹¹¹ The Manager's Guide has several useful figures to aid in visualizing concepts (Johnson et al. 2019).

The AMU/Steens Mountain RMPs/RODs (Bureau of Land Management 2005b; Bureau of Land Management 2005a) direct managers to administer livestock grazing management that meets S&Gs, meaning implement practices or use that maintains or improves rangeland condition. Threat-based management generally equates to managing the rangeland to maintain or improve conditions to a threat-based state A or B. Table 3-38 provides BLM-modelled states within the BCA, by allotment.

¹¹¹ Staff from Eastern Oregon Agricultural Research Center (USDA Agricultural Research Service and Oregon State University Extension Service), and United States Fish and Wildlife Service.

6584

Table 3-38: Threat-Based States by Allotment on BLM-Administered Acres

THREAT-BASED STATE BY ALLOTMENT¹¹²	MAPPED ACRES	ALLOTMENT %
HAMMOND		
State A	3,068	28%
State B	5,199	48%
State C-Sagebrush with Invasive Annual Grass	1,415	13%
State C-Sagebrush with Juniper Encroaching	532	5%
State D-Juniper and Annual Invasive Grass	650	6%
State D-Juniper Dominant, Perennial Grass Understory	16	0.1%
MUD CREEK		
State A	2,794	35%
State B	2,536	32%
State C-Sagebrush with Invasive Annual Grass	455	6%
State C-Sagebrush with Juniper Encroaching	1,529	19%
State D-Juniper and Annual Invasive Grass	674	8%
State D-Juniper Dominant, Perennial Grass Understory	26	0.3%
HARDIE SUMMER		
State A	2,407	49%
State B	303	6%
State C-Sagebrush with Invasive Annual Grass	2	0.0%
State C-Sagebrush with Juniper Encroaching	2,089	43%
State D-Juniper Dominant, Perennial Grass Understory	75	2%
HAMMOND FFR		
State A	268	25%
State B	198	18%
State C-Sagebrush with Invasive Annual Grass	180	17%
State C-Sagebrush with Juniper Encroaching	350	33%
State D-Juniper and Annual Invasive Grass	62	6%
State D-Juniper Dominant, Perennial Grass Understory	16	1%
GRAND TOTAL	24,843	100%

6585

6586 The Hammond Allotment is about 76 percent in states A and B (figure 3-6). Much of the state B
6587 is due to a continued perennial grass condition, created by managed crested wheatgrass seedings
6588 implemented primarily between the 1960s and 1980s. The largest primary threat to the
6589 Hammond Allotment is invasive annual grass because of its lower elevation position; currently
6590 about 19 percent of the allotment is expressing this threat. The higher elevation portion (about 11
6591 percent of the allotment) is experiencing juniper encroachment. Very little of the Hammond
6592 Allotment is dominated by western juniper to the point the shrubs have been outcompeted and
6593 left the site (0.1 percent).

¹¹² Table does not include acres not classified into states, such as aspen stands or areas covered in rock with very sparse vegetation. Juniper is considered western juniper.

Hammond Allotment States

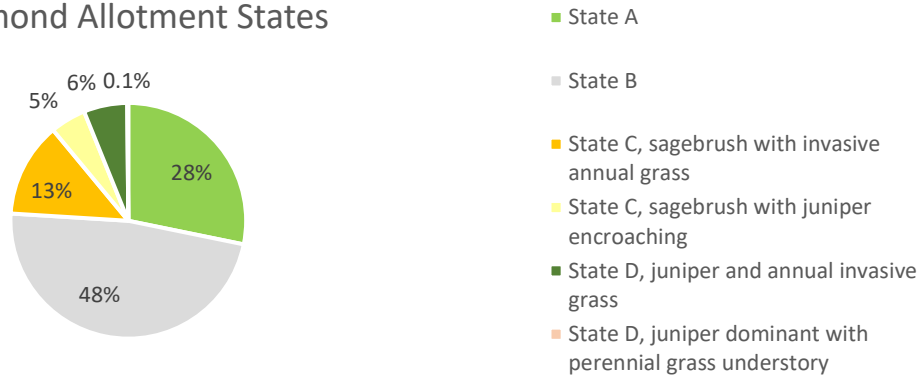


Figure 3-6: Hammond Allotment Threat-Based Model State Pie Chart

The Mud Creek Allotment spans both threat models and is the allotment that uses the dual threat model. About 67 percent is considered in states A and B (figure 3-7). State B is mostly due to the 2006 Granddad fire that removed the shrub component from the lower portion of the allotment. The portion that is adjacent to the Malheur National Wildlife Refuge is in state B due to managed crested wheatgrass seedings, which were originally intended to increase livestock forage by removing competing shrubs (Holechek 1984). The higher elevation portions of the allotment are in the Steens Mountain western juniper belt (27.3 percent). Invasive grass is occupying about 14 percent of the allotment, particularly in the areas that burned severely and had poor recover following the 2006 Granddad fire.

Mud Creek Allotment States

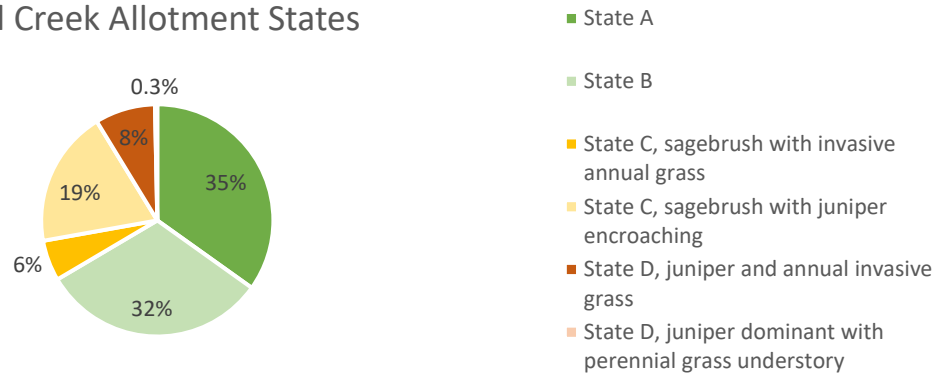


Figure 3-7: Mud Creek Allotment Threat-Based Model State Pie Chart

The lower part of the Hardie Summer Allotment is threatened by encroaching western juniper, about 45 percent (figure 3-8). The higher elevation areas transition into colder areas, less favorable to western juniper, in states A and B, about 55 percent. There is very little annual invasive grass present or threatening the allotment; most of what exists is near roads.

Hardie Summer Allotment States

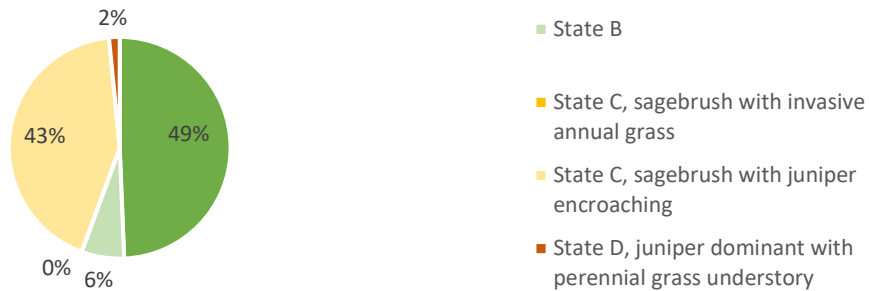


Figure 3-8: Hardie Summer Allotment Threat-Based Model State Pie Chart

The Hammond FFR, because it is in two geographically separated areas on either end of the elevation gradient of the BCA, is variable. Areas considered in states A and B are about 44 percent (Figure 3-9). Areas considered occupied by annual invasive grass are generally nearer to the Hammond Allotment and are approximately 23 percent of the FFR. Areas threatened by juniper encroachment are higher in elevation and come in at about 40 percent of the FFR. The percentages apply only to BLM-administered lands.

Hammond FFR Allotment States

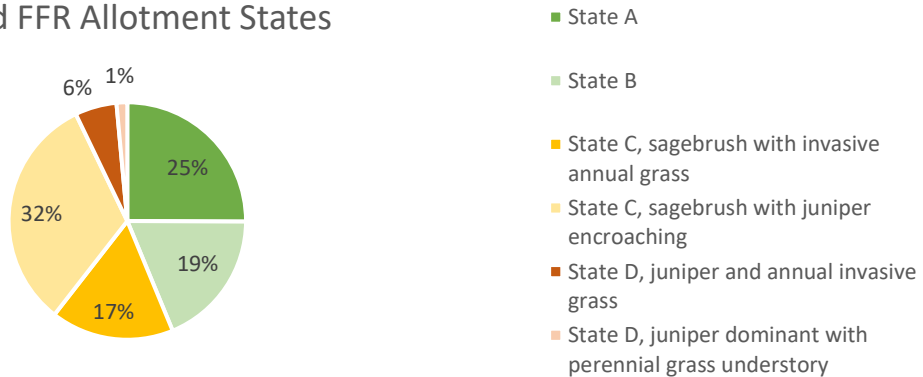


Figure 3-9: Hammond FFR Allotment Threat Based Model State Pie Chart

DRGs are built from ecological sites, which are defined as a distinctive kind of land based on recurring soil, landform, geology, and climate characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances (Pellant et al. 2020). Ecological site descriptions (ESD) are documents that house the collection of information that describes the ecological sites' distinctive kind of land, soil, vegetation, and knowledge of the sites' ability to respond to management and natural disturbances.

ESDs contain conceptual models that help managers classify the current condition of the landscape, how it compares to what would have been the condition pre-European settlement, and how management changes or disturbances would affect the current condition or contribute to a condition that meets the land management objectives. There are many ecological sites within an allotment or pasture. However, the ecological sites can be grouped into DRGs to group

characteristics that can provide a more practical scale for land management analysis and activities.

DRGs are groupings of ecological sites with similar soils, aspects, plant community attributes, and precipitation (Stringham 2009). The assumption is that the similar ecological sites respond to management activities and disturbance in a similar manner, which is important information for analysis of proposed or ongoing management activities. Ecological sites in Major Resource Land Area (MLRA) 23, which contains the BCA, were grouped into DRGs by an interagency interdisciplinary team in 2009 (Stringham 2009). Table 3-39 shows the BCA allotment DRGs by acres and percent DRG per allotment. For example, the use of DRGs narrows the look at three groupings of ecological sites that respond similarly to management, rather than ten ecological sites individually in the Hammond Allotment. DRGs are further described in Appendix I.

Table 3-39: DRGs by Allotment

DRG BY ALLOTMENT	ACRES	ALLOTMENT %
HAMMOND	11,517	100%
6	9,773	60%
8	1,410	27%
10	334	13%
MUD CREEK	8,206	100%
6	1,751	26%
8	393	39%
10	6,062	30%
11	0.0002	4%
HARDIE SUMMER	9,781	100%
8	2,477	45%
10	47	2%
11	5,114	23%
no DRG (mostly aspen sites)	2,144	30%

Generic use of the term “livestock grazing” and whether it does or has occurred or not, does not offer a complete comparison of livestock grazing effects on vegetation. Vegetation is affected by the timing, intensity, and duration of livestock grazing (Trlica 2013). Timing is related to the stage of plant growth and is described by the grazing season of use. Intensity is regarded as the amount of vegetation or biomass removed by livestock grazing and is described by percent utilization. Finally, duration, a measure of length of time livestock have access to pasture and, from a vegetation aspect, whether plants would be grazed again (repeated) within a grazing season. Permitted livestock grazing duration is often limited by utilization.¹¹³ The effects of livestock grazing on western rangelands can differ substantially by variation in these factors (Rice and Westoby 1978; West et al. 1984; Eckert and Spencer 1987; Courtois et al. 2004; Manier and Hobbs 2006; Davies et al. 2014). The kind of livestock grazing animal (for example cattle, horse, sheep/goat) also affects grazing effects and behavior but is not examined here in detail because all grazing alternatives are for cattle grazing, though historic grazing also included sheep, goats, and horses.

¹¹³ Livestock grazing duration is limited by utilization meaning once the allowable utilization has been reached, the livestock are rotated to the next pasture, allotment, or off the allotment depending on stage in the grazing season.

Livestock grazing timing, or season of use, affects vegetation because of the removal of biomass by cattle at different growth stages of the plant (see appendix E). The seasons of use are in date ranges to account for the different general growth patterns and timing by different species of plants within a plant community. Short-term effects are limited to one growing season and perennial bunchgrasses are considered to be native. Schroeder and Johnson's (2019) "Bunchgrass Phenology; Using Growth Stages of Grasses as Adaptive Management Tools" is a user-friendly read with visuals that cover grazing treatments in more detail.

Livestock grazing intensity, or utilization level (presented in percentages), affects how much of the vegetation foliage is removed. Utilization using the landscape appearance key species protocol is classified as: severe (81-100 percent), heavy (61-80 percent), moderate (41-60 percent), light (21-40 percent), slight (6-20 percent), and no use (0-5 percent) (Cooperative Extension Service 1999a: 119). This protocol is based on appearance rather than a calculated height-weight relationship and can be a more conservative protocol for perennial bunchgrass communities because bunchgrass mass (weight) is considerably heavier at the ground level and decreases incrementally with height towards the seed stalks. Refer to the cited protocol for the narrative on visual cues associated with each utilization class.

Rest from livestock grazing for this analysis is considered as: growing season rest (1 growing season), intermediate rest (2-5 years), and long-term rest (10 years plus). Growing season rest has been considered in the preceding discussion and is proposed under all grazing alternatives. Intermediate rest has been shown to help some native plant species increase vigor (for example bluebunch wheatgrass and Idaho fescue) after heavy to extreme clipping that simulated heavy livestock grazing (Mueggler 1975). However, studies that compare intermediate length rest periods to long-term rest are limited and they tend to be lumped together with discussions of long-term rest. In 2014, Davies and others did a comprehensive literature review looking at the "Implications of Longer-Term Rest from Grazing in Sagebrush Steppe" (Davies et al. 2014) and found that in the absence of fire, well managed (moderate) livestock grazing, and long-term grazing exclusion often produced a similar plant community composition, productivity, and density. Also, that shifts in plant communities (such as to invasive annual grass or western juniper encroachment) that were caused in part by historical improper grazing, cannot be reversed by long-term rest (Davies et al. 2014). Eckert and Spencer (1986) found that a rest-rotation of grazing management would have the most benefit on areas dominated by mid-seral species and would maintain vegetation in late seral systems.

When livestock grazing season of use and utilization are considered together, moderate grazing can maintain or improve native perennial bunchgrass communities during the early, defer, and winter seasons of use. Moderate grazing during the graze (growing) season of use, with monitoring and periodic growing season rest or deferment can be neutral to native perennial bunchgrass communities. Appropriate grazing management can help maintain or improve species composition, diversity, and production (Archer and Smeins 1991; Davies and Boyd 2020). As a result, it is expected that appropriate moderate grazing levels should maintain perennial vegetation production. How moderate grazing affects invasive annual grass and fuel characteristics also relates to maintenance of desirable perennial vegetation and is covered later in this section.

As a desirable non-native species, crested wheatgrass (*Agropyron cristatum*, previously known as *A. desertorum*) interacts with livestock grazing differently than the native, deep-rooted perennial bunchgrasses across the Great Basin. Crested wheatgrass originated in Eurasia and likely evolved in its native environment under heavy grazing by large groups of ungulates (Meays et al. 2000). Crested wheatgrass has been widely investigated and is known for being persistent, vigorous, and tolerant to drought and livestock grazing. These qualities made it a favorite for seeding semiarid rangelands (Hyder and Sneva 1963) that were in poor condition after decades of improper grazing in the 1800s and early 1900s, and where spring grazing opportunities were scarce. D.W. Hedrick (Hedrick et al. 1969) held that “Perhaps the greatest benefit [of having crested wheatgrass to graze in the spring] has been an indirect one in the later spring and summer feed in the upper foothills of the Steens Mountains. Grazing crested wheatgrass during this crucial early spring period has deferred turnout on the native species with a resulting boost in their stand and production.”

When compared to bluebunch wheatgrass (*Pseudoroegneria spicata*), a native deep-rooted perennial bunchgrass, crested wheatgrass puts more effort into producing biomass in the form of leaves. Studies have shown that crested wheatgrass has up to 50 percent more green foliage than bluebunch wheatgrass in the same growing environment (Caldwell et al. 1983). Over time, with successive growing seasons of no to light use, the leaves and stems of crested wheatgrass die and accumulate in the base of the grass plant, which creates a light limited or “self-shading” situation. When self-shading occurs, the photosynthesis of the plant is decreased. Maintenance of high photosynthetic rates is critical to the health and vigor¹¹⁴ of a plant especially during the time of year when water and nutrients are plentiful (Meays et al. 2000). Livestock can decrease the amount of self-shading occurring by reducing the previous year’s biomass and current year’s growth by consuming this material. When this was tested by removing 60–85 percent of the green foliage, the result was a more favorable photosynthetic to transpiration ratio (P:T ratio) (Caldwell et al. 1983). A favorable P:T ratio allows the crested wheatgrass to quickly reestablish leaves to maintain photosynthesis for the production of subsequent roots, stems, and leaves. This process applies to all perennial bunch grasses; however, it impacts crested wheatgrass quicker than native species due to higher levels of leaf production. Another measure of health and vigor is evidence of reproduction; crested wheatgrass reproduces vegetatively (tillering) and by seed, where most native perennial species in the BCA reproduce only through seed.

The response of the crested wheatgrass to livestock grazing also varies by the season in which they are grazed. Moderate spring and fall livestock use (40–60 percent utilization) can be used to reduce standing biomass within the crested wheatgrass seedings without having negative impacts to the plants. A summary of studies on crested wheatgrass grazed annually in the spring (April–end of June) by livestock conducted between the 1940s and 1970s found that average utilization between 65–70 percent either maintained or improved crested wheatgrass production (Frischknecht 1968; Laycock and Conrad 1981). This is why the AMU/Steens CMPA RMPs/RODs (Bureau of Land Management 2005b; Bureau of Land Management 2005a) designate a utilization threshold of 60 percent for desirable non-native species such as crested wheatgrass. Fall use of cool season grasses (such as crested wheatgrass and natives in the area)

¹¹⁴ Plant vigor relates to the relative robustness of a plant in comparison to other individuals of the same species. It is reflected primarily by the size of a plant and its parts in relation to its age and the environment in which it is growing (Bedell 1998).

when plants are dormant can be heavier than during the growth period (spring) as the removal of dead material has little direct effect on the plant (Trlica 2013). Furthermore, local studies suggest that uniform utilization of wolf plants would be best accomplished if grazing occurs after standing forage has cured (Ganskopp et al. 2004; Ganskopp and Bohnert 2005). Wolf plants are those that have multi-year accumulation of standing dead biomass within the “bunches.” Photo 3-4 shows crested wheatgrass after consistent moderate spring grazing and without biomass accumulation. Photo 3-5 shows a crested stand with biomass accumulation.

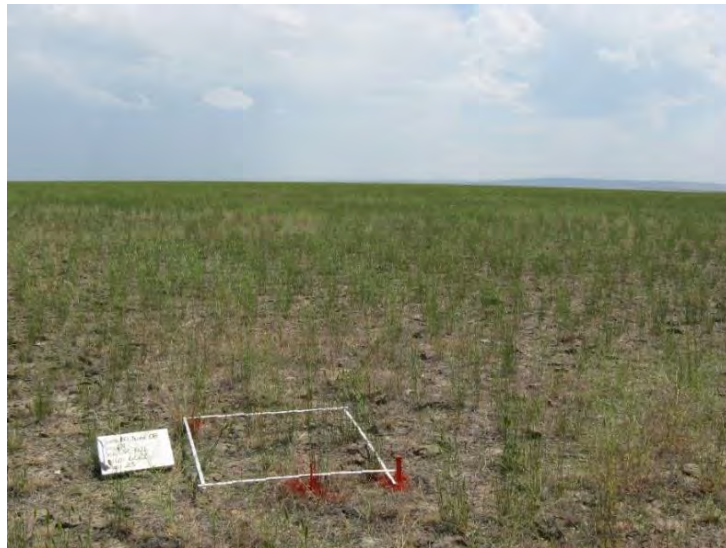


Photo 3-4: Photo of Crested Wheatgrass in South Dutch Oven Pasture in June 2008



Photo 3-5: Photo of Crested Wheatgrass in South Dutch Oven in June 2018. Rested Since 2014.

About 62 percent of the Hammond Allotment and portions of the Lower Field Pasture in the Mud Creek Allotment, particularly the western portions that are adjacent to the Malheur Wildlife Refuge, were planted to crested wheatgrass seedings up through the 1980s. The stocking rate for use by cows and calves was set for the Hammond Allotment, based on the native forage

available prior to the crested wheatgrass seedings being completed, and has not been formally adjusted since. An evaluation of the forage after the crested wheatgrass seedings were established was completed in 1993 and updated in the 2007 Hammond Allotment Evaluation when the carrying capacity was calculated at 2,700 AUMs (Bureau of Land Management 2007a). From 1993 to 2012 approximately 1,000 to 1,500 NR AUMs were authorized to the grazing permit holder through an agreement (outside of the grazing authorization) specifically to manage for the health of crested wheatgrass seedings. The number of NR AUMs authorized varied according to the weather and forage conditions of the grazing season. Use monitoring over time has demonstrated that the use of NR AUMs had been sustainable, and the carrying capacity is higher than what was previously permitted.

Currently, the crested wheatgrass seedings are near monoculture stands, covering a consistent set of ecological sites that transition from loam to claypan soils as elevation and precipitation increase from west to east. Most of the allotment was ungrazed from 2014 to 2018 and 2020 to 2023 grazing seasons. During this period without livestock grazing, the crested wheatgrass seedings had multi-year accumulations of standing dead biomass within the “bunches” resulting in “wolf” or “wolfy” plants (photo 3-6). Wolfy plants have a heightened accumulation of dead material, which creates a self-shading situation at the base of the plant; as a result, the photosynthesis and transpiration are reduced. High photosynthetic rates are critical to health and vigor of a plant (Meays et al. 2000). Reducing the biomass of the wolfy plants would increase their health and vigor by stimulating new growth that is more effective at photosynthesis and transpiration (Caldwell et al. 1983). The continued health and vigor of the crested wheatgrass is important because it is deep rooted and occupies the site, continues the hydrologic and nutrient cycling processes, and prevents annual invasive grass species such as cheatgrass and medusahead rye from invading and dominating the area.



Photo 3-6: Accumulation of Biomass within Crested Wheatgrass Stand in the Hammond Allotment (2018)

Uniform utilization and distribution across a pasture is an unreasonable expectation since that would require grazing animals to have access to all forage and be forced to utilize both

palatable¹¹⁵ and unpalatable species, with no consideration for topography (including slope), cover, or water factors that would limit use (Coughenour 1991). Holechek (2011) suggest that utilization around a water source can be as high as 100 percent directly next to the source, to over 50 percent 200 yards away from the water source. Valentine (1947) found at the water source, utilization was usually around 65 percent, and decreased to approximately 55 percent at 0.2 mile from the water and 50 percent at 0.4 mile from the water. While the actual level of livestock use depends on other factors such as season of use and number of head, other water sources and their capacity, distribution, and availability in the pasture, the pattern described above with heavier utilization close to water sources is a normal pattern.

Overlap of use areas increases livestock willingness to travel between water sources while grazing, further improving livestock distribution and utilization patterns. Stuth (1991) found the optimum grazing area is located in a 0.5-mile radius around the water. As more reliable water developments become available, the individual effects of livestock at any one water source or location would be lessened as the livestock use effects are spread over the larger area that has become accessible. Bailey (2004) found by developing water in areas more than 0.62 mile (one kilometer) away from existing water, overall uniformity of grazing increases. Ganskopp (2001) found moving water in arid pastures was the most effective tool for changing the distribution of cattle.

Invasive annual grass is a management concern because it individually or collectively threatens desirable vegetation by competing with perennial bunchgrass for resources such as nutrients and water, leading to reduced vegetative productivity (refer to Threat Based Management section). Regardless of the decision on the Bridge Creek AMPs, ongoing inventories for invasive annual grasses would be conducted to continue to build the knowledge base on cheatgrass and medusahead rye annual grass occurrences within the area. The BLM would continue to implement control treatments for these, and other noxious and invasive plant species, as authorized by the 2015 Burns District Integrated Plant Management Environmental Assessment (Bureau of Land Management 2015b) and Decision Record (Bureau of Land Management 2015c).

Cheatgrass has occurred in the BCA and Steens Mountain vicinity since at least 1902 in “considerable” quantities (Griffith 1902). Cheatgrass is especially competitive with perennial plants after a wildfire when additional nitrogen is released by the burning of standing biomass and litter (Pellant 1996). Trend monitoring has shown an increase in cheatgrass after the Granddad Fire in the Mud Creek Allotment. Sites with invasive annual grass before fire could transition to invasive annual grass dominant if there are not enough surviving deep-rooted perennial bunchgrasses to reestablish and occupy the site resources first.

Medusahead rye (*Taeniatherum caput-medusae*) is a more recent invader to the BCA. The first site of medusahead detected within a 3-mile buffer of the BCA was on the Malheur National Wildlife Refuge, southwest of Page Springs Campground (BLM) in 1995, and was approximately 10 acres. Exactly how and when the medusahead rye started in the Mud Creek

¹¹⁵ Palatability is the preference an animal has for a particular plant when offered a choice.

Allotment is unknown; however, an extensive inventory was completed in the Grandad Fire area in 2007 and 2008 and it was not detected during that survey effort.

It has been well established that medusahead has been in Oregon since 1880 (Roseburg area) and that the seed can spread by several means. Turner, in a 1963 special report titled “Medusahead: A threat to Oregon rangelands,” (Turner et al. 1963) asserted that automobiles snag seed heads in their underparts, “dust devils” or “whirlwinds” pick up seed heads with the stem breaking off at the first node and moving them along with strong winds (that can move seed considerable distances), and animals transport seeds in their coats. In 2007, small medusahead rye sites were mapped along the northern portion of the Steens Mountain Back Country Byway and additional sites were mapped in 2009. By 2019, the small sites had connected and 4,000 acres of medusahead were aerially treated on the south side of the Mud Creek drainage. The medusahead rye sites initially detected on the north side of the Mud Creek drainage, in the Mud Creek Allotment, were along roadsides in 2018. The main roads in the allotment are native surface (soil) roads and are used during multiple seasons including wet periods where soil and medusahead rye seed mix and stick to vehicles, then drop off the vehicles in other locations.

In a 2013 study that included a study location near Diamond, Oregon, which is near the BCA, Davies and others (2013) suggest that vehicles may be one of the most important vectors for medusahead rye spread, with invasions being more concentrated near roads. The same study found that medusahead rye was more common and occupied a larger part of the plant community along roads than along animal trails, and that random transects that were not near roads or trails had the least medusahead cover (Davies et al. 2013). Furthermore, the BCA has frequent whirlwinds that travel up the mountain, and strong afternoon winds that can pick up and move seed with the seed stalk along with the stem (broken off at first node). Single detached isolated seed heads with stems and no surrounding plants have been observed by BLM staff in the Mud Creek Allotment. The infestation of medusahead rye in the Mud Creek Allotment has not been long term as the sites are scattered, most are small in size (less than 10 square feet to 0.01 acre), and do not have deep thatch of litter from multiple year(s) growth. The Mud Creek Allotment was aerially treated with Imazapic herbicide in 2020 to reduce the medusahead rye infestations in the allotment.

Although cheatgrass and medusahead rye are different invasive annual grass species, there is substantial overlap in how they interact with the landscape and native vegetation. The literature for both species in Harney County suggests that the most effective way to reduce spread and dominance of cheatgrass and medusahead rye is retain or increase large deep-rooted perennial bunchgrasses and reduce fuels that could spread fire, cause native species mortality, and create a favorable disturbed area for continued invasive annual grass invasion. There is a strong negative association between perennial bunchgrass and medusahead rye, whereby medusahead rye density decreases as perennial bunchgrass density increases (Johnson and Davies 2012) and the same association has been found for cheatgrass. A study in the northwest foothills of the Steens Mountain found deep-rooted perennial grasses were the best barrier to medusahead invasion (Davies 2008). The study also found a positive correlation between medusahead rye density and annual grass density of the preexisting plant community, supporting previous work that suggested medusahead appears to invade areas that were dominated by annuals. such as

cheatgrass (Davies 2008). Crested wheatgrass is one of the few species that can outcompete undesirable annuals such as cheatgrass (Arredondo et al. 1998) and, as a deep-rooted perennial grass, prevent the spread of medusahead rye (Davies 2008). If established in an annual grass invaded site, crested wheatgrass can stabilize the soil and hinder further exotic annual grass (Nafus et al. 2015; Davies and Johnson 2017; Davies, Leger, et al. 2021; Davies, Bates, et al. 2023). Therefore, managing for the health and vigor of existing crested wheatgrass within the Hammond Allotment and Mud Creek Allotment would be the most effective way to manage against invasive annual grass establishment and spread in those areas. For the remainder of the Mud Creek Allotment and Hardie Summer Allotment the most effective way to manage against invasive annual grasses would be to maintain or improve a vigorous native, deep-rooted perennial bunchgrass population (Johnson and Davies 2012).

Moderate spring utilization on crested wheatgrass by livestock has been shown to maintain or increase its productivity. For native, deep-rooted perennial grass communities, moderate grazing avoiding repeated use during the growing season, and incorporating periods of rest was recommended to maintain resistance to medusahead rye invasion (Davies, Bates, and Boyd 2016; Porensky et al. 2020; Davies et al. 2024). Complete grazing exclusion likely has varying effects, but the accumulation of fine fuels in the absence of livestock grazing may increase fire risk, potential fire severity, and post-fire annual grass invasion in some situations (Davies et al. 2009; Davies et al. 2010). Davies et al. (2024) found that “strategically applied grazing can modify fuels and plant community composition to achieved desired socio-ecological outcomes such as reduced invasion, decreased fire probability and spread, reduced fire suppression cost, and prevention of ecological transformation postfire.

Consistent fall use of cheatgrass by livestock has been shown to disrupt safe sites for seed germination in standing dead cheatgrass biomass and reduce cheatgrass seed banks by half when compared to an ungrazed control (Perryman et al. 2020). In a study examining future cheatgrass cover in the Northern Great Basin from 2050-2070, Boyte and others (2016) predict that future weather variables affecting precipitation in October, April, and May, may be a strong driver of future cheatgrass percent cover. The prediction is that if precipitation is reduced during these three months as climate data suggests, cheatgrass would be less likely to germinate in the fall and produce seed during the subsequent growing season, and the overall cheatgrass cover would be reduced. If paired with Perryman and others (2020), which shows that fall grazing treatments reduce the cheatgrass seed bank, future grazing treatment timing may be leveraged to reduce the cheatgrass seedbank further. Davies and Bates et al. (2021) found that defer/winter “grazing decreased annual vegetation, primarily exotic species,” but recognizes that they are unsure if the trajectory was changed or if the benefit would only be seen if fall-winter grazing continued. However, it remains unknown if grazing-induced changes altered the plant community trajectory or if community composition will converge between grazed and ungrazed areas if fall-winter grazing ceases. Davies and others (2022; 2024) also found that proper grazing can reduce fuel loading, including annual grasses. Cheatgrass production is very dependent on temperature, and timing and distribution of soil moisture. As a result, the amount of cheatgrass from year to year that can be used for livestock or wildlife forage is variable (Stewart and Young 1939). Cheatgrass dominated rangelands on good years produced more herbage production than native or introduced bunchgrasses (Hull and Pechanec 1947; Young and Allen 1997). On dry years, or

in particular the fall seasons that were dry prior to the growing season that limited germination, cheatgrass production was greatly reduced (Stewart and Hull 1949). As a result, cheatgrass is not considered a consistent forage base from year to year and is considered an overall loss of forage when compared to deep-rooted perennial communities. Due to the variability of cheatgrass production, grazing it, whether for the objective of providing livestock forage or for the objective of using livestock grazing as a tool to reduce fine fuels, requires flexibility in numbers, timing, or both.

Medusahead rye invaded compared to noninvaded plant communities produce less forage for livestock and wildlife. The invasion of medusahead rye can reduce grazing capacity by 50 percent to 80 percent (Hironaka 1961) and in a local study up to 90 percent (Davies and Svejcar 2008) and often results in near monocultures of medusahead (George 1992). Medusahead litter has a slow decomposition rate, allowing it to accumulate over time and suppress desirable plants (Bovey et al. 1961; Bureau of Land Management 1965). Accumulation of medusahead rye litter also increases the quantity and continuity of fine fuel, which can increase fire frequency to the detriment of desirable vegetation (Young 1992; Chambers and D'Antonio 2006).

Currently, there is an accumulation of biomass within the BCA for both native and desirable non-native bunchgrasses, and invasive annual grasses. The last time the BCA was grazed was in 2019 and before that in 2013 (some use in Hammond Allotment occurred in spring of 2014). Most of the 2019 grazing use occurred in the Hammond Allotment in the crested wheatgrass seeding pastures between April and July. In 2019 in the Hardie Summer Allotment there was an upland utilization threshold limit of 35 percent per a court order and the majority of the allotment on BLM lands was used considerably less than the limit between August and September. Mud Creek Allotment was used to trail through from Hammond and Hardie Summer Allotments and back for two weeks total in 2019. Mud Creek Allotment has been largely ungrazed since 2013.

Perennial grasses are adding to the fine fuel loading throughout the BCA at varying levels. Perennial bunchgrasses that survived the 2006 Grandd Fire that burned most of the Mud Creek Allotment have long since taken advantage of available resources, specifically mineralized nutrients, which are a result of burning (Cleary et al. 2010). The removal of shrubs (sagebrush) and conifers (western juniper) can also increase production following a burn, potentially due to increased resources, specifically more available soil, water, and inorganic nitrogen (Bates et al. 2009), and this has been observed in the fire scar. In addition to the increase in perennial grass fine fuel, cheatgrass, and now medusahead rye, is adding to the fine fuel loading, altering fuel characteristics of the area (Davies and Nafus 2013). This is due to increased resource availability associated with the loss of fire intolerant shrubs and some mortality of perennial bunchgrasses after the fire (Stubbs and Pyke 2005; Chambers et al. 2007; Davies et al. 2007; Davies et al. 2014).

Prior to 2019, and except the first six weeks in 2014, there was no grazing in the Hammond Allotment from the 2014-2018 grazing season. NR use in the Hammond Allotment has not occurred since 2012. This presented an opportunity to observe how much biomass can accumulate in crested wheatgrass bunches across six growing seasons. Historically, much of the Hammond Allotment was converted from sagebrush to crested wheatgrass, and the herbaceous

(grass) production dramatically increased in the absence of competition for resources from shrubs since the late 1960s. Without an influence to reduce the biomass (examples are wildfire, livestock grazing, grasshopper infestation) between 2014-2018, it has accumulated to the point it is continuous across the whole area, including the interspaces between grass plants (photos 3-5 and 3-7). Had an ignition source presented itself, naturally by lightning or human caused, the science suggests that the crested wheatgrass seedings would have readily burned because the fine fuel is cured and continuously available to keep fire spreading. Standing dead plant material (less than 0.25-inch diameter) extends the fire season; since it is not in contact with the ground it dries out more quickly, is ready to ignite, and sustains combustion better than other available fuels. Because the Hammond Allotment has not been grazed in the past four grazing seasons (2020, 2021, 2022, and 2023) paired with two good grass growing years (2022 and 2023) the conditions have returned to what is shown in the photos. While this discussion focuses on crested wheatgrass, the same conditions can occur with native perennial bunchgrasses that do not receive removal of fine fuels, just to a lesser extent as production of natives is typically less than crested wheatgrass.

Large wildfires (100,000 acres and larger) in the past fifteen years in Harney County and Southeast Oregon (including the 2012 Miller Homestead Fire, 2012 Holloway Fire, 2014 Buzzard Fire, 2024 Cow Valley Fire) have seen similar fuel loading situations played out in native range and crested wheatgrass seedings, where grazing use is limited, largely due to lack of water. These large wildfires have created an awareness amongst the local community to encourage BLM to manage for fine fuels. These large wildfires burned vegetation in the BCA and ultimately consumed over 1,000,000 acres of southeast Oregon rangelands and GRSG habitat.



Photo 3-7: Accumulation of Fine Fuels in Crested Wheatgrass in North Dutch Oven Pasture (2018)

Because of the interest by the public, as well as other management considerations such as the threat to GRS habitat by wildfires, studies have been conducted that look at the way livestock influence fuel characteristics in the Great Basin (Bates et al. 2009; Davies et al. 2010; Bates and Davies 2014; Schmelzer et al. 2014; Davies et al. 2015a; Davies et al. 2015b; Bruegger et al. 2016; Davies, Bates, Boyd, et al. 2016; Davies et al. 2017; Davies et al. 2022; Davies, Johnson, et al. 2023; Ratcliff et al. 2023; Davies et al. 2024). Studies looked at the season of use of livestock grazing and its influence on fuel characteristics, on spring and fall use, and on winter use, among other grazing treatments. The spring and fall livestock grazing study looked at the probability of fire propagation, meaning the ability of the fire to get started and get large (Davies et al. 2017). The winter study looked at using livestock as a fuel treatment to reduce the likelihood of fire spread and fire severity (Davies et al. 2015b: 2; Davies et al. 2022).

Wildfire season is variable from year to year but, in general, for the BCA, it is from mid-June through the end of August. The main finding of the grazing studies was that grazing in any season¹¹⁶ increased fuel moisture by reducing the amount of dead (cured) fuels in the bunchgrasses, therefore increasing the live:dead material ratio. Live material has more moisture than dead material does, thereby increasing the live:dead ratio reduces the ignition potential and amount of initial fire spread early in the fire season. Overall, spring grazing would be the most effective at creating lasting effects later into the fire season by decreasing fine fuel height, biomass, and fine fuel continuity because it affects current year growth as well as past years' growth. While cattle would target the current year growth during the spring, previous years' growth would be reduced because their coarse mouth structure cannot sort between new and old material when it is mixed within one bite of grass. Both fall and winter grazing increase the live:dead material ratio going into the following growing season, and livestock readily eat it because there is no green growth to select during these seasons. In either study, the emphasis was on the benefit of using grazing to influence fuel characteristics after a high herbaceous production year or where there is a buildup of biomass.

Although the studies investigating livestock grazing influence on fuel characteristics were conducted on native range, the information is still relevant to crested wheatgrass seedings because it was conducted within the vicinity of the BCA, with similar livestock utilization levels as proposed (Alternatives 1, 2, and 3). In these studies, they found no livestock use on sagebrush, and the measurements were taken on deep-rooted perennial bunchgrasses. A comparison of the studies is in table 3-40. By using a target utilization rate of up to 50 percent on native bunchgrasses and 60 percent on crested wheatgrass, the assumption is there would be a similar impact to fuel characteristics of the crested wheatgrass seedings in the Hammond Allotment as in the grazing studies.

In a 2009 southeast Oregon study, Davies and others found that long-term livestock grazing exclusion increased risk of invasive annual grass invasion following a fall burn compared to areas that had been moderately grazed over the same time period (Davies et al. 2009). The increase in invasive annual grass density in areas that had been ungrazed persisted for the long term (10 years or more). The study suggested that moderate levels of livestock grazing reduced

¹¹⁶ The studies defined grazing seasons as: Spring (May–June), Fall (September), and Winter (November–early April).

litter accumulation of perennial bunchgrasses, which resulted in more vigorous plants that experienced less self-shading and reduced fuel loading. A reduced amount of fuel in the bunches of plants that had been moderately grazed better facilitated perennial bunchgrasses' survival after the fire. Because the perennial bunchgrasses had not burned so hot, there was less mortality (death), and the fire was not catastrophic. Greater survival and greater density of mature perennial bunchgrasses in grazed areas following fire greatly reduced postfire resources invasive annual grasses could use when compared to areas that had been rested from livestock grazing. Results from the same study suggested that even plant communities that are not accumulating fuels beyond historical conditions may need low severity fuel reducing disturbances to improve their resilience to more severe disturbances.

Table 3-40: Comparison of Fuel Characteristics by Grazing Season (Davies et al. 2015a; Davies et al. 2017)

HERBACEOUS (GRASS) FUEL CHARACTERISTICS	SPRING	FALL	WINTER
	UTILIZATION 40–50%		UTILIZATION 40–60%
Fuel Moisture	July: 1.6–1.9 X More Moisture; August: 2.0–2.2 X More Moisture than Control	Not Measured	2.1–2.3 X More Moisture than Control Mean of June, July, August Measurement
Fuel Cover	170% Less than Control	140% Less than Control	140% Less than Control
Fuel Continuity	1.5 X Less than Control	No Difference Compared to Control	1.4 X Less than Control
Biomass	Reduced 66% Compared to Control	Reduced 49% Compared to Control	Reduced 58% Compared to Control
Probability of Ignition	Reduced by 170–220% Compared to Control	Reduced by 170–220% Compared to Control	Not Measured
Probability of Bunchgrass Burning	200% Less Likely to Burn Compared to Control	No Difference from Control	Not Measured
Initial Fire Spread	Greatest Reduction in Spread Probability	Much Less Probability than Control in July, Difference with Control Washes out by August	Not Measured

Bradley and others (2018), in a look at the Intermountain West, including the BCA, found that lands with high abundance of cheatgrass cover (considered greater than 15 percent) were twice as likely to burn, and four times as likely to burn multiple times, based on the weather characteristics of years 2000 to 2015. Strategies to increase fuel moisture and reduce fuel continuity become even more important to areas where cheatgrass exists. As elevations increase, so does fuel moisture, which can work to counter some of the impacts of wildfire and prevent wildfire from becoming catastrophic; however, these impacts would be based on current conditions and are hard to predict.

3.13.2 VAGF Environmental Consequences

3.13.2.1 VAGF Issue 1: How would the level of proposed livestock use affect the health and vigor of native vegetation and crested wheatgrass seedings, thereby affecting future levels of forage made available for livestock grazing?

Timing (season) of livestock use relates to the health and vigor of native vegetation and crested wheatgrass and varies between alternatives for each allotment. Under all alternatives except for 5, No Grazing, each alternative would receive periodic growing season rest, though the general grazing rotation is not defined under Alternative 3. Growing season rest provides an opportunity for bunchgrasses (both native and introduced) to complete their lifecycles without responding to

grazing stress and is an important factor in grazing rotations in which pastures are grazed during the graze or critical growth period. The level of grazing would be moderate and is the same under Alternatives 1-3. Moderate grazing levels paired with periodic growing season rest have been shown to maintain or improve bunchgrass communities. Light grazing is described under Alternative 4. It is anticipated that based on grazing activities without accounting for other disturbances or threats, when plant communities are healthy, the future levels of forage would stay the same or even increase over the mid to long term, when there is enough moisture to support such potential production. Forage made available for livestock grazing would be measured by each alternative's AUM level as proposed. Ultimately the forage available is limited by the utilization threshold as the grazing season progresses.

Active trailing proposed under any grazing alternative is not anticipated to have a measurable effect on upland vegetation or future forage levels because use on native and perennial bunchgrasses while livestock are moving is expected to be slight. Most active trailing would occur during the defer and/or winter grazing season of use when bunchgrasses are the least vulnerable to grazing stress.

Fence removal or construction under any alternative would require temporary crushing of vegetation during implementation but would not have a measurable effect on vegetation after the first year. Vegetation would be crushed or damaged to a greater extent (approximately 0.73 acre/linear mile) for fence construction where vehicles are used to deliver fence material, or to a lesser extent where pack animals are trailed, and where material is placed. These effects would not be expected to affect mid to long-term vigor of vegetation or forage levels, and disturbance would be undetectable after one or two growing seasons. Developments specific to alternatives are analyzed below.

3.13.2.1.1 VAGF1 Alternative 1

Under Alternative 1, the season of use in each allotment is limited and grazing would be driven more by a calendar than plant phenology. The direct effect of limiting the grazing seasons for all allotments to between April and October is there are no options for a full early, late defer, or winter grazing treatment. The indirect effect of the proposal for grazing season under Alternative 1 would likely be a carry over or accumulation of fine fuels into the current or following grazing season. Furthermore, grazing timing would be less responsive to variation in high production years (including invasive annual grasses) after the growing season concluded, especially as permitted AUMs would not be added to the grazing authorization within the Hammond Allotment, and no NR AUMs would be allowed. The defer, winter, and early graze treatments have been shown to be some of the most advantageous grazing periods to effectively reduce fine fuels into the next fire season. Patterns in the BLM Burns District have shown that big fire years (more and large acreage fires) occur after two seasons of above average grass production. These effects would be more detectable in the Mud Creek Allotment and possibly portions of the Hammond Allotment. It is anticipated that high elevation and consequent snow on Hardie Summer Allotment would make it unavailable most of the early or later winter grazing period. Considering a normal weather year and in the absence of other disturbances, the future levels of forage production that would be available to livestock grazing would be consistent with past

levels in the Mud Creek and Hardie Summer Allotments. Limits on utilization of native and desirable non-native perennial grasses, paired with rotations that provide growing season rest to bunchgrasses, would ensure the health and vigor of the bunchgrasses and likely improve resiliency after wildfire. In the mid to long term, levels of forage are expected to be maintained or increase accordingly with the desired plant community health.

Under Alternative 1, nonrenewable AUMs would not be authorized. If there is a productive vegetation year, without the ability to authorize nonrenewable AUMs, fine fuel accumulation in the grass plants would remain into the following grazing seasons. There would be an increased risk of a more severe fire that could affect the future resilience of bunchgrasses in the allotments. This would be more apparent in the Mud Creek and Hardie Summer Allotments.

Under Alternative 1, grazing in the Hammond Allotment would be allowed in the second half of the early season, graze, defer, and the first two weeks of the winter season (between April 1 to October 30). Due to the number of pastures within the allotment there is an ability to develop several grazing rotations to provide growing season rest to native and crested wheatgrass seedings. However, specific to the Hammond Allotment, it is unlikely the 60 percent utilization on crested wheatgrass would be reached because of the number of AUMs being proposed is low for forage that is available on average. The stocking rate used under this alternative was set for the allotment prior to several vegetation management projects between the 1960s and 1980s that successfully increased forage production in the allotment, primarily through production increases associated with the crested wheatgrass seedings. Indirectly it is anticipated that over time the crested wheatgrass may not be as vigorous if accumulation within the bunches starts to self-shade. Forage levels may decrease and fine fuel accumulation increase, under this scenario over the mid to long term.

In the Mud Creek Allotment under Alternative 1, the season of use is limited to graze (critical growth period). The direct effect is limiting grazing season options to the seasons where perennial bunchgrasses are in their critical growth phase. Growing season rest would still be implemented but rotation opportunities would be limited since there are two pastures in the allotment. The indirect effect would be not being able to graze plants during the seasons in which livestock would more effectively reduce fuel in bunchgrasses or more readily graze invasive annual grasses. It is anticipated that forage levels would remain consistent in the Mud Creek Allotment under Alternative 1 because the management proposed under Alternative 1 is consistent with past use in the allotment.

Under Alternative 1, grazing in the Hardie Summer Allotment is limited to the deferred season of use. This would allow the vegetation to go through its growth cycle without livestock grazing pressure. Grazing during the early and much of the graze season is not feasible in the allotment due to elevation, snow, and access. Under Alternative 1 there is no winter grazing proposed, although in many years early winter use may be possible. A direct effect of limiting the grazing season of use to defer would be that the opportunity to graze to reduce fuels for the future year is not realized. Currently, season of use to manage for invasive grass with livestock is not a concern in the Hardie Summer Allotment. It is anticipated that in the Hardie Summer Allotment forage levels would remain consistent under Alternative 1 due to the same management.

Grazing in the FFR would have the same effects on vegetation that occurred prior to 2014 and would be similar to the effects described for the other allotments, depending on what portion of the FFR is being considered.

3.13.2.1.2 VAGF1 Alternative 2

In Alternative 2 (except Lower Field of Mud Creek Allotment), the utilization threshold would be consistent at a moderate grazing level of 50 percent use on native bunchgrasses and 60 percent on crested wheatgrass. While the AUM numbers between alternatives differ, the effects to the vegetation are still based on maximum utilization threshold and would be consistent. Once utilization thresholds been met, the livestock would transition to another pasture or allotment or exit the BCA. Considering plot data and modern grazing history in the BCA, the S&G determination, threat-based models/DRG information, and local scientific vegetation work, moderate grazing would either maintain (be neutral) or improve the health of native and crested wheatgrass in the allotments. When combined with a strategic grazing season and rotation the acres classified as A or B (in the threat-based models) would be maintained and closer resemble what is expected. While grazing use would have a direct effect to the plants through defoliation, under the proposed utilization thresholds the plants would have an adequate amount of resources remaining to continue their lifecycle without a decrease in production. Indirectly, the level of use would reduce fine fuels and increase the chance of perennial bunchgrass resiliency after fire. Crested wheatgrass, which tolerates grazing and requires more disturbance to remain vigorous, would be maintained or improved by a higher 60 percent utilization threshold when compared to native vegetation. When combined with a livestock grazing rotation that focuses on plant growth stages, there should be little difference between moderately grazed rangelands and those that have been rested longer term. However, that assumes that there are enough livestock to get close to the utilization threshold within a pasture within a grazing season; it is likely permitted AUMs would be utilized prior to hitting utilization thresholds as current calculated carrying capacities are less than what would be permitted. Under this alternative it is anticipated that the level of forage made available would remain consistent or increase with management focusing on desirable vegetation health.

The AUMs component of livestock level of use may be augmented by the authorization of NR AUMs under Alternative 2. This means that if livestock grazing during the initial grazing period is less than 30 percent on perennial bunchgrasses following full permitted use, additional AUMs could be authorized until utilization thresholds are reached (if permitted use is over 30 percent, no NR AUMs would be authorized within that pasture). However, under this alternative the terms and conditions associated with NR use would ensure not all pastures are grazed to the utilization thresholds using NR AUMs in any given year. It is anticipated that the effects based on moderate grazing would be the same as discussed above under Alternative 1, because the maximum utilization threshold levels have not changed. If the vegetation is not available for forage due to weather or other factors, or utilization threshold has been reached, NR AUMs would not be authorized. Authorizing NR AUMs should not influence future potential forage because the utilization thresholds designed to promote desirable plant health remain the same.

Under Alternative 2, grazing in the Hammond Allotment would be expanded to include earlier and winter season use. Flexibility in grazing season would mean that grazing rotations could be developed to respond to fuel accumulations and grazing of invasive annual grass when the perennial vegetation is the least vulnerable to grazing stress.

Alternative 2 differs from Alternative 1 for livestock intensity because the utilization threshold in the Lower Field of the Mud Creek Allotment may change in regard to adaptive management. Utilization thresholds are proposed to vary between 35 percent at initial resumption of grazing, up to 50 percent, based on monitoring. The design is to respond to GRS habitat needs of retaining taller vegetation for nesting within the vicinity of a nearby lek. Tall grasses are as important as shrubs in Mud Creek Allotment and were largely reduced in the 2006 Granddab Fire. The lower utilization level in the Lower Field to start would directly limit the amount of biomass available to graze; the indirect effect would be an increased likelihood of fine fuel accumulation and potential for catastrophic fire with high levels of mortality. If increases are made in utilization, there would be a corresponding decrease in fine fuel. If increases are not made or adjusted below 35 percent, the accumulation and increased risk of more severe fire, and possible associated invasive annual grass cover increases, would persist.

Under Alternative 2, grazing in the Hardie Summer Allotment would be expanded to include winter season use but would only be an option depending on weather and snow. Flexibility in grazing season would mean that grazing rotations would be developed to respond to fuel accumulations during the season the livestock would utilize the vegetation and when the perennial vegetation is the least vulnerable to grazing stress.

Changes to allotment boundaries in Alternative 2 that would shift acres to different grazing units are not anticipated to have a measurable effect on upland vegetation because utilization threshold would remain 50 percent on native key species and 60 percent on non-native key species, and permitted AUMs were adjusted as appropriate in each allotment.

3.13.2.1.3 VAGFI Alternatives 3

Under Alternative 3, the grazing seasons would be expanded to include early, defer, and winter season use for all allotments. Periodic growing season rest for all pastures would be included in pasture and allotment rotations, though there is a larger risk of exceedance as grazing would not follow a general grazing rotation. The flexibility in grazing season would mean that grazing rotations could still be developed to respond to fuel accumulations and graze invasive annual grasses during the season when the perennial grasses are the least vulnerable to grazing stress, similar to Alternative 2. Also under Alternative 3, grazing in the Hardie Summer Allotment would be expanded to include partial winter season use, with impacts similar to those described under Alternative 2.

Under Alternative 3, permitted AUMs may be augmented by the authorization of NR AUMs across the BCA with fewer terms and conditions than under Alternative 2. This means that if livestock grazing during the initial grazing period is less than 50 percent on native bunchgrasses and 60 percent on crested wheatgrass, additional AUMs could be authorized until those utilization levels are reached. If the vegetation is not available for forage due to weather or other factors, or utilization threshold has been reached, nonrenewable AUMs would not be authorized. It is anticipated that the effects based on moderate grazing would be the same as discussed above under Alternative 1, because the maximum utilization threshold levels have not changed. However, with fewer terms and conditions associated with NR AUMs under Alternative 3, there is an increased risk of utilization threshold exceedance, and it is more likely that all pastures within the BCA would reach the utilization thresholds annually. Because the permitted AUMs are higher under this alternative than Alternative 2, the frequency of authorizing NR AUMs may be less as there is increased potential that thresholds would be used with permitted AUMs, especially in allotments where AUMs permitted under this alternative exceed the calculated carrying capacities described in the Grazing Management section. Authorizing NR AUMs should not influence future potential forage because the utilization thresholds designed to promote desirable plant health remain the same. Though negative impacts would be seen if utilization thresholds were regularly exceeded.

Changes to allotment boundaries in Alternatives 3 that would shift acres to different grazing units, including the proposed Hardie Summer, are not anticipated to have a direct measurable effect on upland vegetation because utilization thresholds would remain 50 percent on native key species and 60 percent on non-native key species. However, under Alternative 3 where there would be an increase in AUMs on the landscape when compared to Alternatives 1 and 2, there would be more of a risk of ecological damage since utilization thresholds would be expected to be met regularly prior to grazing removing all permitted AUMs; therefore, this alternative would rely more on regular monitoring than a carrying capacity that is sustainable. Impacts to vegetation from fence construction and removal would be the same as described under Alternative 2. The season of use and numbers of livestock head within the proposed Hardie Summer FFR would be at the discretion of the livestock operator, as long as grazing utilization met resource objectives. The existing rangeland health status and trends in the Hammond FFR as described in the 2023 LH determination are expected to continue under Alternative 3. Livestock forage use would be expected to continue at the same level as occurred prior to 2014 in the Hardie Summer FFR and is not anticipated to have a different effect on vegetation than what has been discussed for the Hardie Summer Allotment as the same weather and access limitations of the Hardie Summer Allotment would also apply to the Hardie Summer FFR.

Under Alternative 3, the South Grandd and Canyon Pastures would be created in the Mud Creek Allotment, allowing for more grazing rotation options and flexibility with livestock moves. The management of the new pastures would be within what has been analyzed for all allotments under this alternative. The Canyon Pasture would reduce acres in the neighboring Krumbo Mountain Allotment, and associated use would impact riparian vegetation as described in the RWQF section, as slope would limit use on upland vegetation.

Alternative 3 includes a pipeline and trough system that would service the Thompson and Witzel pastures. The direct effect would be physical disturbance to the vegetation in the short term (1-3 years) from installing the pipe and troughs. Pipeline installation would cause short-term damage to vegetation in an area equating to approximately one acre per linear mile. It is anticipated the native vegetation would return in one to three years. Periodic maintenance of the pipeline may remove small areas (size would depend on the length of the area needing maintenance but would be within the original area of disturbance) of vegetation, but this would only occur in areas where the pipeline broke and needed to be replaced. Areas of disturbance would be reseeded to promote recovery of the vegetation on the site, increasing the speed of recovery. Vegetation disturbance associated with trough construction (3) would be no more than 0.05 acre for each trough, and these disturbed areas would be rehabilitated if needed, increasing the vegetative recovery rate. Disturbance caused by livestock concentration would be approximately two acres for each trough due to the increased level of use in the area. The indirect effect of the new pipeline and troughs would be increased distribution and utilization of livestock around the new troughs and between watering points in the pasture; however, use would be reduced at existing water developments and within the current use area. It is anticipated that this would have a neutral or positive effect to the health and vigor of native vegetation, and that forage levels would remain consistent after vegetation affected by construction returned to pre-construction levels.

3.13.2.1.4 VAGFI Alternatives 4

Under Alternative 4, grazing would be limited to defer and winter seasons for all allotments and pastures in the BCA. Also, grazing use would be reduced to 30 percent utilization (light) in all allotments and pastures within the BCA. Directly, there would be less defoliation or stress to the forage vegetation as a result of grazing. Indirectly, there would be less biomass removed, contributing to an accumulation of fine fuels in the base of the bunchgrasses that could put them at a higher risk for burning hotter if there was a wildfire. Bunchgrasses that burn hot have a higher chance of mortality and could create open space and resources for invasive annual grasses to spread or become dominant in those areas. For crested wheatgrass, a 30 percent utilization level would allow self-shading in the bunches to be increased, thereby a reduction of the health and vigor of the crested wheatgrass over the long term (5-10 years or more) would be expected. Over the mid to long term, it is anticipated that forage levels would reduce, particularly where there is ungrazed crested wheatgrass for multiple seasons.

Under Alternative 4, NR AUMs would not be authorized. If there is a productive vegetation year, without the ability to authorize NR AUMs as described in Alternatives 2 and 3, fine fuel accumulation in the grass plants would remain into the following grazing seasons and increase the risk of catastrophic fire that could affect the future resilience of bunchgrasses in the allotments. This impact would be more than under all other grazing alternatives.

Season of use in the Hardie Summer Allotment would be limited to August 1 through November 30. Use at the end of the season may be constrained by elevation and resulting snow, depending on the year. Under Alternative 4, grazing in the Hardie Summer Allotment would be limited to the deferred season of use. This would allow vegetation to complete its growth cycle without

livestock grazing pressure. A direct effect of limiting the grazing season of use to defer would be that the opportunity to graze to reduce fuels for the future year is not realized. Currently, season of use to manage for invasive grass with livestock is not a concern in the Hardie Summer Allotment.

Under Alternative 4, over time there would be an accumulation of fine fuel that would reduce vigor and production of grasses (perennial and introduced) over the long term for all allotments. Indirectly the future level of forage under Alternative 4 would be expected to be reduced due to shading and at increased risk due to increased severity of fire, should it occur.

3.13.2.1.5 VAGFI Alternative 5

The no graze alternative would eliminate defoliation of plants by livestock grazing. The direct effect would be that the plants could complete their lifecycle with no livestock grazing related stress. The indirect effect is magnified from Alternative 4, fine fuels (from perennial and annual grasses where they are) would not be removed at all and instead accumulate in and between the vegetation, and would have less fuel moisture, greater ignition potential, and likely contribute more mortality of bunchgrasses in the case of fire, which would be at increased risk of being catastrophic.

Hammond Allotment would likely be impacted the most by the No Grazing Alternative. Primarily because of the amount of crested wheatgrass seedlings that would be ungrazed. Crested wheatgrass when undisturbed would self-shade itself overtime, reducing the vigor and health of the plants. It is anticipated that, in at least the mid to long term, the level of future available forage would be reduced. Where crested wheatgrass is reduced in vigor or abundance, the risk of invasive annual grasses establishing, and damaging fire, is increased.

Similar to the Hammond Allotment, no grazing in the Mud Creek Allotment under Alternative 5 would create a higher risk of more severe fire as a result of accumulation and continuity of fuels. This is more pertinent to the Mud Creek Allotment because of the increase in herbaceous growth (production and cover) after the loss of shrubs in the 2006 Grandad Fire, and Mud Creek Allotment having a higher percentage of invasive annual grasses, which would be expected to expand following another fire.

Under Alternative 5, no grazing would occur in the Hardie Summer Allotment. The direct and indirect effects are the same as for the Hammond and Mud Creek Allotments, although fine fuel amounts are magnified because the allotment is higher elevation, receives more precipitation, and is more productive from a perennial vegetation standpoint.

3.13.2.2 *VAGF Issue 2: How would the level and timing of proposed livestock use change the spread or dominance of annual invasive grasses,¹¹⁷ and how would this affect future levels of forage available for livestock grazing?*

As discussed in issue question 1 regarding level and timing of use effects on native and crested wheatgrass bunchgrasses, moderate grazing with periodic growing season rest would maintain or improve vegetation. The direct effect from the grazing and defoliation of plants would be offset by the limit of how much can be used by livestock, and periodic growing season rest would allow the grass a complete growing cycle without grazing stress. Grazing in pastures during the early, defer, or winter seasons would have reduced the direct effect to bunchgrasses because they are in varying stages of dormancy, meaning they have fulfilled their lifecycle requirements after or prior to grazing. Healthy grasses and ecosystems would continue to limit the ability of invasive annual grasses to become established and dominate the systems. However, livestock presence may result in some spread of invasive annual grasses, though it is expected that this spread would be less than what occurs from vehicles along roads (Davies et al. 2013).

Indirectly, moderate grazing use (50 percent on native bunchgrass and 60 percent on crested wheatgrass) during any grazing season would reduce fine fuel in the bunchgrasses and the continuity of the fuel, thereby reducing the severity of a fire and resulting in less bunchgrass mortality. Less bunchgrass mortality would result in less opportunity for invasive annual grasses to invade a burned site. Livestock are more likely to graze invasive annual grass in the early, early graze, late defer, and winter seasons because during the earlier times these grasses (cheatgrass and medusahead rye) have higher nutritional value, or the seed heads are softer following fall precipitation.

Considering plot data and modern grazing history in the BCA allotments, the S&G determination, threat-based models/disturbance response group information, and local scientific work, moderate grazing would either be neutral or reduce the spread or dominance of annual invasive grasses. Because invasive annual grass already exists within the allotments, parsing out what invasive annual grass seeds are spread by other vectors (roads, whirlwinds, wildlife, recreation activities) versus livestock would be very difficult. For example, Lehrer and Tisdale (1956), in a controlled study, fed 13,700 cheatgrass and 9,350 medusahead rye seeds respectively to one sheep each. Once the seeds passed through the sheep rumen, which is the same digestive system cattle have, only 2.18 and 2.36 seeds were able to germinate under lab conditions. It is reasonable to think that the seeds that were able to germinate in the lab may have suffered a different, less favorable fate in situ (out in the rangeland) where they could easily dry out, freeze to death, or be frost heaved out of the soil, or be eaten by rodents. rockiness of the stream area, southern aspect, and limited water flow. Holton et al. (2024) concluded “that seeds consumed...in the fall will be subjected to prolonged periods of ruminal fermentation, effectively eliminating germination” and seeds consumed “in the spring were more rapidly degraded.” The study completed by Holton et al. (2024) supported earlier research that “cheatgrass seed mortality [occurred] after 48 hours of ruminal fermentation,” though they also

¹¹⁷ Invasive annual grasses within this area include both cheatgrass and medusahead rye grass. Medusahead rye grass is a listed noxious weed. However, since many of the issues medusahead causes are similar to those caused by cheatgrass, they will be discussed together under the annual grass heading.

recognized that “[t]he lack of germination exhibited in the fecal germination trial is promising, but there are factors to consider before concluding cheatgrass seeds are unable to germinate effectively in the fecal material of cattle.” Davies and others (2013) found that medusahead cover along animal trails was higher than random transects, but still considerably less than along roads. Even so, the trails were known to be used by both cattle and wildlife. As a result of difficulty in analyzing spread over many variables, the focus here is on maintaining or improving perennial bunchgrass communities that reduce the ability of cheatgrass and medusahead to spread from the invasion front or increase in abundance (one measure of dominance).

Under all grazing alternatives the amount of sustainable forage production would be reduced by the spread and dominance of invasive annual grasses. The amount of forage lost would vary widely by the size of the infestation and how dominant the invasive annual grass is. Year to year, the forage amount produced by invasive annual grasses could greatly fluctuate. While cheatgrass can produce more pounds of forage than native range when conditions allow it to germinate in the fall, and if there are ample moisture and warm enough temperatures in the spring, those conditions are not consistent. Medusahead rye can reduce grazing capacity by 50 percent to 80 percent (Hironaka 1961) and in a local study up to 90 percent (Davies and Svejcar 2008) and without intervention often results in near monocultures of medusahead rye (George 1992). Furthermore, medusahead rye litter has a slow decomposition rate, allowing it to accumulate over time and suppress desirable plants under the thatch (Bovey et al. 1961; Bureau of Land Management 1965).

The BLM utilizes a number of ecologically driven management concepts to develop strategies that address the challenge of invasive annual grasses and the associated altered fire regimes. Chambers and others (2014) classified sagebrush plant communities based on their resilience to disturbance and resistance to invasive annual grass invasion. In general, sagebrush plant communities on the warmer, drier end of the distribution have low resistance and resilience to disturbance. In other words, these plant communities are easily disturbed and susceptible to invasion by invasive annual grasses. Higher elevation sagebrush plant communities that are on the cooler, wetter end of the distribution (usually deeper soils and higher annual precipitation) require a higher degree of disturbance to alter plant composition, and invasive annual grasses do not readily establish and/or persist in large numbers after a disturbance event. Maintaining deep-rooted perennial grasses in good vigor would maintain resistance to cheatgrass invasion and maintain resilience for post-fire recovery (Davies, Bates, Boyd, et al. 2016; Davies and Johnson 2017; Pellant et al. 2020). The BLM would utilize principles in the framework and decision support tools developed by Crist and others (U.S. Forest Service 2019) to implement management actions. An important part of this framework is the continued monitoring and evaluation of management actions. The BLM would utilize a variety of monitoring techniques, including AIM to evaluate the sagebrush plant communities’ response to management actions. Restoration of sagebrush plant communities and recolonization of GRSB are outside of the scope of this project, though considered in cumulative effects. However, almost 2,000 sagebrush seedlings were planted in late 2023 within the Mud Creek Allotment (under the 2023 Mud Creek Restoration DNA (Bureau of Land Management 2023c)) in hopes of increasing sagebrush and sagebrush seed sources, to allow for increased natural establishment; the success of this planting has not yet been determined.

3.13.2.2.1 VAGF2 Alternatives 1

Alternatives 1, 2 (except Lower Pasture in Mud Creek Allotment), and 3 all propose moderate grazing utilization thresholds (50 percent on native bunchgrass and 60 percent on crested wheatgrass). Although Alternative 1 proposes moderate use, it does not propose adequate AUMs to approach moderate grazing use utilization levels, especially in the Hammond Allotment, based on allotment use records and carrying capacity calculations. Directly, livestock would remove less biomass, indirectly that fine fuel would accumulate in the individual plants and be more susceptible to fire, burning hotter with an increased likelihood of mortality. Post fire perennial bunchgrass mortality would free up resources that could be used by invasive annual grasses to spread and eventually dominate burned sites.

This effect would be consistent under Alternative 2 in the Lower Field Pasture of the Mud Creek Allotment (under 35 percent utilization), Alternative 4 (30 percent utilization), and substantially amplified by Alternative 5 (No Grazing). There is an anticipated difference in effects between insufficient AUMs to graze to utilization levels of 50 percent on natives and 60 percent on introduced bunchgrasses, and lower utilization threshold levels of 30 percent and 35 percent related to ignition potential and initial fire spread which is lower with the moderate grazing use (Davies, Johnson, et al. 2023).

3.13.2.2.2 VAGF2 Alternatives 2 and 3

The utilization thresholds, seasons of use and available rotations, are similar between Alternatives 2 and 3 thus they will be discussed together. It is anticipated that the grazing between the two alternatives would produce similar effects to both desirable bunchgrasses (see Vegetation section VAGF issue 1) and invasive annual grasses.

Under Alternatives 2 and 3, the seasons of use have been expanded to include opportunities for winter and early seasons of use in the Hammond and Mud Creek Allotments. In the Hammond Allotment approximately 19 percent of the allotment is expressing annual invasive grass threat. This allotment is generally in DRG 6 and has the highest potential of the BCA allotments to transition to cheatgrass if severely burned, especially since the range condition prior to crested wheatgrass seeding was decadent sagebrush with a depleted understory. Grazing the Hammond Allotment with moderate grazing should change the fine fuel characteristics, reduce the potential of the allotment to burn and reduce the probability of conversion to cheatgrass. In the Mud Creek Allotment approximately 14 percent of the allotment is expressing annual invasive grass threat. This allotment is primarily DRG 10, in which the presence of invasive annual grasses reduces the ability of a site to recover from disturbance such as fire. This has been observed in the Mud Creek Allotment after the 2006 Grandd Fire and in the plot data. While grazing in any season would reduce fine fuels in the Mud Creek Allotment, the ability to use before and after growing season grazing would be more effective at promoting perennial bunchgrass health and at the same time modifying fine fuels to reduce the risk of severe fire in a system that is still recovering from fire. In years where production is above average, use of nonrenewable AUMs combined with a strategic grazing rotation would ensure that moderate grazing could be implemented to effectively reduce fine fuels.

In the Hardie Summer Allotment there are trace amounts of annual invasive grass threat being expressed, mostly along roads. This allotment is in DRGs 8 and 11. In DRG 8, catastrophic wildfire in western juniper dominated sites where there is a limited understory may lead to invasive annual grass dominated sites. In DRG 11, it is high enough elevation that cheatgrass and medusahead have not been known to have the same invasiveness. Under Alternative 1 moderate grazing use would reduce fine fuels, but under Alternatives 2 and 3, moderate deferred and early winter season grazing in DRG 8 dominated pastures could further reduce fuels characteristics (increasing the following year live:dead ratio) so that wildfire could not easily spread into juniper dominated sites. Early winter use, depending on the year, may be possible to reduce fine fuels going into the next season, especially since spring grazing is not an option in the Hardie Summer Allotment (due to elevation, snow, and access). While the sites dominated by grasses would burn under varying degrees of severity, depending on pre-fire conditions, they would have reduced likelihood that cheatgrass could spread into the Hardie Summer Allotment.

Developments proposed under Alternatives 2 and 3 may create isolated areas of disturbed soil near fencing and water development projects in which cheatgrass and medusahead could establish. Best management practices such as cleaning equipment, post-activity competitive seeding, and inventories to detect invasive annual grasses for treatment (such as Early Detection Rapid Response) would limit this effect. Proposed boundary changes are largely administrative and would be under the same grazing management timing and intensity and, therefore, are not expected to increase the spread or dominance of invasive annual grasses.

3.13.2.2.3 VAGF2 Alternative 4

Alternative 4 would increase the likelihood of fire spread compared to Alternatives 1, 2 (except Lower Field of Mud Creek Allotment), and 3 because light grazing due to decreased level of permitted and annually authorized AUMs, along with a reduced utilization threshold, would reduce the fine fuels amount and continuity to a lesser extent than would occur under other alternatives.

3.13.2.2.4 VAGF2 Alternative 5

Alternative 5, No Grazing, would not reduce fine fuels, continuity, or the risk of severe fire and could have the highest chance of annual grass invasion post fire.

3.13.2.3 VAGF Issue 3: How would the level and timing of proposed livestock use affect fine fuel accumulation, risk of fire, and fire severity within the allotments?

3.13.2.3.1 VAGF3 Alternatives 1, 2, and 3

Under Alternatives 1, 2 (except Lower Field of Mud Creek Allotment), and 3, moderate grazing is being proposed (utilization threshold 50 percent on native bunchgrasses, 60 percent on crested wheatgrass). Grazing at these utilization levels would effectively reduce fine fuel accumulation, increase fuel moistures, and reduce fuel continuity. Davies and others (2023) found that

7561 moderate grazing of 40-55 percent reduced the probability of an ignition and reduced fire spread,
7562 whereas light grazing of 15-30 percent was largely ineffective.

7563
7564 Alternative 1 does have the same utilization threshold for the Hammond Allotment; however, the
7565 permitted level of AUMs under that alternative has been known to be well under what would be
7566 needed to effectively reduce fine fuels in the allotment. Alternative 1 does not propose
7567 authorizing NR AUMs, so there are no options to adjust livestock numbers to effectively reduce
7568 fuels in the Hammond Allotment under that alternative.

7569
7570 The Lower Field of the Mud Creek Allotment under Alternative 2 has a 35 percent utilization
7571 threshold with a potential increase up to 50 percent depending on the outcome of monitoring and
7572 consequent adaptive management. While the 35 percent utilization would be in place, fine fuels
7573 would accumulate under light grazing and the risk of fire and higher severity fire would increase.

7574
7575 Under Alternatives 2 and 3, the grazing timing (season) has been extended to include more
7576 options for early, deferred, and winter grazing, which are when livestock tend to consume
7577 standing dead and cured invasive annual grass more readily. Ganskopp and Bohnert (2005)
7578 suggest that after grasses complete their lifecycle and cure (e.g., during defer grazing
7579 treatments), cattle are much less aware of the older cured stems and tend to graze the area with
7580 improved distribution (Ganskopp et al. 1992). During these times, cattle often graze sites that
7581 have more abundant forage, regardless of greenness or plant species (Stuth 1991). The direct
7582 effect of this level of grazing particularly during early, early graze, defer, and winter grazing
7583 season is to increase the live:dead material ratio within the bunches of the grass plant. Which in
7584 turn increases fuel moistures in the current year plants or increases the live:dead ratio in
7585 following year grasses effectively shortening the fire season on the site. Also, the risk of
7586 probability of ignition on the grazed grasses decreases, and the continuity of fuels has been
7587 reduced, which decreases the probability of fire spread. The indirect effect is if an ignition does
7588 occur, it would be less likely to start a fire, spread the fire, or burn as hot (lower severity). For
7589 Alternatives 2 and 3 NR AUMs may also be authorized in good vegetation production years
7590 when there is more forage than the permitted stocking rate was set for, which can work with
7591 forage forecasts to develop a grazing strategy to graze early for fuel reduction for the current
7592 season, or late defer/winter to influence fine fuel characteristics for the following grazing season.

7593
7594 Under Alternative 3 there are developments proposed that could influence fine fuels
7595 accumulation by changing grazing patterns and rotation. Under Alternative 3, the South Grandad
7596 Pasture is proposed in the Mud Creek Allotment. This smaller pasture would be used as a tool for
7597 livestock management in the crested wheatgrass seeding in the Mud Creek Allotment and would
7598 likely result in utilization on the seeding closer to 60 percent and reducing fine fuels in that area
7599 to reduce the risk of severe fire. In the Hardie Summer Allotment, the pipeline and trough project
7600 that would service the Thompson and Witzel Pastures would increase livestock distribution
7601 around three troughs and in between watering sites, which would likely result in utilization
7602 closer to 50 percent on native bunchgrasses within the use area and influence fine fuel
7603 characteristics, thereby reducing risk of severe fire. Fence removal under any alternative is not
7604 likely to change fine fuel characteristics.

Boundary changes to the allotments are not anticipated to have a measurable effect to fine fuel characteristics. Under Alternative 3, there are not any anticipated measurable effects by moving the three predominantly private pastures into the Hammond FFR Allotment. Also, under Alternative 3 is a new Hardie Summer FFR Allotment; no measurable effects to fine fuel characteristics are expected to be different than were discussed for effects under Alternative 3 for the Hardie Summer Allotment. This is because on the BLM administered lands within the new FFR boundary, the utilization threshold would be the same. Correspondingly, the season of use is limited in that area due to elevation and snow to the defer and winter grazing seasons, which would mean the bunchgrasses would have been able to complete their lifecycle, cured, and be more likely to be consumed by livestock at that stage to reduce accumulated fine fuels.

Grazing from active trailing proposed under any alternative is likely to have a limited effect on fine fuels in the allotments. Active trailing would likely occur as livestock grazing allotments are being exited back to private land, is brief, and because the cattle are on the move the grazing defoliation on grasses would be minimal.

3.13.2.3.2 VAGF3 Alternative 4

Under Alternative 4, light grazing (30 percent utilization for all bunchgrasses) is being proposed for all the allotments between August 1 and February 28. Portions of Mud Creek, and effectively all of Hardie Summer Allotment, are impractical to graze after November due to snow loads at higher elevations. In the Hammond Allotment there is no opportunity to graze early spring (March and April) before the onset of current year grass growth.

The grazing season would be primarily deferred to late in the season while plants are dormant. This includes fall and early winter after precipitation events where there is a higher likelihood that cattle would consume dried grass. The direct effect of light utilization would result in an inconsistent increase in the live:dead ratio for fine fuels. Utilization around areas where livestock congregate, such as water developments, would be higher and provide some reduction in fuel continuity in localized areas. Indirectly, light utilization would provide inconsistent biomass removal and fuel moistures, resulting in areas within the pastures that would be at an increased risk of catastrophic fire should an ignition occur. Over the long term, when vigor of the bunchgrass (particularly crested wheatgrass) is reduced, the proportion of green stems decreases within the bunch. When the proportion of dead to living stems is too high, that can moderate the effects of the green plant material, and it is no longer enough to limit ignition or fire spread.

3.13.2.3.3 VAGF3 Alternative 5

Alternative 5 is the No Grazing Alternative. Under this alternative livestock would not be used as a tool to reduce fine fuels. Unless reduced by some other disturbance, biomass would accumulate in bunchgrass species and cure creating incremental decreases in the live:dead ratio within the bunch. Probability of ignition in bunchgrasses would increase. Over time standing dead material would break off the plant and become litter over the soil increasing fine fuel continuity. Bunchgrass communities would be at the highest risk for catastrophic fire with high perennial vegetation mortality should an ignition occur. Due to the accumulation of fine fuels to burn hot,

mortality of the bunchgrasses is more likely. If bunchgrasses die, it leaves the site open for invasive annual grasses to spread and/or increase in cover, which further proliferates the annual grass - fire cycle.

3.13.2.4 VAGF Cumulative Effects

The CEAA for direct VAGF effects is the project area, as activities outside the project area would not have an impact on upland vegetation, and the Steens Mountain CMPA for indirect effects as fire could burn areas outside of the BCA. Fence lines and geographic features around the BCA eliminate grazing related impacts from areas adjacent to the BCA. RFFAs that would have an impact on VAGF are continued livestock grazing, weed treatments, fire, and restoration actions including juniper treatments, seeding, and shrub planting.

Continued livestock grazing in areas adjacent to the BCA would indirectly impact the BCA through reduction of fine fuel loading, which would limit the size and severity of a fire if ignition occurred. This would reduce the risk that ignition outside of the BCA would spread to within the BCA, though it would still be possible. The effects of fire within the BCA would be as described above. In general, a reduction in grazing within the CEAA higher elevations would be expected to result in increased fuel loading, increased risk for fire, decreased juniper and shrubs, and increased risk for more invasive annual species.

Weed treatments, specifically those focused on invasive annual grasses, would reduce the presence and density of invasive annual grasses and provide an opportunity for existing or seeded desirable vegetation to increase in vigor and abundance, limiting future dominance by annual grasses. While weed treatments are not known to fully remove invasive annual grasses, a reduction in their dominance would be expected to result in decreased fine fuel loading and risk of a catastrophic fire occurring that would further reduce perennial vegetation and promote annual grasses. Weed treatments combined with proposed actions would be expected to improve ecological conditions within the BCA, though alternatives with increased risk of catastrophic fire could cumulatively result in negative impacts to vegetation in the CEAA if fire were to occur.

Restoration actions would work to move the systems towards what would be expected on the site per ESDs, whether this restoration comes in the form of juniper removal or seeding/planting of desirable species. Sites that have characteristics closer to a reference community are more likely to have increase resilience and resistance in the event of disturbance. These sites typically see lower fire severity, with higher mosaic patterns, which result in less mortality. Restoration actions, in combination with proposed actions involving grazing, would result in ecological conditions that area healthier, though improvement may be difficult to measure. In combination with no grazing, these actions may help reduce the risk of catastrophic wildfire and protect desirable vegetation; however, there would be an increased risk of catastrophic wildfire due to fine fuel accumulation. If an ignition were to occur, the effects to the CEAA would be negative and likely measurable.

3.14 Visual Resource Management (VRM)

3.14.1 VRM Affected Environment

The 2005 AMU/Steens CMPA RMPs/RODs (Bureau of Land Management 2005b; Bureau of Land Management 2005a) identified the following goal for VRM: Manage public land actions and activities in a manner consistent with visual resource management (VRM) class objectives. Protect, maintain, improve, or restore visual resource values by managing all public land in accordance with the VRM system (Bureau of Land Management 2005b: RMP-43; Bureau of Land Management 2005a: RMP-43).

Public lands have a variety of visual resource values. The BLM is responsible for ensuring that scenic values are considered before allowing uses that may alter the visual characteristics of the area. These different values warrant different levels of management accomplished through the VRM system. Therefore, visual resources were assigned management classes in the 2005 RMPs (Bureau of Land Management 2005b; Bureau of Land Management 2005a); the BCA includes lands within VRM Classes I, II, and III.

VRM classes set specific VRM objectives for lands within each class designation, as well as the level of visual change allowed in the landscape character as a result of proposed management activities. The objectives and allowable levels of change for each of the classes within the project area are as follows:

- VRM Class I Objective: To preserve the existing character of the landscape. Allowed Level of Change: This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- VRM Class II Objective: To retain the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- VRM Class III Objective: To partially retain the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The BCA is diverse in landscape character. It is deeply carved by two prominent drainages, Bridge Creek and Mud Creek, which dissect the area from east to west and are the primary topographic features of the area. Both drainages are steep canyons with sheer, darkly colored rock walls that reach a maximum depth of 400 feet in Mud Creek. The average depth of the canyons is about 175 feet in Bridge Creek and 200 feet in Mud Creek. Most of the land that lies

between the drainages is flat to gently rolling. A number of small drainages cut through the flatter terrain prior to entering Bridge or Mud Creeks.

Vegetation in the BCA consists of low, dense sage, mixed grasses, juniper trees, and aspen groves. Vegetation colors can change drastically depending on the season. In spring, brush and grasses appear to be bright green and in summer they change to dull greens, tans, and browns. Visual resource inventory for the BCA denotes it is of high scenic quality.

3.14.2 VRM Environmental Consequences

3.14.2.1 VRM Issue 1: How would the proposed developments affect visual resources?

3.14.2.1.1 VRM1 Alternative 1

Under this alternative, grazing management would continue as it was authorized on the previous 2004 grazing authorization. All VRM management objectives under the 2004 grazing authorization were being met. No developments are proposed under this alternative. Developments would be limited to existing infrastructure, and existing developments would continue to be maintained following existing policy and existing decisions. All maintenance and replacement activities would be designed to meet VRM objectives for the area. There would be no effects on visual resources, and the alternative would conform to VRM objectives.

3.14.2.1.2 VRM1 Alternative 2

This alternative proposes developments, specifically fence construction and removal, including modification of the Bridge Creek Water Gap. An extension of the existing water gap fences approximately 0.02-mile-long would connect the two fences on the west side of the water gap. On the east side of the water gap, a new fence, approximately 0.18-mile-long, would be constructed across the creek. Both fences would be within the Bridge Creek WSA. This area is designated VRM class I. VRM class I objectives are to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. Fence design would require green metal posts with four strands of barbed wire to match existing fencing, so as not to add to visual contrasts. Vegetation and rock removal would be the minimal amount necessary for fence construction/removal (see General Project Design Elements for a full description on rangeland development design elements and rehabilitation activities). The level of change to the characteristic landscape would be very low and not attract additional attention to the site beyond what already occurs.

This alternative also proposes construction of new fences within the Hardie-Summer Allotment and the removal of interior fence within the Hammond Allotment's Krumbo Creek #2 Pasture and the Hardie Summer Allotment's Cabin Pasture #1. Both of these fence construction and fence removal areas are located within VRM Class II designated lands, with an objective to retain the existing character of the landscape, and the level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and

texture found in the predominant natural features of the characteristic landscape. Under this alternative, there would be a net decrease in fences within the BCA. All proposed fence construction would connect into existing fence. Vegetation and rock removal would be the minimal amount necessary for fence construction. Materials would be brought in by motorized vehicle using existing roads. General project design elements would minimize the effects to landscape character change. New fence construction would represent a visible change to the landscape, as the linear fence would contrast with the landscape where no fence existed previously. The removal of fence would improve the viewshed of the natural landscape. Although the proposed change may be visible, it would represent a low level of change that would not attract the attention of the casual observer, and there would be a net improvement to the viewshed.

3.14.2.1.3 VRM Alternative 3

Like Alternative 2, this alternative proposes construction and removal of fences, as well as modification of the Bridge Creek water gap. Unlike Alternative 2, this alternative would remove approximately 0.31 mile of existing fence. The area is within the Bridge Creek WSA and is designated VRM Class I. VRM Class I objectives are to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. The water gap fence removal would represent a visible improvement to the landscape viewshed. However, water gap fence removal would allow cattle into Bridge Creek drainage. Cattle trampling in this area, which has been excluded from livestock grazing, would result in visual contrast as new trails are modified.

Within the Mud Creek Allotment, fence construction is proposed north of Little Bridge Creek and south of the southern rim of the Bridge Creek Canyon. Both developments are within the Bridge Creek WSA in VRM Class I designated lands. The proposed new fence construction would represent a visible change to the landscape, as the linear fence would contrast with the landscape where no fence existed previously. This proposed construction would alter the existing character of the landscape although the changes would not be seen from frequently visited location (trails, roads, overlooks, viewpoints, etc.). This fence construction would not conform to VRM Class I objectives.

New fence is proposed within Hardie Summer Allotment under this alternative and would have the same effects as new fences in this area under Alternative 2. Also similar to Alternative 2, Alternative 3 would include fence removal and the effects would be that same as described in Alternative 2. However, while Alternative 2 would have a net decrease in fence, improving visual resources, Alternative 3 would have a net increase in fence, negatively impacting visual resources.

Fence would be constructed in the Mud Creek Allotment in VRM Class II and III designated lands to create South Granddad Pasture. More fences would be constructed in the Mud Creek Allotment in VRM Class II and III designated lands to modify the Granddad Reservoir

enclosure. Effects from fences would be the same as described above for Hardie Summer Allotment.

Also under this alternative, three troughs of galvanized steel measuring approximately 4'x8', would be installed on the Hardie Summer Allotment within VRM Class II designated lands. Proposed trough installation represents a visible change to the landscape. The galvanized silvers of the troughs, bold lines, and rough irregular shapes represent strong contrasts to the existing landscape. These proposed developments, without proper design features, would be visible and attract the attention of the casual observer, although the changes would not be seen from frequently visited locations (trails, roads, overlooks, viewpoints, etc.). However, PDEs incorporated in this alternative, including paint or chemical treatment to match the colors of the surrounding landscape, would reduce visual contrasts from the troughs. Proper siting and location using vegetative and topographic screening would also be used to reduce the visual contrasts.

Reconstructing livestock handling structures at Granddad Reservoir would also occur under this alternative. These facilities would include a set of corrals and a loading ramp and may have water troughs. These corrals would be within VRM Class II designated lands. While these corrals existed in the past, there is no longer any remaining sign of the past structures. Therefore, from a visual resource standpoint, the impacts would be new and would represent a visible change to the landscape. PDEs, as described above for the troughs, could help reduce visual contrasts. Using dark, untreated wood for the handling structures could reduce some contrasts although the absence of vegetation around the structures and troughs would create a strong contrast in itself. The prominent bold lines and blocky, angular shapes of the corral and loading ramp along with galvanized silvers of the troughs represent strong contrasts to the existing landscape. These proposed developments would be visible and would attract the attention of the casual observer, although the changes would not be seen from frequently visited locations (trails, roads, overlooks, viewpoints, etc.). These proposed developments would affect visual resources and do not conform to VRM Class II objectives, even with PDEs.

3.14.2.1.4 VRM Alternative 4

Under this alternative, permitted AUMs would be reduced to 50 percent of what is analyzed in Alternative 1 and no livestock grazing would be authorized in portions of the Mud Creek and Hardie Summer Allotments where ecological objectives are not currently achieved. No developments are proposed under this alternative. Existing infrastructure would be maintained to properly function and designed to meet VRM objectives for the area. Therefore, there would be no effects to visual resources and the alternative would conform to VRM objectives.

3.14.2.1.5 VRM Alternative 5

In this alternative the BLM would not issue a grazing permit(s) for the BCA. Permitted livestock grazing would be completely removed from all BLM-managed land within all four allotments. No new developments would be constructed; therefore, there are no direct effects to visual

resources. Indirectly, visual resources may have negative effects if developments are not removed but fall into disrepair.

3.14.2.2 VRM Cumulative Effects

The CEAA for VRM is the BCA. The area is used primarily by hunters, recreational visitors, cattle permittees, and private landowners who spend time in the area. The RFFAs that could have effects to VRM includes road maintenance, fire, and restoration treatments, specifically juniper treatment. These actions could all result in changes to vegetative screening and would have higher visual contrasts during implementation, lessening with time and project completion. VRM Class objectives allow up to five years for contrasts to fall within prescribed limits, and all projects, regardless of VRM class, must be designed to prevent unnecessary and undue degradation of resources, including visual resources. Project design features or mitigation measures help to ensure that the VRM Class is met and, therefore, these project level measures help to decrease the visual resource management level impacts that could incrementally - directly or indirectly - contribute to cumulative impacts. There would be negligible long term cumulative impacts to visual quality, because the treatment areas would not impact the setting of any viewsheds managed to VRM Class I, II, or III objectives, they would not result in any cumulative impacts to these VRM classes. The visual quality of the area would remain intact to the existing condition of visual resources in the area.

3.15 Wilderness (W)

3.15.1 Wilderness Affected Environment

On October 30, 2000, Congress passed the Steens Act designating 428,156 acres as the CMPA, including establishment of Steens Mountain Wilderness. Steens Mountain Wilderness falls entirely within the 426,156-acre CMPA. The CMPA is located approximately 70 miles south of the community of Burns, Oregon. Steens Mountain Wilderness is within an area generally bounded on the west by State Highway 205, on the west and south by the Catlow Valley Road, on the east by the East Steens Road, and on the north by part of the Steens Loop Road. The Steens Mountain Wilderness lies in two segments. The larger eastern portion runs up the east slope of Steens Mountain, starting from the south near Fields and continuing about 35 miles to the northeast. The portion of wilderness described in this document is a 38-acre section of designated wilderness within this allotment. The Steens Act of 2000 resulted in this area being designated as wilderness, but not as part of the no livestock grazing area. This small section of wilderness is sage-steppe habitat in the high elevation, southwest corner of the Hardie Summer Allotment. Grazing within this designated wilderness was authorized prior to the Steens Act of 2000. Grazing in the entire allotment was suspended in 2014. The area is remote and livestock utilization in the wilderness portion of the BCA prior to 2014 was found to be light.

The Wilderness Act, Section 4(d)(4)(2) states: “the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the [administering agency].” Grazing is part of the BLM’s multiple use and sustained yield mandate, and is promoted, along with other specific

uses, in the Steens Act, as long as grazing is outside the no livestock grazing area (NLGA). One of the purposes of the Steens Act is “To promote viable and sustainable grazing and recreation operations on private and public lands” (Steens Act Sec. 1(b)(11)). The Steens Act also clearly states, in reference to livestock grazing, that “Except as otherwise provided in this section and title VI, the laws, regulations, and executive orders otherwise applicable to the Bureau of Land Management in issuing and administering grazing leases and permits on lands under its jurisdiction shall apply in regard to the Federal lands included in the Cooperative Management and Protection Area” (Steens Act Sec. 113(e)(1)). The 2005 Steens Mountain CMPA RMP states “Except for the designated No Livestock Grazing Area, grazing of livestock will continue and will be administered in accordance with Section 4(d)(4) of the Wilderness Act, pursuant to provisions of the Steens Act, and in conformance with guidelines set forth in Appendix A of House Report 101-405 of the 101st Congress.” As described in the BLM Wilderness Manual, “structures and installations used for livestock management existing at the time of designation may be maintained...New facilities will be permitted by the BLM only for the purposes of enhancing the protection of wilderness character” (Bureau of Land Management 2012b: 1–28, 1–29).

In Section 2(c) (“Definition of Wilderness”) of the Wilderness Act, wilderness character is defined as being composed of four mandatory qualities, and a fifth, optional, quality. These qualities were further defined in BLM Manual 6340 Management of BLM Wilderness (Bureau of Land Management 2012b: 1–5, 1–6), which described Wilderness as being:

- Untrammeled. The Wilderness Act states that wilderness is “an area where the earth and its community of life are untrammeled by man.” A “trammel” is literally a net, snare, hobble, or other device that impedes the free movement of an animal. Here, used metaphorically, “untrammeled” refers to wilderness as essentially unhindered and free from modern human control or manipulation. This quality is impaired by human activities or actions that control or manipulate the components or processes of ecological systems inside wilderness.
- Natural. The Wilderness Act states that wilderness is “protected and managed so as to preserve its natural conditions.” In short, wilderness ecological systems should be as free as possible from the effects of modern civilization. Management must foster a natural distribution of native wildlife, fish, and plants by ensuring that ecosystems and ecological processes continue to function naturally. Watersheds, water bodies, water quality, and soils are maintained in a natural condition; associated ecological processes previously altered by human influences will be allowed to return to their natural condition. Fire, insects, and diseases are allowed to play their natural role in the wilderness ecosystem except where these activities threaten human life, property, or high value resources on adjacent non-wilderness lands. Additional guidance on this is provided in Section 1.6.C of this manual [(Bureau of Land Management 2012b)], which addresses the management of specific activities in wilderness. This quality may be affected by intended or unintended effects of human activities on the ecological systems inside the wilderness.

- 7957 • Undeveloped. The Wilderness Act states that wilderness is an area “of undeveloped
 7958 Federal land retaining its primeval character and influence, without permanent
 7959 improvements or human habitation,” “where man himself is a visitor who does not
 7960 remain,” and “with the imprint of man’s work substantially unnoticeable.” Wilderness
 7961 has minimal evidence of modern human occupation or modification. This quality is
 7962 impaired by the presence of structures or installations, and by the use of motor vehicles,
 7963 motorized equipment, or mechanical transport that increases people’s ability to occupy or
 7964 modify the environment. More detail on the activities that impair this quality is found in
 7965 Section 1.6.B of this policy.
- 7966 • Solitude or Primitive and Unconfined Recreation. The Wilderness Act states that
 7967 wilderness has “outstanding opportunities for solitude or a primitive and unconfined type
 7968 of recreation.” Wilderness provides opportunities for people to experience natural sights
 7969 and sounds; remote, isolated, unfrequented, or secluded places; and freedom, risk, and the
 7970 physical and emotional challenges of self-discovery and self-reliance. Any one
 7971 wilderness does not have to provide all these opportunities, nor is it necessary that they
 7972 be present on every acre of a given wilderness. Where present, however, the preservation
 7973 of these opportunities is important to the preservation of wilderness character as a whole.
 7974 This quality is impaired by settings that reduce these opportunities, such as visitor
 7975 encounters, signs of modern civilization, recreation facilities, and management
 7976 restrictions on visitor behavior.
- 7977 • Unique, Supplemental, or Other Features. The Wilderness Act states that wilderness areas
 7978 “may also contain ecological, geological, or other features of scientific, educational,
 7979 scenic, or historical value.” Though these values are not required of any wilderness,
 7980 where they are present, they are part of that area’s wilderness character, and must be
 7981 protected as rigorously as any of the four required qualities. They may include historical,
 7982 cultural, paleontological, or other resources not necessarily considered a part of any of
 7983 the other qualities. These values are identified in a number of ways: in the area’s
 7984 designating legislation, through its legislative history, by the original wilderness
 7985 inventory, in a wilderness management plan, or at some other time after designation.

7989 **3.15.2 *W Environmental Consequences***

7990 Under all alternatives, there would be no development construction or removal within the small
 7991 area of wilderness found within the BCA. Due to the size of the wilderness area, as well as
 7992 topography consisting of steep slopes and dense vegetation, it is not expected that use under any
 7993 alternative would exceed no to light utilization. None of the alternatives would result in any
 7994 measurable changes to wilderness characteristics as they are now found. Fuel reduction is not
 7995 expected to occur in this area due to grazing as use levels would not be at a level determined to
 7996 impact fuel loading as described in other sections of the EIS. As there are no roads within or
 7997 immediately adjacent to this portion of wilderness, it is not expected that any impacts associated
 7998 with roads, such as spread of annual invasive species, would occur under any alternative. In
 7999 addition, no known weed sites are known to be present on this small portion of wilderness, or
 8000

adjacent to it, which would further reduce risks. Weed spread from other vectors such as recreation and wildlife would still occur.

3.15.2.1 W Issue 1: How would issuing new grazing permits affect wilderness and wilderness character within the BCA?

3.15.2.1.1 W1 Alternative 1

Under this alternative grazing would be authorized as previously occurred, prior to 2014, and use in the wilderness would be as occurred then. There would be some impacts from the reintroduction of grazing, such as a reduction in solitude due to grazing permittees and operations in the area. However, due to the location of this portion of wilderness within the allotment, it is not expected that either permittees or animals would be present to an extent that there would be a measurable impact to solitude.

Reintroduction of livestock and permittees would increase potential vectors for spread of noxious weeds within the wilderness; however, current existing vegetation would be expected to be resilient and spread of weeds would not be expected to result in dominance of those species.

This alternative would be consistent with wilderness direction as occurred prior to 2014.

3.15.2.1.2 W1 Alternative 2

This proposal includes approximately 0.22 mile of fence adjacent to the wilderness boundary on the private land – BLM-managed land boundary, outside of wilderness. This alternative would result in the removal of 0.14 mile of fence within the wilderness, resulting in a net decrease of fence within the Steens Mountain Wilderness.

No AUMs would be available beyond what is proposed under Alternative 1. While boundaries would be adjusted, stocking rates, and therefore, expected use on any given acre, would be expected to be the same as under Alternative 1. If the proposed fence changes described above were to occur, no wilderness would be available to grazing within the BCA as the fence would add the 38 acres of wilderness currently in the BCA to the Frazier Field Allotment, where grazing within wilderness is currently occurring, consistent with wilderness direction. There would not be an increase in use within wilderness as no AUMs would be added to the Frazier Field grazing permit, and additional acres would just result in increased distribution within the wilderness.

The fence removal component of this alternative would have a small positive effect on naturalness. Adding 0.22 mile of fence to the wilderness boundary would negatively affect the undeveloped quality of wilderness character and naturalness to a small degree adjacent to but outside of the wilderness.

3.15.2.1.3 *W1 Alternative 3*

This alternative would not include any developments adjacent to the wilderness, and the 38 acres of wilderness would remain within the BCA, as part of the new Hardie Summer FFR. Grazing could occur from July 1 to December 31, and use would be expected to be similar in distribution to Alternative 1. However, AUMs would be increased in all allotments under this alternative, which would result in a higher stocking rate than previously occurred or would occur under other alternatives. A higher stocking rate would result in each animal grazing fewer acres, and more animals may be seen within the wilderness. However, thresholds would still be present, limiting use, and use would be required to continue to achieve S&Gs, protecting conditions within the wilderness. Though this pasture would become part of an FFR, with reduced monitoring and active management, the location and small size of this wilderness portion already receives minimal use and monitoring, therefore, it is not expected that there would be any change to those components compared to other alternatives.

3.15.2.1.4 *W1 Alternative 4*

No new developments would be constructed adjacent to the wilderness, and the 38 acres of wilderness would remain within the Hardie Summer Allotment of the BCA. This alternative includes a roughly 50 percent reduction in permitted AUMs, and no livestock grazing would be authorized in portions of the Hardie Summer Allotment where ecological objectives are not currently achieved, with a more restrictive season of use, and no use in consecutive years. This would result in less chance for livestock or permittees being seen within the wilderness, resulting in a slight increase in opportunities for solitude compared with other grazing alternatives with more AUMs and longer seasons of use. Reduced AUMs could also reduce the risk of livestock and permittees spreading weeds, though wildlife and recreation would still be vectors, similar to all other alternatives.

3.15.2.1.5 *W1 Alternative 5*

The No Grazing Alternative would continue the current suspension of grazing. No developments would be constructed adjacent to the wilderness. Wilderness characteristics would remain in their current condition and would not experience any effects from the reintroduction of grazing or related permittee actions.

3.15.2.2 **W1 Cumulative Effects**

The CEAA for wilderness is the Steens Mountain Wilderness. RFFAs that may result in cumulative impacts includes continued weed treatments, fire, and the Steens Mountain Back Country Byway Restoration, which would allow for the entire loop road to be opened (it was closed due to unsafe conditions following a rockfall in 2023). While weed treatments would continue to promote ecological conditions, and the road rehabilitation would allow easier access for visitors into the wilderness, there would not be any measurable cumulative effects to wilderness under any BCA alternative.

3.16 Wilderness Study Areas (WSA)

3.16.1 WSA Affected Environment

WSAs are managed in accordance with the BLM's WSA Manual 6330 (Bureau of Land Management 2012a). The Congressional mandate of non-impairment, the primary standard for management, directs land under wilderness review be managed so as not to impair its suitability for preservation as wilderness. Wilderness values, described in Section 2(c) of the Wilderness Act of 1964 (Pub. L. 88-577), must be protected in WSAs. The initial task of identifying areas suitable for wilderness preservation has been completed as mandated in the Federal Land Policy and Management Act (FLPMA) Section 603 and is documented in BLM's 1979 Wilderness Review – Initial Inventory Final Decision on Public Lands Obviously Lacking Wilderness Characteristics and Announcement of Public Lands to be Intensively Inventoried for Wilderness Characteristics (Bureau of Land Management 1979) and Wilderness Inventory Oregon and Washington Final Intensive Inventory Decision (Bureau of Land Management 1980), which were followed by the 1991 Wilderness Study Report (Bureau of Land Management 1991). While the BLM no longer designates wilderness study areas (WSA), it must manage all those currently under its jurisdiction to preserve their wilderness characteristics until Congress either releases them from WSA status or designates them as wilderness. Wilderness characteristics include naturalness, outstanding opportunities for solitude, outstanding opportunities for primitive and unconfined recreation, and the presence of supplemental values (Bureau of Land Management 2012a). The area must also be roadless and at least 5,000 acres (with some exceptions). If an area is found to have naturalness, outstanding opportunities for solitude or outstanding opportunities for primitive and unconfined recreation, and meets the size requirement, the area is determined to have wilderness characteristics. Supplemental values are not required for wilderness characteristics to be present but add to the overall wilderness value of the area. The following definitions are from BLM Manual 6330 (Bureau of Land Management 2012a).

- *Naturalness* refers to an area that “generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable.”
- *Solitude* is defined as “the state of being alone or remote from habitations; isolation. A lonely, unfrequented, or secluded place.”
- *Primitive and Unconfined Recreation* is defined as non-motorized and undeveloped types of outdoor recreation activities.
- *Supplemental Values* are listed in the Wilderness Act as “ecological, geological, or other features of scientific, educational, scenic, or historical value.”

WSA Manual 6330 (Bureau of Land Management 2012a) takes precedence over other management direction unless the latter is more restrictive and protective than WSA Manual 6330, in which case the more restrictive management is followed. WSA Manual 6330 (Bureau of Land Management 2012a) states activities must comply with specific policy guidance, including the non-impairment criteria. There are seven classes of allowable exceptions to the non-

impairment standard defined in Section 1.6.C.1 in BLM Manual 6330 (Bureau of Land Management 2012a). One of the exceptions, exception f., to the non-impairment standard is “[a]ctions that clearly benefit a WSA by protecting or enhancing these characteristics are allowable even if they are impairing, though they must still be carried out in the manner that is least disturbing to the site” (Bureau of Land Management 2012a: 1.6.C.2.f.). The manual also allows for new livestock developments under certain circumstances: “New livestock developments may only be approved if they meet the non-impairment standard or one of the exceptions, such as protecting or enhancing wilderness characteristics” (Bureau of Land Management 2012a: 1.6.D.3.a.ii.).

Under Title II, Section 204(b) of the Steens Act and Section 603(c) of FLPMA, the Secretary shall manage lands, according to his authority and other applicable laws, in a manner so as not to impair the suitability of such areas for preservation of wilderness, prevent unnecessary or undue degradation of the lands and their resources, or to afford environmental protection. While at the same time under the Section 102 of the Steens Act, BLM must emphasize conserving, protecting, and managing the long-term ecological integrity of Steens Mountain, and to promote grazing, recreation, historic, and other uses that are sustainable. Compliance with Section 603(c) of FLPMA is based on guidance provided in BLM’s Manual 6330 (Bureau of Land Management 2012a). The BLM’s management policy is to continue resource uses on lands designated as WSAs in a manner that maintains the area’s suitability for preservation as wilderness as long as the use meets the non-impairment standard or exception (Bureau of Land Management 2012a: 16.B.).

The off-highway vehicle (OHV) and mechanized vehicle use in WSAs is limited to existing and designated ways unless the WSA is completely closed to OHV and mechanized vehicle use. Existing ways are those existing at the time of the wilderness inventory. Ways may be closed due to resource concerns. Use of OHVs and mechanized vehicles, including mountain bikes, is only allowed on existing ways and within open areas designated prior to passage of the FLPMA (October 1976).

Grazing, mining, and mineral leasing uses and facilities that were allowed on the date of approval of FLPMA (October 21, 1976)—or the designation date for Section 202 WSAs not reported to Congress—are grandfathered (i.e., allowed as a pre-existing use). As provided for in FLPMA Section 603(c), these uses and facilities may continue in the same manner and degree as on that date. The benchmark for the “manner and degree” of an existing use is the physical and visual impact that use was having on the area on October 21, 1976. Wilderness inventories were conducted in Oregon in 1979 (Bureau of Land Management 1979). In 1980 final inventory decisions were made (Bureau of Land Management 1980).

The BCA includes 8,612 acres of the Bridge Creek WSA, which is the only WSA within the planning area. Wilderness characteristics of this WSA were first described in the BLM Oregon and Washington *Final Intensive Inventory Decisions* (Bureau of Land Management 1980). The Bridge Creek WSA totaled 14,545 acres; 14,060 acres of BLM-managed land with a 40-acre private property parcel and 485 acres of split estate land located in the northern portion. The dominant vegetation is big and low sagebrush, and western juniper, with perennial bunchgrasses.

Riparian vegetation occurs along Mud Creek and the lower portion of Bridge Creek. The Bridge Creek and Mud Creek drainages are the primary topographic features. The Bridge Creek WSA was modified to include 485 additional acres after the BLM acquired jurisdiction over surface management from the State, though the State of Oregon has retained subsurface mineral estate. The wilderness characteristics identified in the 1991 report (Bureau of Land Management 1991) are summarized here.

- **Naturalness:** The WSA is in a relatively natural condition and contains 32 unnatural features (21 reservoirs, 4 fences totaling 6 miles, 6 ways totaling 7 miles, and 1 crested wheatgrass seeding of about 1,200 acres). The majority of the developments are scattered throughout the WSA in the areas between canyons, although a few reservoirs occur along the northern boundary. An estimated 12 percent of the WSA is influenced by human development. Reservoirs have the largest influence, but their locations often reduce overall visibility.
- **Solitude:** Topographic and vegetative screening, as well as the size of the WSA, provide areas where visitors can find a secluded spot. However, this screening is primarily limited to the Bridge Creek and Mud Creek canyons and the eastern part of the WSA. The western portion of the WSA offers little screening or cover.
- **Recreation:** The WSA offers opportunities for hiking, camping, backpacking, horseback riding, fishing, and hunting (elk, mule deer, pronghorn antelope, and chukars).
- **Special Features/Supplemental Values:** Special features include wildlife, cultural resources, and scenic features that add to the value of the study area as wilderness. This WSA contains crucial mule deer winter range, high quality raptor nesting, and a GRSG strutting ground. The WSA also contains redband trout, a native fish with a limited range.

Current conditions of the WSA are consistent with what was included in the 1991 report (Bureau of Land Management 1991); however, changes to vegetation have occurred in response to fire and the increase in invasive annual grasses, as previously described within this document. No new developments within the WSA since 1991 are known to have been constructed.

3.16.2 WSA Environmental Consequences

3.16.2.1 WSA Issue 1: How would the proposed livestock grazing management, including season of use and AUM levels, impact wilderness characteristics in the Bridge Creek WSA and meet the non-impairment standard or an exception to the standard?

3.16.2.1.1 WSA1 Alternative 1

This alternative proposes no new developments and is a continuation of the grazing use prior to suspension of grazing permits in 2014. In the Mud Creek Allotment, where the majority of the WSA occurs, there would be a short grazing season, from May 16-June 30. AUMs would be permitted at the previous level of use. As terms and conditions on the permit would be the same

as on the previous permit, there would be no changes that would work to improve ecological conditions or naturalness, beyond what occurred in the past, under this alternative.

Livestock grazing would be permitted to occur with the same number of AUMs as was occurring when the Bridge Creek WSA was designated. Due to that, this grazing is considered a grandfathered use and allowed to continue. The resumption of grazing may have a minor, immeasurable impact on solitude since livestock grazing hasn't occurred regularly since 2013. The resumption of grazing would result in an increase in presence of livestock managers within the allotment when livestock are present above what has occurred since 2013; however, the impacts to solitude would be similar to what was occurring prior to 2013. The WSA Inventory (Bureau of Land Management 1980), completed when grazing was occurring, for the Bridge Creek WSA was identified as strongly contributing to opportunities for solitude and primitive and unconfined recreation in the WSA. The operations and vehicle use associated with the resumption of grazing at the pre-2014 level would not have a detrimental effect on those values; given that this level of grazing and the associated level of operation work were occurring at the time of the inventory. Therefore, this alternative would not remove these qualities from the WSA. There would be no new effect to outstanding opportunities for primitive and unconfined recreation and that wilderness characteristic would be unchanged.

Under this alternative, livestock grazing would be permitted to occur during the same season as previously authorized, and that was occurring when the WSA was designated. Due to that, this grazing is considered a grandfathered use and allowed to continue.

Grazing treatments within the Mud Creek Allotment would be limited to just the graze treatment, which means grazing could only occur when perennial bunchgrasses are growing and most susceptible to damage from livestock grazing. While a rest/graze rotation would occur, the ability to utilize livestock grazing as a tool to improve ecological conditions by grazing during a defer treatment, addressing fine fuel accumulations and grazing green invasive annual grasses, when perennial grasses are dormant, as recommended in Smith et al. (2012), would be limited under this alternative.

In the portion of the WSA within the Hammond Allotment, there would be more opportunity to adjust grazing, as the season of use would allow for early, graze, defer and some winter grazing. This would allow livestock grazing when perennial grasses are dormant, reducing the potential for negative effects on perennial species, while allowing for fine fuel reduction and grazing of annual grasses to occur outside of the growing season. This would have positive effects on ecological conditions, though, since flexibility would still be limited, these positive effects would be less than under Alternatives 2 and 3.

Livestock would be allowed to graze within the allotments under this alternative, removing residual fine fuels. Removing these fuels would reduce the risk for catastrophic wildfire that would have a negative effect on ecological health within the WSA if it were to occur, especially in areas that currently have a high number of annual grasses, since those areas have less ability to recover naturally. Catastrophic wildfire that removes desired perennial vegetation and is followed by increases in invasive annual grasses would have a negative effect on naturalness.

Therefore, resumption of grazing could potentially result in an increased protection of naturalness due to reduction of risk of catastrophic wildfire (see Grazing Management and Vegetation sections for detailed information).

Unique, supplemental, or other features would not be affected beyond what has historically occurred under this alternative. Development and maintenance would continue to occur but would not impact wilderness characteristics beyond what previously occurred. Overall, there would be no measurable changes to naturalness, solitude, primitive and unconfined recreation, or supplemental values under this alternative.

3.16.2.1.2 WSA1 Alternative 2

Grazing at the AUM level established in 1976 is a grandfathered use in the wilderness and WSA and would continue under this alternative. There would be an increase in permitted AUMs within the Hammond Allotment, which includes a portion of the Bridge Creek WSA within the Knox Spring Pasture; however, this increase would not occur in the Bridge Creek WSA, as a new term and condition would limit use in the associated pasture to 356 AUMs, which is consistent with those authorized during the 1976 grazing year. Under this alternative, there would be no increase in AUMs within the Bridge Creek WSA. Therefore, effects to wilderness values under this alternative would be the same as under Alternative 1.

Currently, utilization thresholds are 50 percent for native species and 60 percent for desirable non-native species; this is a decrease in the threshold from the 1984 Andrews FEIS, which set the threshold at 60 percent on all native plants. Therefore, utilization levels under this alternative are less than what was occurring in 1976.

Effects to wilderness values from grazing under this alternative would be similar as under Alternative 1. However, under this alternative, livestock management would be improved through an increased season of use within the WSA, as well as the non-WSA. The permitted season of use within the BCA areas associated with the WSA would be extended to allow grazing to occur at any time of year to address ecological conditions and allow for flexibility and adaptive management, as well as improved grazing systems. Under BLM policy, changes in grazing practices in WSAs from what was authorized in the 1976 grazing fee year must meet the non-impairment standard or one of its exceptions. Since the proposed change in season of use is not temporary it does not meet the non-impairment standard. The change in season of use does, however, meet an exception (exception F) to the non-impairment standard by protecting or enhancing the naturalness component of wilderness characteristics.

While the permitted season of use would be year-long, grazing would not occur year-long and would follow the general grazing rotation described under the alternative, which would ensure each pasture receives periodic growing season rest. In addition, the utilization thresholds would still occur, as would the requirement that S&Gs continue to be achieved or that, if not achieved, livestock are not a causal factor. The limitations that would be placed on livestock grazing would ensure that livestock grazing would only occur during a portion of the permitted season of use in

each pasture, and livestock would be removed once thresholds are met. The specific dates when each pasture would be grazed annually would be specified in an annual letter of authorization.

Allowing for a longer season of use would allow the BLM and permittee(s) to utilize grazing as a tool to reduce fuel loading from standing vegetation, including invasive annual grasses, which may result in a decrease in catastrophic fire risk and fire severity. This would improve the long-term ecological condition of the WSA since annual grasses and other noxious weeds often increase following fire and make rehabilitation more difficult. Protecting this area from severe or catastrophic wildfire would help ensure S&Gs continue to be achieved in the future. It would also allow more grazing to occur later in the year when perennial grasses are dormant, which would allow perennial species to periodically complete a full lifecycle, establish roots, and produce seed, all of which are beneficial in establishing vigorous vegetation that can compete better with annual grasses. See sections on Grazing Management and Vegetation for more details on how proposed grazing management would allow for improved ecological conditions, which improve and protect naturalness.

Promoting ecological health has a positive impact on feelings of naturalness and meets an exception to the non-impairment standard. This change of season of use may affect some visitors' perceptions of solitude and primitive and unconfined recreation experiences since there would be an increased presence of livestock managers during times when they have not previously been within the area on a regular basis checking livestock. Depending on the individual's values, this effect may be negative or positive.

NR use would potentially be authorized in years of favorable precipitation and high production only within the portion of the WSA found within the Mud Creek Upper Field. NR use is a temporary action allowable within WSAs and would be authorized as described under the alternative description. As NR use is currently limited by utilization, 50 percent on native key species and 60 percent on desirable non-native key species, and these utilization limits would continue, the use of NR AUMs would not have any additional effects on WSAs. The establishment of terms and conditions associated with NR use under this alternative would reduce any potential temporary negative impacts to wilderness character and ecological health, especially the term and condition which limits NR grazing to areas where permitted utilization was less than 35 percent. The establishment of terms and conditions associated with NR use under this alternative would reduce any potential temporary negative impacts to wilderness character and ecological health, especially the term and condition that limits NR grazing to areas where permitted utilization was less than 35 percent.

Under this alternative all developments would receive maintenance to allow for continued functioning. Maintenance of reservoirs and waterholes would provide the most short-term (<1 year) disturbance. Dozers or excavators would be used to clean these water developments. These are transported with a truck and lowboy as close to the work site as they can be then driven cross-country to the actual location to do the work. Surface disturbances in the form of tracks left in the soil, crushed vegetation, or steel track cleats chipping boulders along the route may occur. These disturbances are temporary and, except for the chipped rock, vanish after a growing season. The chipped rock weathers and becomes substantially unnoticeable. Surface disturbance

is temporary. Over time, estimated to be a minimum of one growing season, the disturbance would fade, and vegetation would reclaim the area. Therefore, these maintenance activities would not have any long-term effect on wilderness characteristics.

3.16.2.1.3 WSA1 Alternative 3

Impacts would be similar to those described under Alternative 2; however, there would be more impacts to wilderness characteristics under this alternative as AUMs would be increased within the WSA, grazing management would not have a general grazing rotation, and the Bridge Creek corridor would be made available to grazing.

Impacts to primitive and unconfined recreation would be the same as described under Alternative 2, though there would be increased risk for visitor conflict due to increased presence of livestock and the permittee. However, this alternative would have more impacts on solitude. One area where this would occur would be within the Bridge Creek corridor, which has previously been excluded from all grazing. The presence of livestock and permittee(s) within the Bridge Creek drainage may reduce the feelings of solitude that visitors have come to expect even prior to 2014, when livestock were still present in other areas of the WSA. As no grazing has been occurring within the Bridge Creek drainage for decades, visitors would feel a larger decrease to solitude when compared to the resumption of grazing in other portions of the WSA. In addition, as more AUMs would be authorized under this alternative, it is expected that livestock would be present either in higher numbers or for a longer amount of time than would occur under any of the other alternatives. This would likely result in a permittee taking more trips into the WSA, which could further reduce the feelings of solitude, though the magnitude of this would be difficult to measure.

This alternative would include a permanent increase in AUMs in all allotments, including within the WSA. Within the Mud Creek Allotment, which contains the majority of the WSA within this area, AUMs would be increased by 69 percent. AUMs within the Hammond Allotment would also be increased and could be used in any pasture including Knox Spring. As described in the Grazing Management section, proposed AUMs under this alternative would exceed estimated carrying capacity and increase livestock AUMs above what was authorized in 1976, requiring the proposed management to meet an exception to the non-impairment standard. However, unlike under Alternative 2, this alternative is not expected to meet the exception as grazing management would not be as likely to improve ecological conditions and naturalness.

While grazing utilization thresholds of 50 percent on native key species and 60 percent on desirable non-native species would still be in place, there would be no general grazing rotation to ensure that grazing management would provide all pastures periodic growing season rest. Without a general grazing rotation in place, it is likely that pastures could go longer periods prior to receiving growing season rest. As more AUMs could be utilized under this alternative, and as NR AUMs would be authorized in all areas, any time that permitted utilization was less than the threshold, it is more likely that grazing would meet these utilization thresholds regularly. While thresholds are in place to protect ecological conditions, the high number of permitted AUMs and the lack of terms and conditions for NR AUM authorization, this alternative would not be

expected to improve ecological conditions, but to only maintain them, potentially with a downward trend depending on how actual grazing occurred over time.

When managed properly, grazing under this alternative could protect perennial bunchgrasses (would maintain or improve their conditions, abundance, and vigor), while removing fine fuels and reducing the catastrophic fire risk, which could protect naturalness from the negative effects that follow a catastrophic fire, such as an increase in invasive annual grasses. However, if grazing does not protect perennial bunchgrasses, and results in a decline of the health, vigor, and abundance over time, then even fires that burn at a lower severity could be catastrophic as vegetation communities may not be as resilient or resistant to the associated negative effects of fire. Due to the lack of a general grazing rotation and specific terms and conditions that would ensure naturalness would be improved, it is not likely that naturalness would be improved or protected in the long term. While thresholds and responses would remain in place, under this alternative, the risk of exceeding those thresholds would be higher, further increasing the risk of negative impacts to ecological conditions and associated naturalness. This alternative would have the lowest risk of fire spread as it would result in the most fine fuels being removed, which could protect naturalness.

Without having a general grazing rotation that specifies which grazing treatments would typically be used, it is difficult to estimate what the direct effects of grazing would be on ecological conditions, even with the utilization thresholds in place. However, the requirement that grazing continue to achieve S&Gs, or not be a causal factor in not achieving S&Gs, would be expected to protect the WSA from negative impacts to ecological condition and associated naturalness, though conditions would have the highest risk of negative impacts under this alternative.

3.16.2.1.4 WSA1 Alternative 4

This alternative includes a reduction in permitted AUMs, resulting in only about half the AUMs authorized in Alternative 1 being authorized under this alternative, along with the term and condition that no livestock grazing would be authorized in portions of the Mud Creek and Hardie Summer Allotments where ecological objectives are not currently achieved. In addition, this alternative proposes a shortened season of use, with an emphasis on rest during the growing season. The reduced number of AUMs proposed under this alternative, along with a shorter season of use, would result in the permittee requiring fewer trips into the WSA to check or move livestock. Fewer trips by the permittee would increase the feelings of solitude within the WSA as there would be fewer opportunities and reduce risk of conflict with other visitors. Under this alternative there would be no impacts to primitive and unconfined recreation as all opportunities would continue to exist, though there would be a reduced risk of conflict with livestock due to reduced presence within the WSA.

With fewer AUMs being utilized under this alternative compared to other grazing alternatives, there would be reduced removal of fine fuels, and this alternative would have the highest risk of catastrophic wildfire compared to other grazing alternatives. This would result in an increased risk of catastrophic wildfire due to fine fuel accumulation, which would be more likely to result

in perennial vegetation mortality and would open the area up to increased invasion by invasive annual grasses and noxious weeds, potentially reducing the ability of the site to recover to a healthy ecological condition that benefits naturalness and supports outstanding opportunities for solitude and recreation. Catastrophic wildfire risk would be less under this alternative compared to Alternative 5.

Under this alternative, the season of use of grazing within the WSA would be changed from what was authorized in 1976 and would have to meet an exception to the non-impairment standard. In the portion of the Bridge Creek WSA that is within the Hammond Allotment, the season of use would be the same length as under Alternative 1 but would be moved to August 1 through February 28. Within the Mud Creek portion of the WSA, the season of use would be extended from one and one-half months under Alternative 1, to 5 months under this alternative. In addition, the season of use would be changed from May/June to August through December. These changes would result in all grazing being defer/winter and would result in less flexibility and ability to utilize adaptive management to use grazing as a tool to improve ecological conditions. Under this alternative, livestock could still be used as a tool to target annual grasses in the fall and early spring, when they may green up. This could help reduce invasive annual grasses and promote desirable perennial grasses. While grazing during this period would have no short- or long-term impacts on perennial grasses (as they would be dormant during grazing), grazing later in the year often results in livestock grazing riparian vegetation more, which tends to be green and more palatable into the year. This would have minimal impact on the naturalness within the WSA as riparian areas are limited to water gaps, though use in those areas would increase and naturalness within them may decrease.

3.16.2.1.5 WSA1 Alternative 5

Under this alternative, livestock grazing, and associated operations, would no longer occur within the Bridge Creek WSA; therefore, there would be positive effects to solitude due to fewer visitor interactions with livestock managers. In addition, over time naturalness would improve at range development sites as the range developments would no longer be maintained unless needed for other resources. Ecological processes would be affected primarily by the forces of nature. Livestock trails or areas where livestock have concentrated would become less visible over time as vegetative cover replaced bare mineral soil. This would protect and enhance naturalness. Since grazing is considered a grandfathered use, the removal of grazing would not increase the ability of this area to be considered wilderness above any of the other alternatives. The No Grazing Alternative would maintain the existing opportunity for solitude and primitive unconfined recreation, with no risk of visitor conflict with livestock or permittees (though conflict risk would still occur between visitors).

As no grazing would be authorized, grazing would not be used as a tool to reduce fine fuels, or to graze invasive annual grasses to promote perennial grasses. The abundance of both perennial and annual grasses would not be modified by livestock, nor would naturalness associated with ecological conditions.

Without grazing by livestock in this area, the risk of a catastrophic wildfire due to fine fuel accumulation would be increased, and the accumulation of fine fuels may result in the increased mortality of desirable perennial species (see Grazing Management and Vegetation sections). Fire in the area would likely be catastrophic and have a negative impact with higher perennial species mortality and increased risk of dominance by invasive annual grasses following fire; this would result in a negative impact to naturalness and outstanding opportunities for primitive and unconfined recreation.

3.16.2.2 WSA Issue 2: How would the proposed developments, including the proposed pasture boundary fences within the Bridge Creek WSA, impact wilderness characteristics and meet the non-impairment standard or an exception to the standard?

Table 3-41 summarizes the estimated area where naturalness would be influenced by developments proposed under each alternative. In some cases, the disturbances associated may overlap, resulting in the total disturbance being overestimated.

Table 3-41: Estimate of Acres in Each WSA Affected by Alternative

ALTERNATIVE	PROPOSED DEVELOPMENT OR MAINTENANCE	LENGTH (NUMBER OF MILES)	ACRES AFFECTED PER DEVELOPMENT	TOTAL ACRES AFFECTED	% OF WSA
Alternative 1	Existing Water Development Maintenance	14	0.1	1.4	0.0096
Alternative 1 Total				1.4	0.0096
Alternative 2	Existing Water Development Maintenance	14	0.1	1.4	0.0096
	Bridge Creek Water Gap Extension	0.20	60 acres/mile	12	0.0825
Alternative 2 Total				13.4	0.0921
Alternative 3 ¹¹⁸	Existing Water Development Maintenance	14	0.1	1.4	0.0096
	Fence Construction	3.42	60 acres/mile	205.2	1.4108
	Fence Removal ¹¹⁹	1.01	60 acres/mile	60.6	0.4166
Alternative 3 Total				146	1.0038

While there are other proposed developments considered within the BCA, only the Alternative 2 Bridge Creek water gap extension, and Alternative 3's Bridge Creek water gap removal, Canyon Pasture fence construction, and removal of Hammond Allotment/Mud Creek Allotment boundary fence occur within the Bridge Creek WSA.

3.16.2.2.1 WSA2 Alternative 1

Under Alternative 1, there are no proposed developments within the BCA. Therefore, there would be no direct impacts to wilderness characteristics from proposed developments under this alternative.

The existing Bridge Creek water gap would continue to help limit the ability of livestock to access the Bridge Creek drainage. Some livestock may still be able to get around the fences and

¹¹⁸ As the proposed new pipeline and troughs are not within an existing WSA, they are not considered within this table.

¹¹⁹ These would be positive impacts on wilderness characteristics.

topographic barriers, and may access the drainage on occasion, as has occurred occasionally in the past. When livestock do get around the existing water gap and into the drainage, they are able to walk up and down the Bridge Creek drainage unimpeded and unmanaged since their presence in the drainage may not be known right away. This could result in negative ecological impacts to the riparian area since any livestock that do get into the drainage would graze and loaf in that area until the permittee realizes they got in there and removes them. Negative impacts to ecological conditions could result in negative impacts to naturalness, especially if this occurs multiple years in a row or for long periods of time. The presence of cows may result in a perceived decrease in solitude, similar, though less to what was described under WSA1 Alternative 3. As this would not be expected to occur regularly, or by a large number of animals, it is not expected that it would result in a measurable reduction in naturalness or solitude.

3.16.2.2.2 WSA2 Alternative 2

Under Alternative 2, the Bridge Creek water gap would be modified, including extending existing water gap fences; approximately 0.20 mile of new fence would be constructed within the WSA. This alternative would increase the effectiveness of the water gap compared to Alternatives 1, 3, and 4. The fence would prevent livestock from getting around the fences or topographic features that currently form the water gap. It would ensure that livestock are not able to walk up or down the Bridge Creek drainage and removes the risk of impacts to naturalness and solitude within the drainage. These fences would meet an exception to the non-impairment standard by protecting and enhancing the wilderness characteristics of naturalness and solitude. Due to the small area of the water gap, it is expected that there would be an overlap of the acres already affected by the existing water gap fence with the acres that may be affected by the extended fence under this alternative (i.e., not all affected acres would be newly affected but may also be currently affected by the existing fence). The construction of these additional fences within the water gap would negatively affect naturalness on no more than 12 acres of the WSA. Due to potential overlap of affected areas this acreage is likely overestimated. Excluding livestock from within the Bridge Creek drainage may increase opportunities for solitude as it would be less likely that the permittee would be in the drainage looking for their livestock at times outside of their regular livestock management activities. In addition, excluding livestock from within the drainage would reduce grazing and loafing that would occur in the Bridge Creek drainage and any associated riparian areas, and preserve the area's naturalness by protecting its ecological conditions. While livestock have not been found to be a causal factor in not achieving riparian Standards, fully excluding livestock from this drainage would fully remove the risk that livestock grazing would result in long-term damage to these riparian areas in the future and would allow riparian ecological conditions within the Bridge Creek drainage an opportunity to continue to improve without the potential for unauthorized livestock grazing to cause any disturbance.

The fence construction would result in some short-term (less than 5 years) soil and vegetation disturbance; however, blading along the fence would not be allowed and only areas needing spot removal of rock or vegetation would occur, ensuring the visual impact of the fence on naturalness would be minor.

This fence would clearly benefit the WSA by protecting, and potentially enhancing, the Bridge Creek drainage, which provides (along with the Mud Creek drainage) the primary solitude associated with this WSA. The BLM has determined that the enhancement of naturalness and solitude through the exclusion of livestock outweighs the fence's negative impacts on the area's naturalness. Construction of these fences thus meets an exception to the non-impairment standard despite some negative impacts to the area's naturalness.

All other fencing would occur outside of the WSA, would not be directly adjacent to the WSA, and would not affect wilderness characteristics within the WSA.

Under Alternative 2, maintenance of existing developments would be allowed to occur, even within the WSA. Maintenance and equipment used for maintenance would have a short-term (<1 year) impact on naturalness where vegetation is disturbed. As all maintenance activities would occur within the original construction footprint of the development there would be no new impacts to naturalness from maintenance. Solitude and primitive recreation may be impacted while equipment and operators are present, but these impacts would be removed once maintenance work is completed. Impacts could be either visual or noise disturbance associated with the presence of development maintenance on visitor solitude or their experience and would be short term (minutes) and be limited to a visitor's direct encounter with a development as they pass by on foot, horseback, or in a vehicle.

3.16.2.2.3 WSA2 Alternative 3

Under this alternative, maintenance of existing developments would occur as described under Alternative 2.

Alternative 3 proposes approximately 1.01 miles of fence removed from within the Bridge Creek WSA, of that amount, approximately 0.31 mile would be the removal of the Bridge Creek water gap, and the remainder would be the removal of the Mud Creek Allotment/Hammond Allotment boundary fence. The Bridge Creek water gap would be completely removed.

Removal of the water gap would result in the removal of negative effects to naturalness on approximately 18.6 acres within the Bridge Creek WSA. However, this would open up the Bridge Creek drainage and associated riparian area to grazing as part of the proposed Canyon Pasture, which would have negative effects to wilderness characteristics as described under WSA1 Alternative 3.

Removal of the allotment boundary fence would result in removal of negative effects to naturalness on approximately 42 acres of the Bridge Creek WSA. However, removal of this fence could result in indirect negative effects as the boundary between the Hammond and Mud Creek Allotments would be based on topographical features and it would be expected that some livestock may be able to cross the boundary into areas where they are not currently authorized. This could result in negative impacts to ecological conditions, and therefore naturalness, due to uncontrolled grazing that would be occurring in an area and at a time when livestock are not

supposed to be present. How often this would occur is unable to be predicted; therefore, there is no way to determine if the negative impacts to naturalness would be measurable or not.

There would be some short-term (less than 5 years) disturbance to soil and vegetation from fence removal, but the direct effect of fence removal would not result in any direct long-term negative impact on wilderness characteristics.

Under this alternative, a new fence approximately 3.42 miles long would be constructed within the Bridge Creek WSA in order to construct a pasture boundary for the proposed Canyon Pasture. This new fence would affect naturalness on approximately 205.2 acres of the WSA. The proposed fence would have no direct effect on solitude or primitive and unconfined recreation in the area, but it could have a negative perceived affect when visitors have to cross through a new fence. The fence construction would result in some short-term (less than 5 years) soil and vegetation disturbance; however, blading along the fence would not be allowed and only areas needing spot removal of rock or vegetation would occur, minimizing the visual impact of the fence on naturalness. The new canyon pasture would be grazed regularly, opening the area up to livestock grazing as described under WSA1 Alternative 3.

Naturalness under Alternative 3 would be negatively affected on a net of 144.6 acres within the Bridge Creek WSA, which is approximately 1 percent of the total WSA area.

The creation of the South Granddad Pasture, enclosure of Granddad Reservoir, and associated livestock handling corrals proposed as part of this project occurring on BLM-administered lands, outside, but adjacent to, the Bridge Creek WSA, would be expected to have some influence on naturalness felt within the WSA. These effects would be limited, as most developments would occur along the outer edges of the WSA. Most acres of the WSA indirectly affected by these developments would still have a generally natural appearance but would have some visual or noise disturbance associated with the construction, maintenance, and presence of the proposed developments.

3.16.2.2.4 WSA2 Alternative 4

As there are no proposed developments under Alternative 4, the impacts to wilderness characteristics are the same as described under Alternative 1.

3.16.2.2.5 WSA2 Alternative 5

Under this alternative, no grazing would occur, and developments would only be maintained as needed for other resources. Therefore, as developments degrade and become less noticeable, there may be an increase in naturalness. However, as developments would not be fully removed under this alternative, the magnitude of impact on naturalness would be difficult to measure. There would be no direct impacts to solitude or recreation under this alternative; however, the perception of solitude may be increased as less maintenance activities would occur and there would be fewer interactions between BLM workers and visitors under this alternative.

3.16.2.3 WSA Issue 3: How would the proposed supplemental alfalfa hay feeding, within the Bridge Creek WSA, impact wilderness characteristics?

3.16.2.3.1 WSA3 Alternatives 1, 2, 4, and 5

Under these alternatives there is no proposed supplemental alfalfa hay feeding that would occur within the Bridge Creek WSA. No changes to naturalness, solitude, primitive and unconfined recreation, or supplemental values within the existing Bridge Creek WSA would occur from supplemental feeding of alfalfa hay under these alternatives.

3.16.2.3.2 WSA3 Alternative 3

Under this alternative, supplemental feeding of alfalfa hay would be permitted, as needed, for use as a protein supplement. Since supplementation using alfalfa hay would be required to occur at existing supplement locations that are already disturbed, no new areas would be created above what have occurred in the past. However, alfalfa hay as a supplement takes up more room than the other forms of supplements; it is expected that size of the existing disturbed supplement areas would increase, which would decrease naturalness in the area. Utilizing alfalfa hay as a supplement may require more trips by the permittee and may result in a decrease in solitude below what would occur under the other alternatives. During the 1976 grazing season supplementation was allowed to occur in the form of block, dry, or liquid, but there is no record of supplementation using hay occurring within the WSA. Therefore, while supplementation in block, dry, or liquid form is a grandfathered use within the WSA and does meet an exception to the non-impairment standard, supplementation using alfalfa would not improve naturalness or any other wilderness characteristics and would not meet an exception to the non-impairment rule.

3.16.2.3.3 WSA Cumulative Effects

The CEAA for WSA is the Bridge Creek WSA, located within the BCA. RFFAs in the CEAA that may contribute to cumulative effects to WSA include ongoing noxious weed treatments, fire, restoration treatments, specifically juniper treatments, recreation, and existing development maintenance.

Equipment used for maintenance may include large-tracked vehicles such as an excavator, or rubber-tired vehicles such as a backhoe. Seeding maintenance may include reseeding by hand or aurally. All maintenance activities would occur within the original construction footprint of the development. Removal of vegetation would be the minimal amount required to maintain the developments.

Continued livestock grazing in areas adjacent to the Bridge Creek WSA would indirectly impact the WSA through reduction of fine fuel loading, which could limit the size and severity of a fire if ignition occurred. This would reduce the risk that ignition outside of the Bridge Creek WSA and BCA would spread to within the WSA, though it would still be possible.

Weed treatments, specifically those focused on invasive annual grasses, would reduce the presence and density of invasive annual grasses and provide an opportunity for existing or seeded desirable vegetation to increase in vigor and abundance, limiting future dominance by annual grasses, promoting ecological health, and increasing naturalness. While weed treatments are not known to fully remove invasive annual grasses, a reduction in their dominance would be expected to result in decreased fine fuel loading and decreased risk of a catastrophic fire occurring that would further reduce perennial vegetation and promote annual grasses. Weed treatments combined with proposed actions would be expected to improve ecological conditions within the WSA, though alternatives with increased risk of catastrophic fire could cumulatively result in negative impacts to vegetation in the CEAA if fire were to occur.

Restoration actions would work to move the systems towards what would be expected on the site per ESDs, whether this restoration comes in the form of juniper removal or seeding/planting of desirable species. Sites that have characteristics closer to a reference community are more likely to have increased resilience and resistance in the event of disturbance. These sites typically see lower fire severity, with higher mosaic patterns, which results in less mortality. Restoration actions, in combination with proposed actions involving grazing, would result in ecological conditions that are healthier, though improvement may be difficult to measure. Juniper treatments, specifically the cutting of juniper trees, would result in stumps with an unnaturally flat surface. This would have a negative impact on naturalness in the short term (<5 years). However, in the long term (>5 years), as surrounding vegetation increases in abundance and vigor, and the stump weathers, the improvements to naturalness would outweigh the short-term decrease in naturalness. Where piles are burned, an unnatural mosaic of burned areas would be obvious in the short term, but naturalness in these areas would increase in the long term as vegetation becomes re-established within the burned areas. In combination with no grazing, these actions may help reduce the risk of catastrophic wildfire and protect desirable vegetation; however, there would be an increased risk of catastrophic wildfire due to increased fine fuel accumulation following juniper removal. If an ignition were to occur, the negative effects to the CEAA would be negative and likely measurable.

None of the RFFAs would result in a long-term or permanent negative effect on wilderness characteristics.

4 CONSULTATION AND COORDINATION

4.1 Tribes, Individuals, Organizations, or Agencies Consulted

NAME	PURPOSE & AUTHORITIES FOR CONSULTATION OR COORDINATION	FINDINGS & CONCLUSIONS
Burns Paiute Tribe	Consultation as required by the American Indian Religious Freedom Act of 1978 and National Historic Preservation Act of 1966.	The project was presented and discussed with the Burns Paiute Tribe Cultural Heritage Director on November 9, 2020, during the BLM Burns District quarterly meeting with the Tribe, via Zoom. This meeting was considered government-to-government consultation for the EIS.
Livestock Grazing Permit Applicants	Consultation, cooperation, and coordination with the three applicants for available forage, as required by 43 CFR §4100	Alternatives and issues brought up during consultation, cooperation and coordination have been incorporated into Chapter 2.
Oregon Department of Fish and Wildlife (ODFW)	ODFW was notified via email on October 6, 2020, of the proposal to issue grazing permit(s) and mailed a scoping letter requesting their input on the proposed alternatives and any issues.	ODFW suggested BLM consider the location of GRSG leks related to new fence construction and timing of construction activities near lek sites outside of the breeding season to avoid disturbance. These concerns are incorporated into the EIS at 2.2.2 Required Design Features (RDF) (from the GRSG ARMPA (Bureau of Land Management 2015a)).
U.S. Fish and Wildlife Service (USFWS)	No formal consultation is required for this project; however, a scoping letter was mailed to USFWS requesting their input on the proposed alternatives and any issues.	USFWS submitted a letter dated November 3, 2020, recommending BLM follow applicable “Management Decisions” in the GRSG ARMPA (Bureau of Land Management 2015a), specifically those in Section 2.2.4 Livestock Grazing and Range Management. Also, GRSG ARMPA appendix C: RDFs regarding lek buffers, hourly restrictions, livestock concentrations, collision hazards, predator perches, and maintaining PFC in riparian/wetland areas. These concerns have been incorporated into Chapter 2, Section 2.2 2.2 Project Design Elements, Required Design Features, and Best Management Practices of the EIS.

4.2 Summary of Public Participation

The BLM began public outreach for this process during the 2020 BCA Environmental Assessment (DOI-BLM-ORWA-B060-2020-0001-EA) (Bureau of Land Management 2020b), where similar alternatives were proposed and presented to the public for their consideration. In December 2021, a Notice of Intent was issued in the Federal Register initiating a 30-day scoping period for this Draft EIS (Bureau of Land Management 2022a). Additionally, a scoping letter was mailed to interested publics to solicit issues and potential impacts and alternatives to be addressed in the Draft EIS (Bureau of Land Management 2022a). The scoping letter was also posted to BLM’s National NEPA Register (Bureau of Land Management 2022a). Separate letters were also mailed to the Burns Paiute Tribe and other agencies to invite them to be cooperating agencies on this project. This scoping period provided an opportunity to involve the public in the

NEPA process and helped the BLM gauge the concerns of those who have a stake in the management of the public lands in this area. The BLM received 61 scoping letters representing 9 organizations, two tribes, and 53 individuals. Of the individual letters, 23 were form letters, 8 of which provided BLM with additional unique comments. Those comments and concerns were brought forward as issues in Chapter 1 or incorporated into the alternatives described in Chapter 2.

4.3 List of Preparers

TEAM MEMBER	TITLE	ANALYSIS/RESPONSIBILITY
BLM Burns District Office		
Autumn Toelle-Jackson	Planning & Environmental Coordinator Andrews/Steens	Project Lead, NEPA, GIS
Rick Knox	Rangeland Management Specialist	Grazing Management, Vegetation
Jamie McCormack	District Rangeland Management Specialist	Grazing Management, Vegetation, Invasive Annual Grasses, Soils, BSC, ACEC, T&E Flora
Alec Barber	Natural Resource Specialist	Riparian, Fisheries, T&E Fisheries, Water Quality
Katie Rhode	Geologist	Geology, Minerals
Anna Gahley	Realty Specialist	Lands and Realty
Kyle Wanner	Outdoor Recreation Planner	Recreation, VRM
Holly Higgins	Wildlife Biologist	Wildlife, SSS, and T&E Fauna
Matt Obradovich	District Natural Resource Specialist	Wildlife, SSS, and T&E Fauna, Riparian, Fisheries, Water Quality
David Holst	Archaeologist	Cultural Resources, American Indian Traditional Practices
Melissa Murphy	GIS Specialist	GIS
Don Rotell	Andrew/Steens Field Manager	Review
BLM Oregon/Washington State Office		
Stewart Allen	Socioeconomic Specialist	Social and Economic Values

5 GLOSSARY

- A -

Access — The opportunity to approach, enter, or make use of public lands.

Acquisition — The act or process of acquiring fee title or interest of property.

Actions (Management) — Anticipated measures, which are considered by managers to achieve desired outcomes of a particular resource or resource use. Proposed management actions will authorize, recommend, or implement actions to address the purpose and need.

Active Use — The portion of the grazing preference that is currently authorized and available for livestock grazing use under a permit or lease. Active use may constitute a portion, or all, of permitted use. Active use does not include temporary nonuse or suspended use of forage (43 CFR 4100.0-5).

Actual Use — Where, how many, what kind or class of livestock, and how long livestock graze on an allotment, or on a portion or pasture of an allotment (43 CFR 4100.0-5).

Actual Use Report — A report of the actual livestock grazing use submitted by the permittee or lessee (43 CFR 4100.0-5).

Adaptive Management — A type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves testing, monitoring, evaluation, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify management policy.

Adjacent — Specific to an inventory unit and its relative location to a WSA. The inventory unit is “adjacent” to the WSA if the two are separated by a road or other human created (anthropomorphic) linear feature. See **Contiguous**.

Administrative Use — Travel-related access for official use by BLM employees and agency representatives during the course of their duties. Access is for resource management and administrative purposes and may include fire suppression, cadastral surveys, permit compliance, law enforcement, and resource monitoring or other access needed to administer BLM-managed lands or uses.

Allocations (Land Use) — Broad program classifications (based on desired future conditions) given to public lands. These determine whether certain categories of activities are allowed, restricted, or excluded in all or part of the planning area. For example, OHV allocations speak to where off-road use may occur within the planning area.

Allotment — An area of land designated and managed for grazing of livestock (43 CFR 4100.0-5). An allotment generally consists of Federal rangelands, but may include intermingled parcels of private, State, or other Federal lands.

Allotment Management Plan (AMP) — A documented program developed as an activity plan, consistent with the definition at 43 U.S.C. 1702(k), that focuses on, and contains the necessary instructions for, the management of livestock grazing on specified public lands to meet resource condition, sustained yield, multiple use, economic and other objectives (43 CFR 4100.0-5). A plan for managing livestock grazing on an allotment.

Animal Unit (AU) — One cow, one cow/calf pair, one horse, or five sheep.

Animal Unit Month (AUM) — The amount of forage necessary for the sustenance of one cow or animal unit for a period of 1 month (43 CFR 4100.0-5). Approximately 800 pounds of forage.

Apparent Trend — When trend appears to be moving in a direction.

Area of Critical Environmental Concern (ACEC) — Area 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 humans from natural hazards.

Authorized Officer — Any person authorized by the Secretary to administer regulations in this part (43 CFR 4100.0-5).

Available Forage — The portion of the forage that is accessible for consumption by a specified status of grazing animal.

- B -

Base Property — Land that has the capability to produce crops or forage that can be used to support authorized livestock for a specified period of the year (43 CFR 4100.0-5).

Basin (River) — In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.

Best Management Practices — A set of practices that, when applied during implementation of management actions, ensures that negative impacts to natural resources are minimized. Best management practices are applied based on site-specific evaluation and represent the most effective and practical means to achieve management goals for a given site. Often developed in conjunction with land use plans, they are not considered a land use plan decision unless specified as mandatory. They may be updated or modified.

Biological Soil Crusts (BSC) — Lichens, mosses, green algae, fungi, cyanobacteria, and bacteria growing on or just below the surface of soils.

Boundaries, Inventory Unit — Inventory unit boundaries are normally formed by wilderness inventory roads, property lines, developed rights-of-way, or other substantially noticeable imprints of human activity. Dead-end roads (cherry stem roads) extend into the unit and are excluded from the unit, which modify the unit boundary.

Broad Scale — A large regional area such as a river basin and typically a multi-state area.

Bureau of Land Management (BLM) — Government agency with the mandate to manage Federal lands under its jurisdiction for multiple uses.

- C -

Cancelled or Cancellation — A permanent termination of a grazing permit or grazing lease and grazing preference, or free-use grazing permit or other grazing authorization, in whole or in part (43 CFR 4100.0-5).

Candidate Species — Any species included in the Federal Register Notice of Review that are being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service.

Canopy — In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

Carrying Capacity — The average number of livestock and/or wildlife animals that may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity. It may vary from year to year on the same area due to fluctuating forage production (43 CFR 4100.0-5).

Catastrophic Fire — A fire with very high severity resulting in high mortality of vegetation.

Class of Livestock — Ages and/or sex groups of a kind of livestock.

Colluvium — Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Community — A group of species of plants and/or animals living and interacting at a particular time and place; a group of people residing in the same place and under the same government.

Complex, Soil — A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Connectivity — The degree that organisms or natural processes can move unimpeded across habitats – both terrestrial and aquatic. Natural and semi-natural components of the landscape must be large enough and connected enough to meet the needs of all species that use them.

Consultation — (1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups, and individuals; and (b) considers their interests as a necessary and integral part of the BLM's and Forest Service's decision-making process. (2) The Federal Government has a legal obligation to consult with American Indian Tribes. This legal obligation is based in such laws as NAGPRA, AIRFA, and numerous other Executive Orders and statutes. This legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision. (3) The term also refers to a requirement under Section 7 of the ESA for Federal agencies to consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service with regard to Federal actions that may affect listed threatened and endangered species or critical habitat.

Consultation, Cooperation, and Coordination (CCC) — Interaction for the purpose of obtaining advice, or exchanging opinions on issues, plans, or management actions (43 CFR 4100.0-5).

Contiguous — Specific to a wilderness characteristics inventory unit and its relative location to an established area with wilderness characteristics within the planning area. This term is used where a unit is contiguous to a WSA.

Control — Having any relationship which gives an entity or person authority directly or indirectly to determine the manner in which an applicant, permittee, or lessee conducts grazing operations. Being responsible for and providing care and management of base property and/or livestock. (43 CFR 4100.0-5).

Corridor (Landscape) — Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

Critical Habitat — Specific to geographic areas and designated by the USFWS, critical habitats are areas containing features essential to the conservation of an endangered or threatened species, which may require special management and protection. Critical habitat may also include areas that are not currently occupied by the species but needed for its recovery. Not all listed species have critical habitat designated.

Cumulative Action — Proposed actions, which, when viewed with the proposed action, potentially have cumulatively significant impacts related to one or more identified issues. Cumulative actions “should be discussed” in the same NEPA document (40 CFR 1508.25(a)(2)).

Cumulative Effect — “...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such actions” (40 CFR 1508.7) and (40 CFR 1508.25).

Custodial Allotment — The “custodial” category identifies allotments with a very low ratio of public land to private land, and low resource values. These allotments are lowest priority for monitoring efforts and receive minimal effectiveness and performance monitoring. Designated as a “C” allotment.

- D -

Design Features — Measures or procedures incorporated into the proposed action or an alternative, including measures or procedures that could reduce or avoid adverse impacts. Because these features are built into the proposed action or an alternative, design features are not considered mitigation.

Designated Road — Specific roads identified by the land management agency where some type of use (motorized or nonmotorized) is appropriate and allowed either seasonally or yearlong and which have been inventoried and mapped and are appropriately signed on the ground.

Desirable Non-Native Species — Non-native species such as crested wheatgrass and forage kochia that fill the niche of native species in order to outcompete non-native invasive species such as cheatgrass.

Dispersed Recreation — Recreation that does not occur in a developed recreation life; for example, hunting or backpacking.

District — The specific area of public lands administered by a District Manager.

Disturbance — Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, insects, and pathogens. Human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

Drainage, Surface — Runoff, or surface flow of water, from an area.

- E -

Earnings — Wages and salaries, other labor income, and proprietor’s income (including inventory valuation and capital consumption adjustments).

Easement — A document issued in replacement of an existing right-of-way grant over lands being transferred out of BLM management or Federal ownership.

Ecological Site Inventory (ESI) — The basic inventory of present and potential vegetation on BLM rangelands. Ecological sites are differentiated on the basis of the kind, proportion, or amount of plant species.

Ecological Status — The present state of vegetation of a range site in relation to the potential natural community for that site. Four classes are used to express the degree to which the production or composition of the present plant community reflects that of the potential natural community (climax):

ECOLOGICAL STATUS (SERAL STAGE)	% OF COMMUNITY IN CLIMAX CONDITION
Potential natural community	76–100
Late seral	51–75
Mid seral	26–50
Early seral	0–25

Ecosystem — A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Ecosystem Management — The use of a “whole-landscape” approach to achieve multiple-use management of public lands by blending the needs of people and environmental values in such a way that these lands represent diverse, healthy, productive, and sustainable ecosystems.

Effect — Impact to the human environment brought about by an agent of change, or action. Effects analysis predicts the degree to which the environment will be affected by an action. The CEQ uses both the terms “effect” and “impact” in the NEPA regulations; these terms are synonymous in the NEPA context. As a noun, other synonyms include consequence, result, and outcome. Effects can be both beneficial and detrimental, and may be direct, indirect, or cumulative.

Encroachment — Includes both expansion (establishment of juniper into areas previously devoid of trees) and infill (increasing closure of previously sparse juniper canopies). (Coates et al. 2017).

Endangered Species — Any species defined under the ESA as being in danger of extinction throughout all or a significant portion of its range. Under the Endangered Species Act, species may be listed as “endangered” (in danger of extinction throughout all or a significant portion of its range) or “threatened” (any species that is likely to become an endangered species).

Environmental Assessment (EA) — One type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) that portrays the environmental consequences of proposed Federal actions that are not expected to have significant impacts on the human environment.

Environmental Impact Statement (EIS) — One type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) that portrays the environmental consequences of proposed major Federal actions expected to have significant impacts on the human environment.

Ephemeral Stream — Ephemeral Stream: A stream, or reach of stream, that flows only in direct response to precipitation. It receives no continuous supply from melting snow or other source, and its channel is always above the water table (Bureau of Land Management 2005a).

Erosion — The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (Accelerated) — Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a natural disturbance (e.g., fire that exposes the surface).

- F -

Fauna — The vertebrate and invertebrate animals of an area or region.

Federal Land Policy Management Act of 1976 (FLPMA) — Law mandating that the BLM manage lands under its jurisdiction for multiple uses. Establishes guidelines for its administration; and provides for the management, protection, development, and enhancement of the public lands, among other provisions.

Fenced Federal Range (FFR) — An allotment that is mostly private but contains some public land fenced within. These allotments are generally classified as custodial allotments.

Fire Intensity — The rate of heat release per unit time per unit length of fire front. Numerically, it is the product of the heat yield, the quantity of fuel consumed in the fire front, and the rate of spread.

Fire Regime — Periodicity and pattern of naturally occurring fire in a particular area or vegetative type, described in terms of frequency, biological severity, and area extent.

Fire Return Interval — The number of years between two successive fires documented in a designated area (i.e., the interval between two successive fire occurrences).

Fire Suppression — All the work activities connected with fire-extinguishing operations, beginning with the discovery, and continuing until the fire is completely extinguished.

Flood Plain — A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform build of sediment deposited during overflow and lateral migration of the stream.

Flora — The plants of a particular region, habitat, or geological period.

Forage — Vegetation (both woody and non-woody) eaten by animals, especially grazing and browsing animals.

Forb — Any herbaceous plant not a grass or a grasslike species. Broad-leafed plants; includes plants that commonly are called weeds or wildflowers.

Four-Wheel Drive Vehicle (4x4, 4WD) — A passenger vehicle or light truck having power available to all wheels, generally capable of off-highway travel.

Fuels — Includes living and dead plant materials that are capable of burning.

Functional at Risk (FAR) — Riparian/wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation, determined through a proper functioning condition assessment (PFC).

- G -

Geographic Information System (GIS) — An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

Goal — Broad statement of desired outcomes.

Grazing District — The specific area within which the public lands are administered under Section 3 of the Taylor Grazing Act. Public lands outside grazing district boundaries are administered under Section 15 of the Taylor Grazing Act (43 CFR 4100.0-5).

Grazing Lease — A document authorizing use of the public lands under Section 15 of the Taylor Grazing Act. Grazing leases specify all authorized use including livestock grazing, suspended use, and conservation use. Leases specify the total number of AUMs apportioned, the area authorized for grazing use, or both (43 CFR 4100.0-5).

Grazing Permit — A document authorizing use of the public lands under Section 3 of the Taylor Grazing Act. Grazing permits specify all authorized use including livestock grazing and suspended use. Permits specify the total number of AUMs apportioned, the area authorized for grazing use, or both (43 CFR 4100.0-5).

Grazing Preference or Preference — The total number of animal unit months on public lands apportioned and attached to base property owned or controlled by a permittee, lessee, or applicant for a permit or lease. Grazing preference includes active use and use held in suspension. A superior or priority position against others for the purpose of receiving a grazing permit or lease. (43 CFR 4100.0-5).

Ground Water — Water that sinks into the soil and is stored in slowly flowing and slowly renewed underground reservoirs called aquifers.

- H -

Habitat — A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Headcut — A headcut is a physical feature found in a stream. It is an erosional feature found in both intermittent (flows only part of the year) and perennial (flows continuously all year) streams. A headcut occurs where there is an abrupt vertical drop in the streambed. They usually begin at a knickpoint (sharp change in channel slope) that can be as subtle as an over-steepened riffle or as obvious as a waterfall. At the base of a headcut a small plunge pool is usually found, caused by the high energy of falling water. As the streambed erodes and lowers the knickpoint the active headcut will migrate upstream. When a headcut moves up a stream it causes channel incision (the channel bed lowering or down cutting).

Hydrologic — Refers to the properties, distribution, and effects of water. “Hydrology” refers to the broad science of the waters of the earth, their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

Hydrologic Unit Code (HUC) — A coding system developed by the U.S. Geological Service to map geographic boundaries of watersheds of various sizes.

- I -

Impacts — The effect an action has on other resource conditions.

Improve Allotment — The “improve” category identifies allotments with management and resource concerns. These allotments receive priority for implementation, effectiveness, and performance monitoring. Designated as an “I” allotment.

Indirect Effects — Effects that “...are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on water and air and other natural systems, including ecosystems” (40 CFR 1508.8(b)).

Interdisciplinary Team (IDT) — An interdisciplinary team consisting of BLM staff involving more than one discipline or resource management program. Promotes resource management at a plant community, landscape, or ecosystem level.

Interested Public — An individual, group, or organization that has submitted a written request to the authorized officer to be provided an opportunity to be involved in the decision-making process for the management of livestock grazing on specific grazing allotments or has submitted written comments to the authorized officer regarding the management of livestock grazing on a specific allotment (43 CFR 4100.0-5).

Intermittent Stream — A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources (Bureau of Land Management 2005a).

Issue — An opportunity, conflict, or problem about use or management of public land resources. Disputes or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices. To be considered a “significant” EIS issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

- J -

- K -

- L -

Land Use Plan (LUP) — A set of decisions contained in resource management plans that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA, an assimilation of land use plan level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed.

Lands with Wilderness Characteristics (also *Parcels with Wilderness Characteristics*) — Wilderness characteristics inventory units found to possess the minimum criteria for wilderness characteristics. See **Wilderness Characteristics**.

Livestock or Kind of Livestock — Species of domestic livestock-- cattle, sheep, horses, burros, and goats.

Livestock Crossing Permit — A permit issued by the authorized officer that temporarily allows livestock operators to cross the public lands controlled by the BLM, with proper livestock for proper and lawful purposes. Specifically, when livestock are not permitted within a grazing allotment. See also **Livestock Trailing**.

Livestock Distribution — The pattern that livestock create when grazing a pasture. This pattern can result in some areas of the pasture being lightly grazed and other areas being heavily grazed based on other factors such as distance to water, topography, animal familiarity with range, salt or supplement locations, and where livestock enter and leave pasture (i.e., gates). The total area where livestock may distribute to within a pasture is the livestock use area.

Livestock Trailing — The movement of livestock between authorized permitted pastures or allotments during the grazing rotation that is part of the authorized grazing use that is authorized through a preference grazing permit. See also **Livestock Crossing Permit**.

Livestock Use Area (Service Area) — The area that can be properly grazed by livestock watering at a certain water (43 CFR 4100.0-5). Use areas may factor in location of water, fences, and topography.

- M -

Manage Allotment — The “manage” category identifies allotments with low or no management and resource concerns. These allotments receive lower priority for monitoring, and are targeted for effectiveness and performance monitoring, unless monitoring data indicate need for change to management strategy. Designated as an “M” allotment.

Management Actions — Identified through land use plans, management actions are proactive measures recommended to achieve desired outcomes. These measured criteria guide activities occurring on public land. Priorities to maintain, restore, or improve land health will be delineated in management actions for specific land uses. In certain instances, conditions develop over time that will not correct themselves without management intervention.

Management Concern — Procedures or land-use allocations that do not constitute issues, but that are recognized, through the RMP/EIS preparation process, as needing modification or decision regarding management direction.

Management Decision — BLM decisions made to manage public lands. Management decisions include both land use plan decisions and implementation decisions.

Management Direction — A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Migration Corridor — The habitat pathway an animal uses to move from one place to another.

Mitigation Measures — Measures designed to counteract environmental impacts or to make impacts less severe. These “overlay” an action and are intended to reduce the action to eliminate or decrease the impacts. They may be added to an action that has been analyzed and found to have impacts to a resource or use.

Monitoring — The periodic and systematic collection of resource data to measure progress toward achieving objectives.

Monitoring and Evaluation — The collection and analysis of data to evaluate the progress and effectiveness of on the ground actions in meeting resource management goals and objectives.

Multiple Use Management — Management of public land and resource values to best meet various present and future needs of the American people. This means coordinated management of resources and uses to ensure the long-term health of the ecosystem.

- N -

National Conservation Lands — Also known as the National Landscape Conservation System (NLCS), these federally recognized areas are the “crown jewels of the American West.” The NLCS was created in 2000 and adopted through the National Landscape Conservation System Act of 2009.

National Environmental Policy Act of 1969 (NEPA) — Law requiring all Federal agencies to evaluate the impacts of proposed major Federal actions with respect to their significance on the human environment.

National Landscape Conservation System (NLCS) — See National Conservation Lands.

National Wildlife Refuge (NWR) — An area administered by the U.S. Fish and Wildlife Service for the purpose of managing certain fish or wildlife species.

Naturalness (A Primary Wilderness Value) — An area that generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

Notice of Availability (NOA) — The Federal Register notice that an EIS (draft or final) or record of decision is available. Publication of a notice of filing of an EIS by the Environmental Protection Agency formally begins the public comment period.

Notice of Intent (NOI) — This Federal Register notice announces that an environmental impact statement or an environmental assessment level land use plan amendment will be prepared. Publication of this notice formally starts the scoping process.

Noxious Weed — A plant specified by law as being especially undesirable, troublesome, and difficult to control. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Nutrient, Plant — Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil, and carbon, hydrogen, and oxygen obtained from the air and water.

- O -

Objectives (Management) — Specific desired outcomes and management decisions for resources to reach those outcomes. They are clearer statements of the specific activities required to achieve the goals, based on law and regulation. Objectives represent land use plan decisions and reflect the projected direction that management of these lands should follow in the future.

Off-Highway Vehicle (OHV) — Also known as off-road vehicle. Any motorized vehicle designed for and capable of being operated on or off improved and regularly maintained roads.

- P -

Parcel — For a sub-unit of a wilderness characteristics unit, see Lands with Wilderness Characteristics and Wilderness Characteristics Inventory Unit (WIU).

Pending Lek — A lek not counted regularly in the last seven years, but birds were present one or more years of that period.

Perennial — A plant that lives for three or more years.

Perennial Stream — A stream in which water is present during all seasons of the year (Steens CMPA RMP 2005).

Permeability — The quality of the soil that enables water to move downward through the profile, measured as the number of inches per hour that water moves downward through the saturated soil.

Permitted Use — The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and is expressed in AUMs (43 CFR 4100.0-5).

Pervasive and Omnipresent Impacts — These are noises or visual disturbances that have such a ubiquitous and noticeable effect on a wilderness characteristics unit that they make it difficult to manage to preserve naturalness or presence of primitive and unconfined recreation.

Playa — A shallow lake that is seasonally dry. Soils on the lake bottom are usually quite alkaline.

Point Source Pollution — Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

Preferred Alternative — The alternative the BLM believes would reasonably accomplish the purpose and need for the proposed action while fulfilling its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. This alternative may or may not be the same as the BLM's or the proponent's proposed action.

Primary Wilderness Values — The primary or key wilderness values described in the Wilderness Act by which WSAs and designated wildernesses are managed to protect and enhance the wilderness resource. Values include roadlessness, naturalness, solitude, primitive and unconfined recreation, and size.

Primitive and Unconfined Recreation (A Primary Wilderness Value) — non-motorized and undeveloped types of outdoor recreation activities. Refers to wilderness recreation opportunities such as nature study, hiking, photography, backpacking, fishing, hunting, and other related activities. Does not include the use of motorized vehicles, bicycles, or other mechanized means of travel.

Primitive Route — Any transportation linear feature located within a WSA or lands with wilderness characteristics designated for protection by a land use plan and not meeting the wilderness inventory road definition (not a boundary road). Also known as motorized primitive route or motorized primitive trails. A WSA primitive route was also known as a “way.” See route classification.

Productivity — (1) Soil productivity: the capacity of a soil to produce plant growth, due to the soil’s chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). (2) Vegetative productivity: the rate of production of vegetation within a given period. (3) General: the innate capacity of an environment to support plant and animal life over time.

Proper Functioning Condition (PFC) — Riparian-wetland areas achieve Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambanks against cutting action; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and supports greater biodiversity. The functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water, and vegetation.

Proposed Action — A proposal by a federal agency to authorize, recommend, or implement an action.

Public Access — The right of passage, established by law, over another’s property. Access can be created by an easement dedicated or reserved for public access.

Public Lands — Any land and interest in land owned by the United States and administered by the Secretary of the Interior through the BLM (43 CFR 4100.0-5). Federal, state, or municipal land is held in trust for the governed populace (public landowner).

- Q -

- R -

Range Administration System (RAS) — RAS provides grazing administrative support and management reports for the BLM and the public. The Rangeland Administration system serves as an electronic calendar for issuance of approximately 18,000 applications and 2,400 grazing authorizations (Permits, Leases, and Exchange-of-Use Agreements) per year, eliminating the need for manually processing these forms. RAS also creates approximately 30,000 grazing bills per year. RAS provides distribution information to the Collections and Billings System (CBS) for tracking, collecting, and distributing grazing receipts. Additionally, the system maintains electronic files about allotments, authorizations, and grazing bill history.

Range Improvement or Range Development — An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means (43 CFR, Part 4100.0-5).

Range Site — An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Rangeland — Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Rangeland Health — The degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained.

Rangeland Studies — Any study methods accepted by the authorized officer for collecting data on actual use, utilization, climatic conditions, other special events, and trend to determine if management objectives are being met (43 CFR, Part 4100.0-5). See **Monitoring**.

Reasonably Foreseeable Action — Actions for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

Record of Decision (ROD) — An official document in which a deciding official state the alternative that will be implemented from a prepared Final EIS.

Regeneration — The new growth of a natural plant community, developing from seed.

Rehabilitation — The activities necessary to repair damage or disturbance caused by wildland fire or the first suppression activity.

Research Natural Area (RNA) — A physical or biological unit maintained in current natural conditions, where natural processes predominate, and which is preserved for research and education. Under current BLM policy, these areas must meet the relevance and importance criteria of ACECs and are designated as ACECs. An area of significant scientific interest that is designated to protect its resource values for scientific research and study.

Reserve Common Allotment — An area that is designated in the land use plan as available for livestock grazing but reserved for use as an alternative to grazing in another allotment in order to facilitate rangeland restoration treatments and recovery from natural disturbances such as drought or wildfire. It would provide needed flexibility that would help the agency apply temporary rest from grazing where vegetation treatments or management would be most effective.

Resistance and Resilience — A measure of the relative ecological integrity of a unit based on factors that indicate a likely ability of resident plant communities to recover quickly or avoid change due to disturbances. Resilient ecosystems have the capacity to regain their fundamental structure, processes, and functioning when altered by stressors like drought and disturbances. Resistant ecosystems have the capacity to retain their fundamental structure, processes, and functioning when exposed to stresses, disturbances, or invasive species.

Resource Management Plan (RMP) — A land use plan as described by the FLPMA. A BLM planning document, generically referred to as a “land use plan,” prepared in accordance with Section 202 of FLPMA that presents systematic guidelines for making resource management decisions for a planning area. An RMP is typically based on an EIS.

Restoration — Holistic actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes.

Revegetation — Establishing or re-establishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

Right-of-way (ROW) — A grant or permit for an easement authorizing the use of public land for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, to use a specific land for certain projects for a specific period of time. Also describes the reference to the land covered by such an easement or permit.

Rill — A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riparian /Wetland Areas — Areas with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Road — A linear route (as declared by owner) managed for use by low-clearance vehicles, persons, or animals. Roads are improved and maintained by mechanical means for regular and continuous use. See **Wilderness Inventory Road**.

Road, Primitive — A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards. Unless specifically prohibited, primitive roads can also include other uses such as hiking, biking, and horseback riding.

Routes — An umbrella term for the multiple roads, trails, and primitive roads that represent the BLM transportation system. Generically, components of the transportation system are described as “routes” or “assets.”

Runoff — The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground water runoff or seepage flow from ground water.

- S -

Sagebrush Focal Area (SFA) — Areas identified by the USFWS that represent recognized “strongholds” for GRSG that have been noted and referenced by the conservation community as having the highest densities of GRSG and other criteria important for the persistence of GRSG.

Scoping (Internal and External) — The process by which the BLM solicits internal and external input on the issues and effects that will be addressed, as well as the degree to which those issues and effects will be analyzed in the NEPA document. Scoping is one form of public involvement in the NEPA process. Scoping occurs early in the NEPA process and generally extends through the development of alternatives (the public comment periods for EIS review are not scoping). Internal scoping is simply the use of BLM staff to decide what needs to be analyzed in a NEPA document. External scoping, also known as formal scoping, involves notification and opportunities for feedback from other agencies, organizations, and the public.

Sediment — Soil, rock particles, and organic or other debris carried from one place to another by wind, water, or gravity.

Seral — Refers to the sequence of transitional plant communities during succession. Early-seral refers to plants that are present soon after a disturbance or at the beginning of a new successional process (such as seedling or sapling growth stages in a forest); mid-seral in a forest would refer to pole or medium sawtimber growth stages; late- or old-seral refers to plants present during a later stage of plant community succession (such as mature and old forest stages).

Seral Stage — The developmental phase of a rangeland with characteristic structure and plant species composition. The rated departure of a plant community from a described potential natural community (PNC) for a specific ecological site. Low-seral stage is an existing plant community which is defined as 0-25% comparability to the defined PNC; Mid-seral stage is an existing plant community which has 26-50% comparability to the PNC; Late seral stage is 51-75% comparable to the PNC; PNC is an existing plant community with 76-100% comparability to the defined PNC.

Series, Soil — A nationally defined soil type set apart on distinct soil properties that affect use and management. In a soil survey, this includes a group of soils having profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Significant Impact — Effects of sufficient context and intensity that an environmental impact statement is required. The CEQ regulations at 40 CFR 1508.27(b) include ten considerations for evaluating intensity.

Slope — The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soft Triggers — Represent “an intermediate threshold indicating that management changes are needed at the implementation level to address habitat or population losses. If a soft trigger is tripped, the BLM will apply more conservative or restrictive implementation (project-level) conservation measures to mitigate for the causal factor(s) in the decline of populations or habitats, with consideration of local knowledge and conditions,” as defined in the Oregon Greater Sage-Grouse Proposed RMPA/Final EIS (Bureau of Land Management 2015e: D, p. 2).

Soil — A natural, three-dimensional body at the earth’s surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil Association — A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single soil map unit.

Soil Classification — The systematic arrangement of soils into groups or categories on the basis of their characteristics.

Soil Compaction — An increase in soil bulk density of 15 percent or more from the undisturbed level.

Soil Complex — A map unit of two or more kinds of soils in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping.

Soil Productivity — The capacity of a soil to produce a specified plant or sequence of plants under specific management.

Soil Profile — A vertical section of the soil extending through all its horizons and into the parent material.

Soil Survey — A field investigation resulting in a soil map showing the geographic distribution of various kinds of soil and an accompanying report that describes the soil types and interprets the findings.

Soil Texture — The relative proportions of sand, silt, and clay particles in a mass of soil.

Solitude (A Primary Wilderness Value) — The state of being alone or remote from habitations; a lonely, unfrequented, or secluded place. The intent is to evaluate the opportunity for solitude in comparison to habitations of people.

Special Status Species (SSS) — Plant or animal species known or suspected to be limited in distribution, rare or uncommon within a specific area, and/or vulnerable to activities that may affect their survival. Lists of SSS are prepared by knowledgeable specialists through the State of Oregon; the BLM prepares a list of State sensitive species predominantly based on the list prepared biennially by the Oregon Natural Heritage Program.

Standards and Guidelines (S&Gs) — The standards set by a resource advisory council to ensure the administration of BLM grazing helps preserve currently healthy rangelands and restore healthy conditions to those areas that are not functioning properly. Standards and Guidelines provide specific measures of rangeland health and will identify acceptable or best management practices. The authority for these Standards and Guidelines is found in 43 CFR 4180.

Stream Channel — The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Structure, Soil — The arrangement of primary soil particles into compound particles or aggregates.

Subwatershed — A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5th-field HUC), which in turn is contained within a subbasin (4th-field HUC).

Succession — A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as “seral stages.” See **Seral**.

Supplemental Feed — A feed which supplements the forage available from the public lands and is provided to improve livestock nutrition or rangeland management. (43 CFR 4100.0-5). Not the same as a supplement (mineral) or salt.

Supplemental Wilderness Values — Includes ecological (such as vegetation, wildlife, and overall biological/botanical processes and values associated with the natural environment), geological, scientific, educational, scenic, and historic values. When present they can enhance primary wilderness values but are not mandated by Congress.

Sustainability — (1) Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long-term productivity of goods, services, and values without impairing productivity of the land. (2) In commodity production, refers to the yield of a natural resource that can be produced continually at a given intensity of management.

- T -

Temporary Impacts — For purposes of the impact tables a “temporary impact” is one that is not expected to last more than 5 years.

Temporary Nonuse — The authorized withholding, on an annual basis, of all or a portion of permitted livestock use in response to a request of the permittee or lessee (43 CFR 4100.0-5).

Terrestrial Communities — Groups of cover types with similar moisture and temperature regimes, elevational gradients, structures, and used by vertebrate wildlife species.

Threatened Species — Any plant or animal species defined under the ESA as likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Listings are published in the Federal Register.

Treatments — Direct control for invasive plant management includes manual (pulling and grubbing), mechanical (chainsaws/mowing), biological (including targeted grazing by domestic animals or insects), prescribed fire, herbicide application (using wands, wicks, handguns, booms, and aircraft), and the use of competitive seeding or plantings of desirable vegetation.

Trend — The direction of change in ecological status observed over time. Trend is described as toward or away from the potential natural community, or as not apparent (43 CFR 4100.0-5).

- U -

Unauthorized Leasing and Subleasing — (1) The lease or sublease of a Federal grazing permit or lease, associated with the lease or sublease of base property, to another party without a required transfer approved by the authorized officer; (2) The lease or sublease of a Federal grazing permit or lease to another party without the assignment of the associated base property; (3) Allowing another party, other than sons and daughters of the grazing permittee or lessee meeting the requirements of § 4130.7(f), to graze on public lands livestock that are not owned or controlled by the permittee or lessee; or (4) Allowing another party, other than sons and daughters of the grazing permittee or lessee meeting the requirements of § 4130.7(f), to graze livestock on public lands under a pasturing agreement without the approval of the authorized officer (43 CFR 4100.0-5).

Unit — An area meeting the size criteria (public land at least 5,000 acres or adjacent to other, existing areas with wilderness characteristics such as WSAs) that was later analyzed for wilderness characteristics. Also see **Parcels**.

Untrammelled — Unhindered and free from modern human control or manipulation.

Upland (Geography) — Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Utilization — The percentage of the current year's forage production that has been consumed by livestock, wild horses and burros, wildlife and insects during a specified period. The term is also used to refer to the pattern of such use (43 CFR 4100.0-5). Utilization may refer either to a single plant species, a group of species, or to the vegetation as a whole. Utilization is synonymous with use.

- V -

Visual Resource Management Classifications — Define the degree of acceptable visual change within a characteristic landscape. A class is based on the physical and sociological characteristics of any given homogeneous area and serves as a management objective. Categories assigned to public lands are based on scenic quality, sensitivity level, and distance zones. Each class has an objective that prescribes the amount of change allowed in the characteristic landscape (Bureau of Land Management 2005d).

- Class I: The objective of this classification is to preserve the existing character of the landscape. This class provides for natural ecological changes and limited management activity. The level of change should be very low and must not attract attention. Class I is assigned to those areas where a management decision has been made to preserve a natural landscape.
- Class II: The objective of this classification is to retain the existing character of the landscape. The level of change to landscape characteristics should be low. Management activities may be seen but should not attract the attention of a casual observer. Any changes must conform to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. This class represents the minimum level of VRM for WSAs.
- Class III: The objective of Class III is to partially retain the existing character of the landscape. Moderate levels of change are acceptable. Management activities may attract attention but should not dominate the view of a casual observer. Changes should conform to the basic elements of the predominant natural features of the characteristic landscape.
- Class IV: The objective of Class IV is to provide for management activities that require major modification of the landscape. These management activities may dominate the view and become the focus of viewer attention; however, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

- W -

Way — See **Primitive Route**.

Wilderness — Areas of undeveloped land retaining its primeval character and influence, without permanent improvement or human habitation. "An area where the earth and community of life

are untrammelled by man, where man himself is a visitor who does not remain.” These areas are protected and managed so as to preserve their natural conditions.

Wilderness Act of 1964 — Act of Congress that established Federal wilderness areas.

Wilderness Area — Uninhabited and undeveloped Federal land to which Congress has formally designated and granted special status and protection under the National Wilderness Preservation System. Established by the Wilderness Act, these areas are managed to preserve the natural conditions, allowing foot and horse traffic only; no mountain bikes, OHVs, hang gliders, or other “machines” are allowed.

Wilderness Characteristics — The attributes that define an area as possessing wilderness, as defined in the Wilderness Act. Characteristics include the area’s size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. In the planning area, wilderness characteristics units are those lands inventoried and determined by the BLM to contain wilderness characteristics, as follows:

- Size – Roadless areas of at least 5,000 acres of public lands or of a manageable size.
- Naturalness – Affected primarily by the forces of nature rather than human activity.
- Outstanding opportunities for solitude or primitive and unconfined recreation activity.
- May contain supplemental values (ecological, geological, scientific, educational, scenic, or historical value).

Wilderness Characteristics Inventory Roads — Routes that have been improved and maintained by mechanical means to ensure relatively regular and continuous use. Often, these roads make up the borders of the wilderness characteristics inventory units. The BLM has committed to maintain these roads for future use. See **Routes**.

Wilderness Characteristics Inventory Unit (WIU) — An area meeting the size criteria (public land at least 5,000 acres or adjacent to other, existing areas with wilderness characteristics like WSAs) that was later analyzed for wilderness characteristics.

Wilderness Inventory — Applies only to the original inventory conducted in 1980 (Bureau of Land Management 1980) and restructured report of the 1991 Wilderness Study Report (Bureau of Land Management 1991). A written description of resource information and data, and a map of those public lands that meet the wilderness criteria as established under FLPMA and the Wilderness Act. An evaluation of the public lands, showing those lands that meet the wilderness criteria. Lands meeting the criteria were identified as wilderness study areas (WSA).

Wilderness Study Area (WSA) — Parcels of BLM roadless areas with wilderness characteristics identified and designated through inventory and study processes, authorized by FLPMA and the Wilderness Act. WSAs in the planning area are currently in an interim management status awaiting wilderness designation or release by Congress. The general standard for interim management is that lands under review (WSAs) are managed so as not to impair suitability for preservation as wilderness.

968 **Wildfire** — An unplanned ignition of a non-structure fire that occurs in vegetation or natural
969 fuels, such as fire caused by lightning, volcanoes, unauthorized or accidental human-caused fires,
970 and escaped prescribed fire.

971
972 **Wolf(y) Plants** — Plants typically from bunchgrasses that accumulate excess old plant material.

973
974 **Woodland** — A forest community occupied primarily by noncommercial species such as
975 juniper, mountain mahogany, or aspen.

976
977 - X -

978
979 - Y -

980
981 - Z -

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7 APPENDIX A: MAPS

A: Vicinity

B: Land Status & Special Management Areas

C: Current Grazing Allotments & Developments

D: BCA Monitoring Plot Locations

E: Alternative 2 – Proposed Grazing Allotments & Developments

F: Alternative 3 – Proposed Grazing Allotments & Developments

G: Alternative 1 – Piosphere Modelling

H: Alternative 2 – Piosphere Modelling

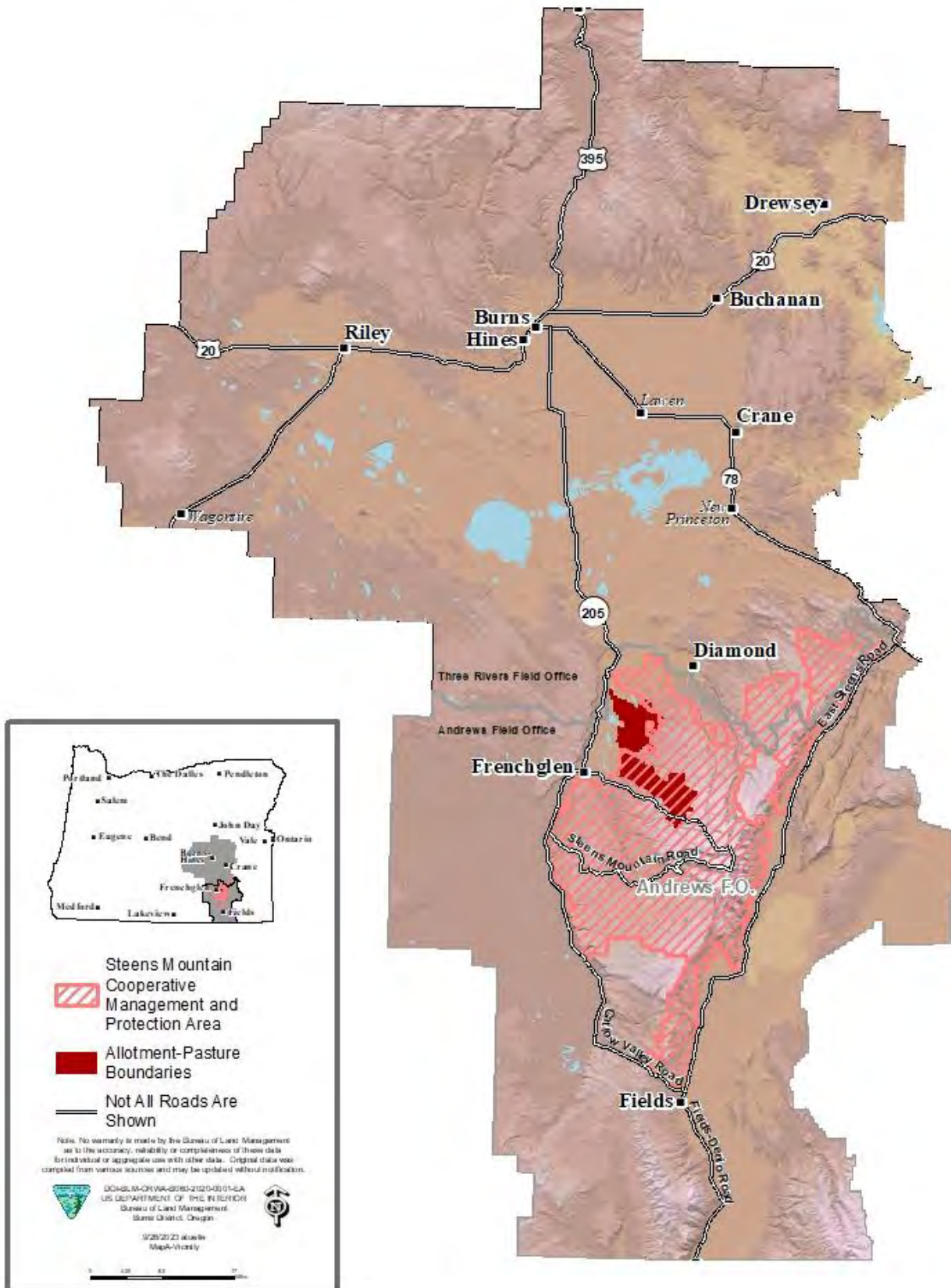
I: Alternative 3 – Piosphere Modelling

J: Alternative 4 – Piosphere Modelling

K: GRSG 2nd, 3rd, and 4th Order HAF Boundaries

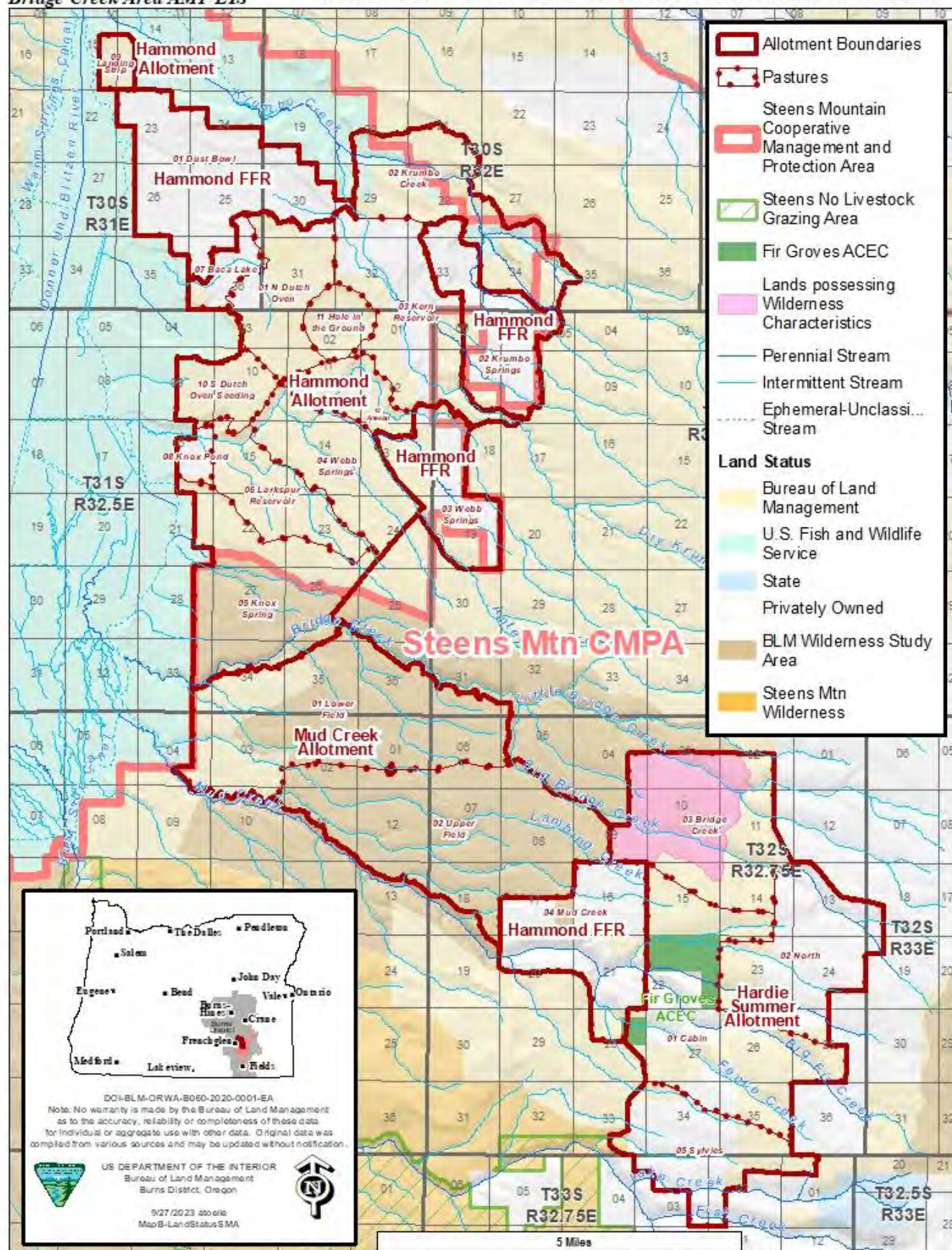
Map A
Bridge Creek Area AMP EIS

VICINITY



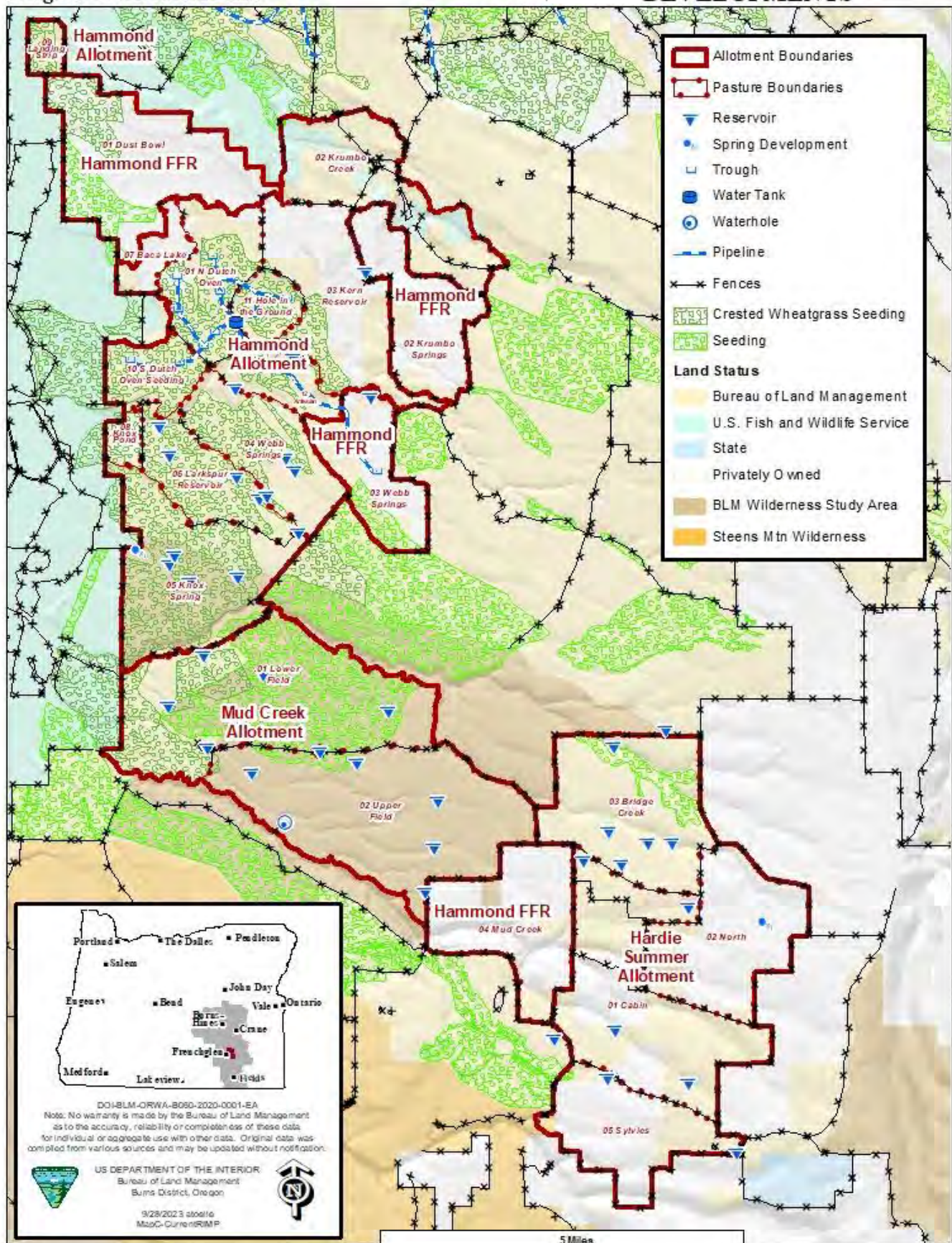
Map B
Bridge Creek Area AMPEIS

LAND STATUS & SPECIAL MANAGEMENT AREAS



Map C
Bridge Creek Area AMP EIS

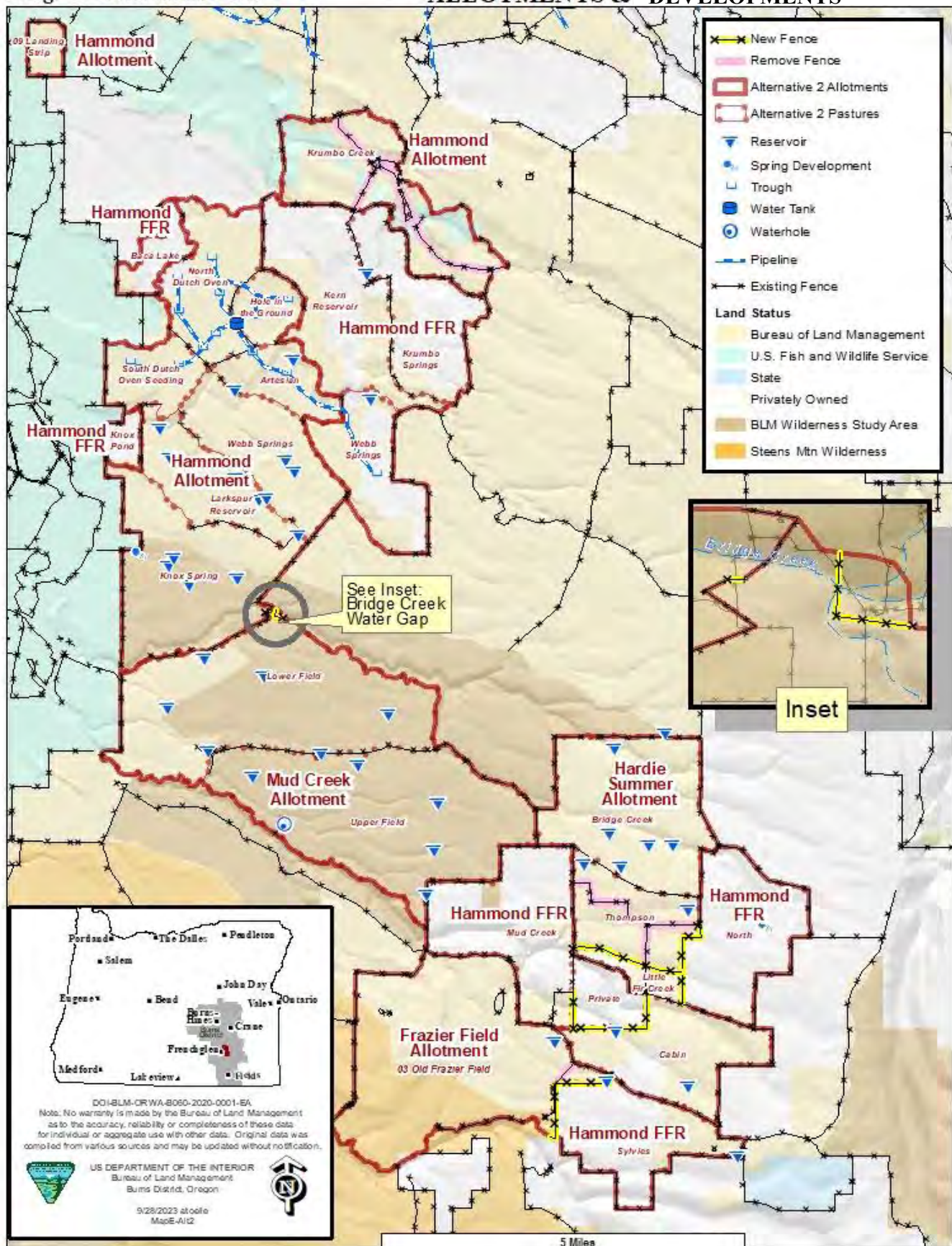
CURRENT GRAZING ALLOTMENTS & DEVELOPMENTS



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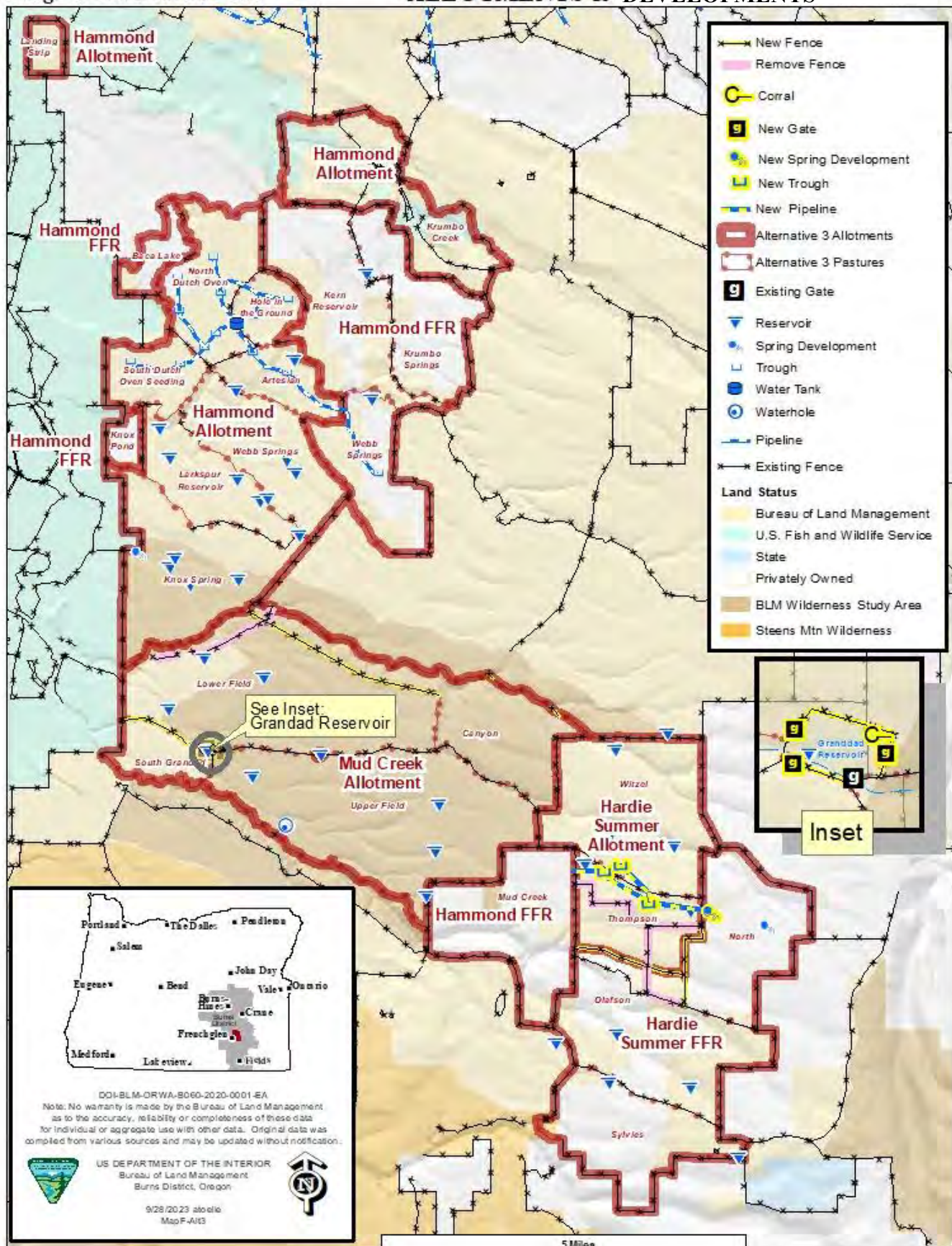
Map E
Bridge Creek Area AMP EIS

ALTERNATIVE 2 - PROPOSED GRAZING ALLOTMENTS & DEVELOPMENTS



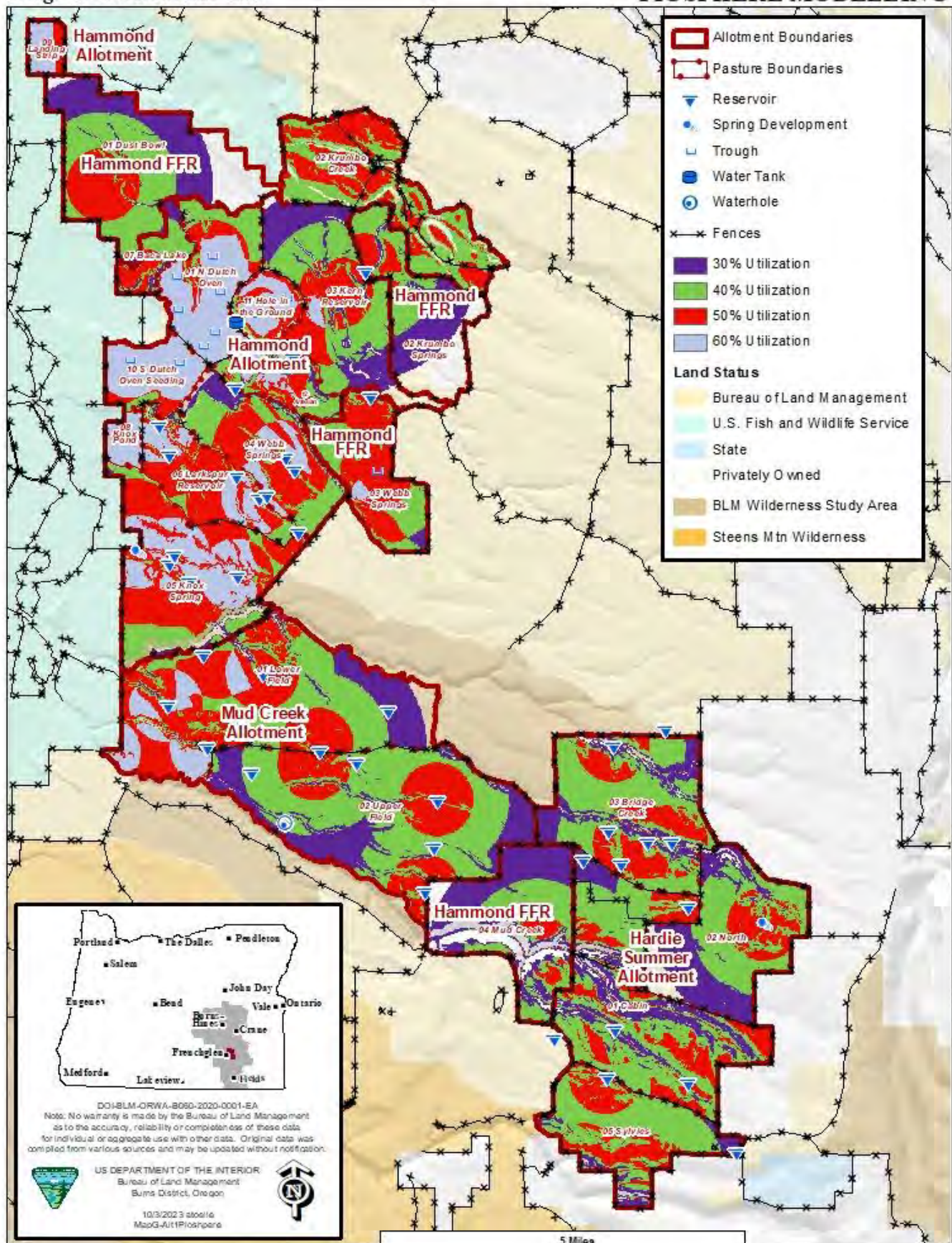
Map F
Bridge Creek Area AMP EIS

ALTERNATIVE 3 - PROPOSED GRAZING ALLOTMENTS & DEVELOPMENTS



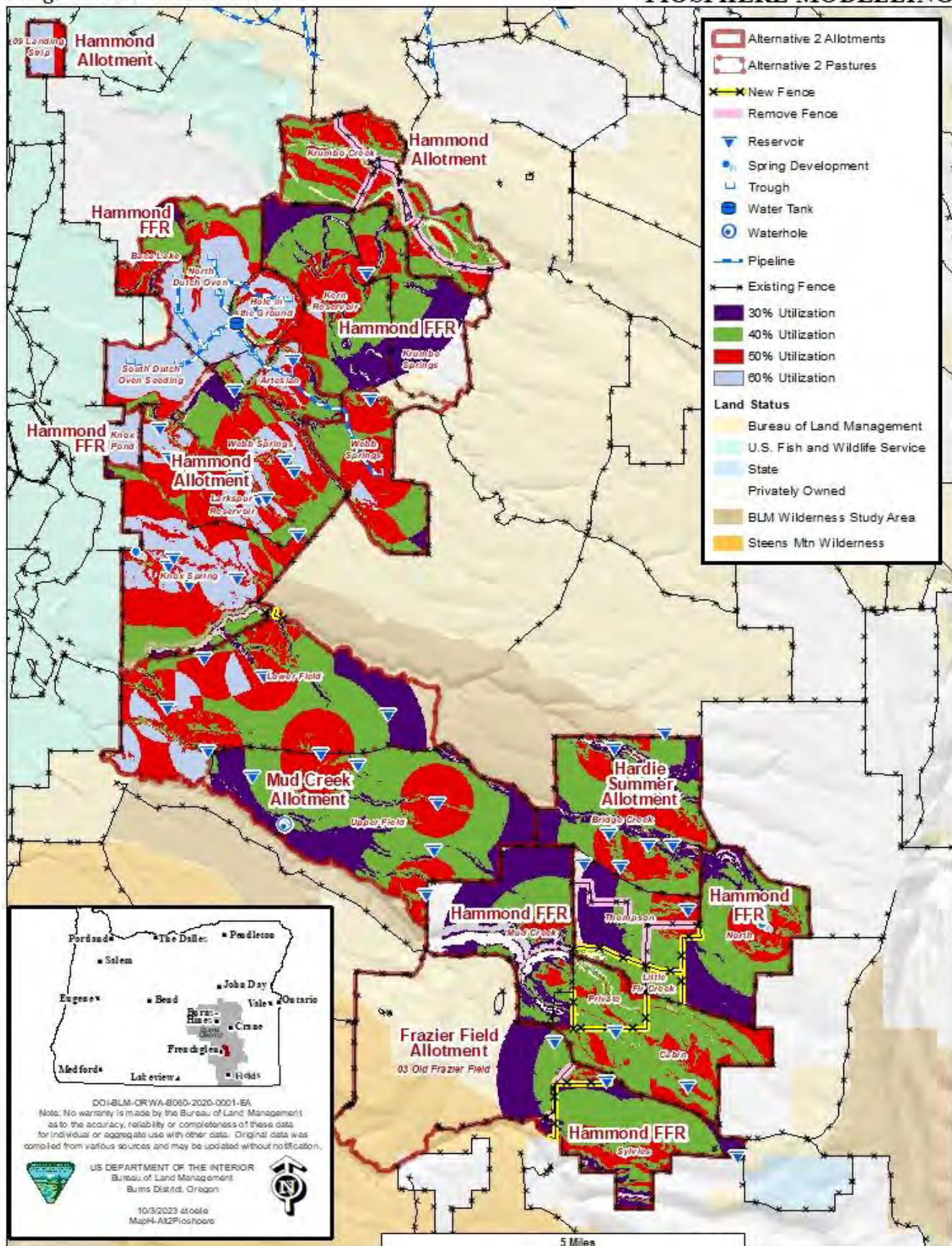
Map G
Bridge Creek Area AMP EIS

ALTERNATIVE 1 RELIABLE WATER PIOSPHERE MODELLING



Map H
Bridge Creek Area AMP EIS

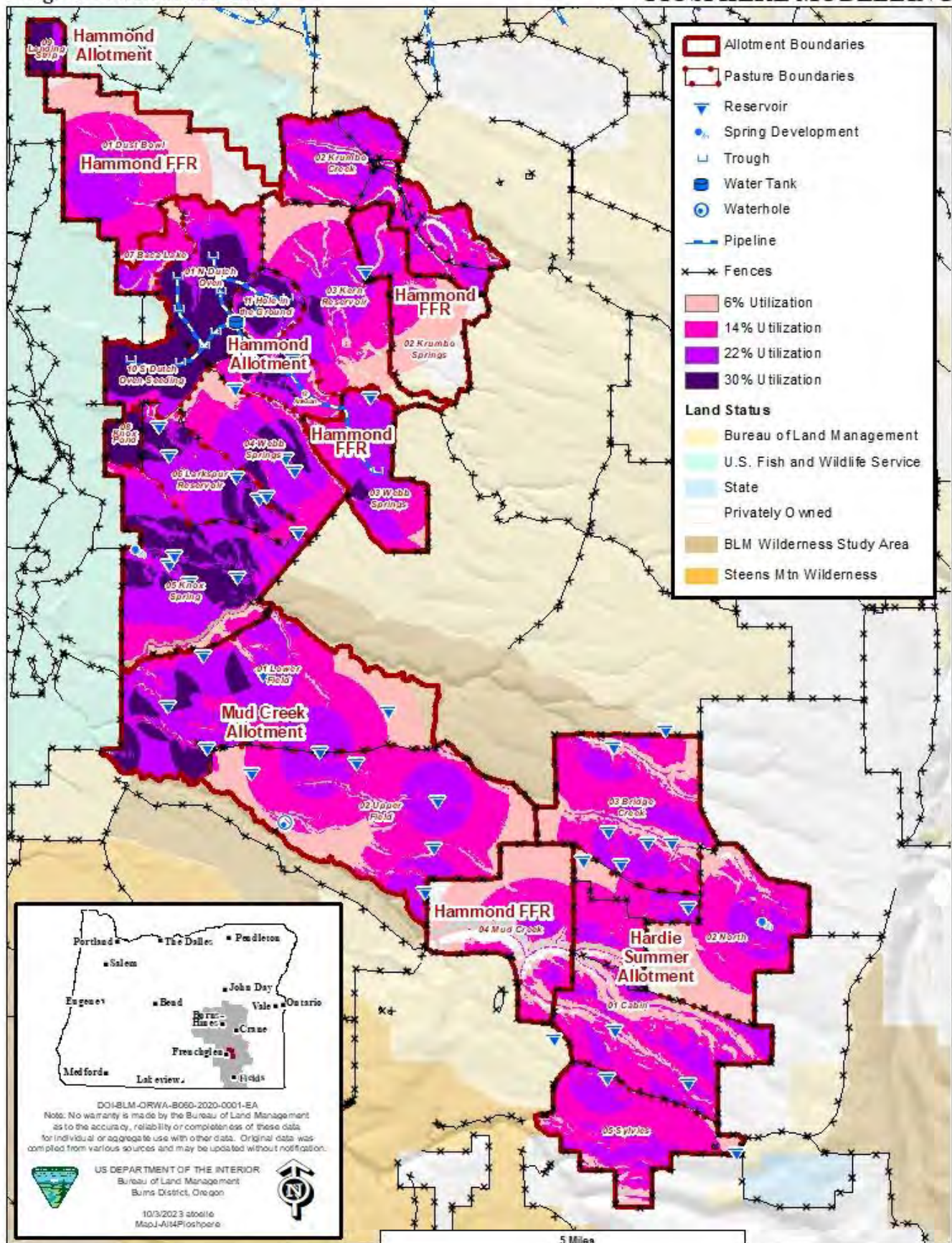
**ALTERNATIVE 2 RELIABLE WATER
PIOSPHERE MODELLING**





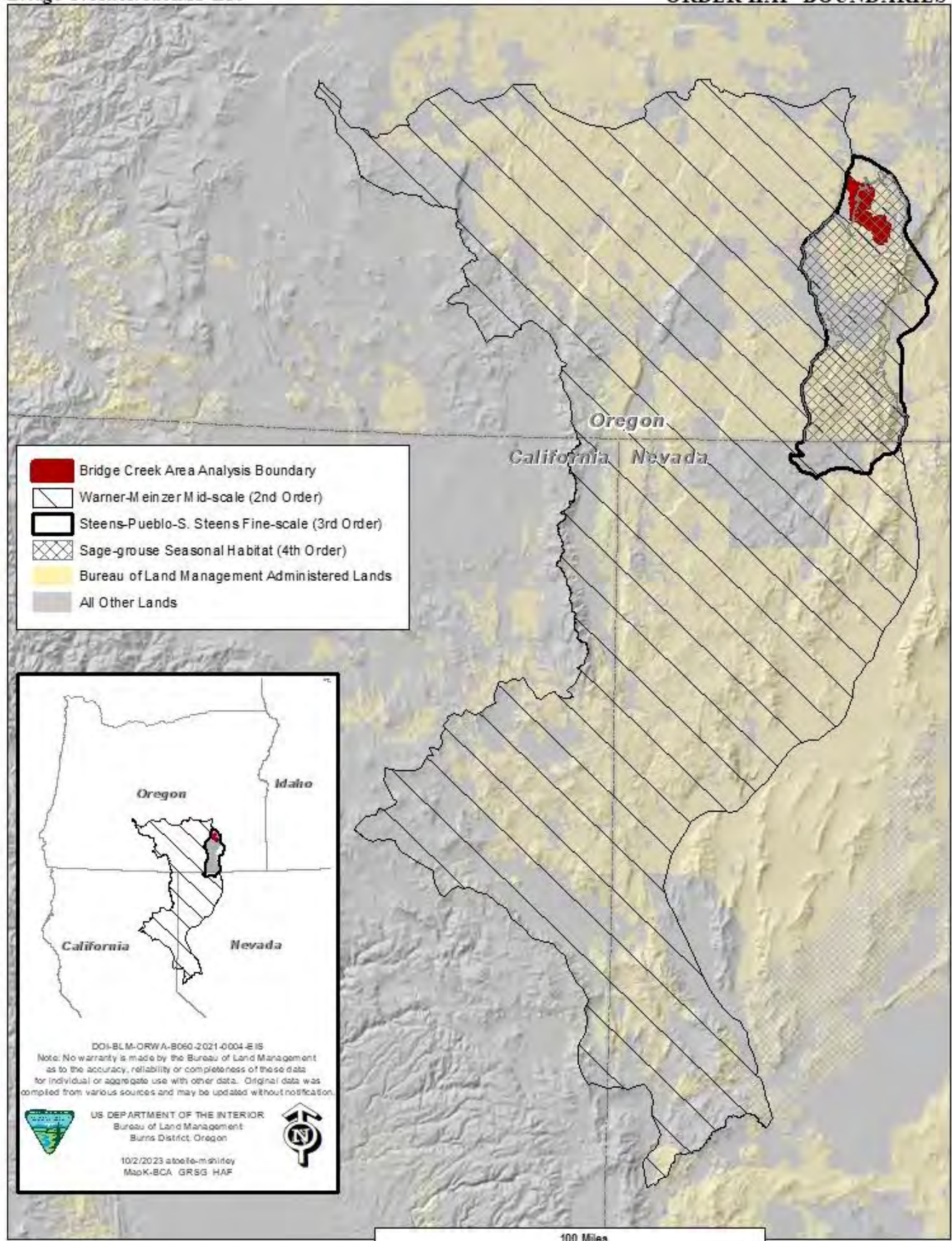
Map J
Bridge Creek Area AMP EIS

ALTERNATIVE 4 RELIABLE WATER PHOSPHORE MODELLING



Map K
Bridge Creek Area AMP EIS

**GRSG 2nd, 3rd, AND 4th
ORDER HAF BOUNDARIES**



8 APPENDIX B: RESOURCE OBJECTIVES

The following management objectives are from the August 2005 Steens Mountain Cooperative Management and Protection Area (CMPA) Resource Management Plan (RMP)/Record of Decision (ROD) (Bureau of Land Management 2005a), as amended by the 2015 Oregon Greater Sage-Grouse (GRSG) Approved RMP Amendment (ARMPA)/ROD (Bureau of Land Management 2015a). These resource objectives are relevant to the Bridge Creek Area (BCA) and proposed actions. Resource objectives, goals, and management direction included in this list are only the most relevant direction from the named documents.

- Manage impaired waters on public lands listed under Section 303(d) of the Clean Water Act (CWA) to restore beneficial uses and to improve water quality so that listing is no longer warranted (Water Resources, RMP-18).
- Manage mineral soil to limit accelerated erosion on critical sites, protect soil characteristics on noncritical sites, and maintain or improve existing infiltration and permeability rates. (Soils and BSCs, RMP-22).
- Manage vegetation to achieve and maintain healthy watersheds (Vegetation, RMP-23).
- Maintain, restore, or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and wetlands and associated structure, function, process, and products that provide public land values such as forage, water, cover, structure, and security necessary to meet the life history requirements of fish and wildlife; public recreation and aesthetics; water quality and quantity; and livestock forage and water (Riparian and Wetlands, RMP-24).
- Maintain, restore, or improve the integrity of desirable vegetation communities including perennial, native, and desirable introduced plant species. Provide for their continued existence and normal function in nutrient, water, and energy cycles. Maintain or restore native vegetation communities through sound landscape management practices. Manage desirable nonnative seedings to meet resource objectives (Rangelands, RMP-30).
- Manage big sagebrush, quaking aspen, and western juniper plant communities to meet habitat requirements for wildlife. Manage big sagebrush communities to meet the life history requirements of sagebrush-dependent species (Rangelands, RMP-31).
- Control the introduction and proliferation of noxious weeds and reduce the extent and density of established populations to acceptable levels. Treat noxious weeds and inventory for new infestations using the most effective means available, as outlined in the Burns District's Integrated Management Program Environmental Assessment/Decision Record (DR) (Bureau of Land Management 2015c) (Noxious Weeds, RMP-32).
- Provide diverse, structured, resilient, and connected habitat on a landscape level to support viable and sustainable populations of wildlife, fish, and other aquatic organisms. Maintain, restore, or improve habitat. Manage forage production to support wildlife

population levels identified by the Oregon Department of Fish and Wildlife (ODFW) (Fish and Wildlife, RMP-33).

- Maintain, restore, or improve special status plant populations and animal habitats; manage public land to conserve or contribute to the recovery of threatened or endangered species; and prevent future Endangered Species Act (ESA) listings. Conserve special status animal species and the ecosystems on which they depend. Manage big sagebrush communities to meet the life history requirements of sagebrush-dependent special status species (SSS) (SSS, RMP-35).
- Manage public land actions and activities in a manner consistent with visual resource management (VRM) class objectives. Protect, maintain, improve, or restore visual resource values by managing all public land in accordance with the VRM system (Visual Resources, RMP-45).
- Manage public land to provide social and economic benefits to local residents, businesses, visitors, and future generations. Work cooperatively with private and community groups and local government, Burns Paiute tribal, and other tribal governments to provide for customary uses consistent with other resource objectives and to sustain or improve local economies. Maintain and promote the cultural, economic, ecological, and social health of the Steens Mountain Area (Social and Economic Values, RMP-46).
- Manage for a sustained level of livestock grazing while maintaining healthy public land resources. Provide for a sustained level of livestock grazing in the CMPA, while meeting resource objectives and requirements for the S&Gs. Implement administrative solutions and rangeland projects to provide proper management for livestock grazing while meeting resource objectives and requirements for S&Gs (Bureau of Land Management 1997a) (Grazing Management, RMP-53).
- Restore and maintain the integrity of ecosystems consistent with appropriate fire regimes and land uses. Implement management actions across the CMPA that maintain or return plant communities to the historic fire regime, except where changes to the biophysical environment have progressed to the point that a return to historic conditions is impractical. In areas where the biophysical environment has changed significantly and a return to historic conditions is not possible or ecologically desirable, the appropriate fire regime will be determined based upon current conditions. Management actions will be implemented to establish the appropriate fire regime. Assess burned areas for appropriate biological and physical rehabilitation activities (Wildland Fire Management, RMP-57).
- Manage livestock grazing in wilderness under the stipulations of the Congressional Grazing Guidelines (HR 101-405 Appendix A) (House of Representatives 1990) (Wilderness, RMP-75).
- Manage existing WSAs so as not to impair their suitability for preservation as wilderness (WSAs and Parcels with Wilderness Characteristics, RMP-80).

- Manage parcels with wilderness characteristics to protect those characteristics (WSAs and Parcels with Wilderness Characteristics, RMP-81).

The following management objectives, specific to the Hammond Allotment, are from the Andrews Management Unit (AMU)/Steens Mountain CMPA RMP/ROD, Appendix J - Allotment Management Summaries, J-27 (Bureau of Land Management 2005e), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a):

- Improve the ecological condition of upland vegetation communities.
- Maintain the ecological condition of upland vegetation communities.
- Maintain/improve the condition of riparian vegetation communities.

The following management objectives, specific to Hardie Summer Allotment, are from the AMU/Steens Mountain CMPA RMP/ROD, Appendix J - Allotment Management Summaries, J-29 (Bureau of Land Management 2005e), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a):

- Maintain the ecological condition of upland vegetation communities.
- Maintain/improve the condition of riparian vegetation communities.

The following management objectives, specific to the Mud Creek Allotment, are from the AMU/Steens Mountain CMPA RMPs/RODs, Appendix J - Allotment Management Summaries, J-11 (Bureau of Land Management 2005e), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a):

- Improve the ecological condition of upland vegetation communities.
- Maintain the ecological condition of upland vegetation communities.
- Maintain/improve the condition of riparian vegetation communities.

The following management objective, specific to the Hammond FFR Allotment, is from the AMU/Steens Mountain CMPA RMPs/RODs, Appendix J - Allotment Management Summaries, J-45 (Bureau of Land Management 2005e), as amended by the 2015 Oregon GRSG ARMPA/ROD (Bureau of Land Management 2015a):

- Pasture dominated by private land and managed custodial with no specified management objective.

The following goals, objectives, and management direction (MD) are from the 2015 Oregon GRSB ARMPA (Bureau of Land Management 2015a) and apply to all allotments.

- Conserve, enhance, and restore the sagebrush ecosystem upon which GRSB populations depend in an effort to maintain and/or increase their abundance and distribution, in cooperation with other conservation partners (Goal SSS 1, p. 2-3).
- Manage land resource uses in GRSB habitat to meet the desired conditions described in Table 2-2, Habitat Objectives for Greater Sage-grouse. Use the desired conditions to evaluate management actions that are proposed in GRSB habitat to ensure that habitat conditions are maintained if they are currently meeting objectives or habitat conditions move toward these objectives if the current conditions do not meet these objectives (Objective SSS 4, p. 2-4).
- Apply buffers and seasonal restrictions in Table 2-3 to all occupied or pending leks in PHMA and GHMA to avoid direct disturbance to GRSB. 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 USGS Report Conservation Buffer Distance Estimates for Greater Sage-Grouse—A Review (Manier et al. 2014) (MD SSS -9, p. 2-7).
- Anthropogenic disturbances or activities disruptive to GRSB (including scheduled maintenance activities) shall not occur in seasonal GRSB habitats unless the project plan and NEPA document demonstrate the project will not impair the life-cycle or behavioral needs of GRSB populations. Seasonal avoidance periods vary by GRSB seasonal habitat as follows:
 - In breeding habitat within four (4) miles of occupied and pending leks from March 1 through June 30. Lek hourly restrictions are from two hours before sunset to two hours after sunrise at the perimeter of an occupied or pending lek.
 - Brood-rearing habitat from July 1 to October 31.
 - Winter habitat from November 1 through February 28.
 - The seasonal dates 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 coordination with ODFW, in order to better protect GRSB (MD SSS-11, p.2-9).
- All authorized actions in GRSB habitat are subject to required design features (RDF) and Best Management Practices in Appendix C of the GRSB ARMPA and these disturbance screening criteria. Where avoidance is not possible, disturbance will be allowed under the following conditions:
 - New anthropogenic disturbance does not occur within 1.0 mile of an occupied or pending lek in PHMA or GHMA.
 - Development meets noise restrictions in PHMA and GHMA (GRSB ARMPA Appendix L).

- Analyze through implementation level NEPA seasonal protection and timing limitations of occupied and pending leks in PHMA and GHMA.
 - All new permitted activities will follow RDFs (GRSG ARMPA Appendix C) in PHMA and GHMA.
 - To the extent feasible, development should only occur in non-habitat areas. If this is not possible, then development must occur in the least suitable habitat for GRSG.
 - Apply buffers and seasonal restrictions in Table 2-3 to all occupied or pending leks in PHMA and GHMA to avoid direct disturbance to GRSG.
 - Screening criteria and conditions will not be applicable to vegetation treatments being conducted to enhance GRSG habitat, except noise and seasonal restrictions will apply. (MD SSS -13, p. 2-9).
- Increase the resistance of Greater Sage-grouse habitat to invasive annual grasses and the resiliency of Greater Sage-grouse habitat to disturbances such as fire and climate change to reduce habitat loss and fragmentation. (VEG Goal 1, 2-10).
 - Vegetation management activities that are timing-sensitive for maximum effectiveness, such as herbicide application or seeding operations, can occur during the breeding season within 4.0 miles of occupied or pending leks. Limit operations to no more than 5 days and to the period beginning two hours after sunrise and ending two hours before sunset during the breeding and early brood rearing period. Conduct pre-treatment surveys for nests and do not damage or destroy identified nests during treatment operations. Conduct operations so as to minimize the risk of accidentally killing chicks. Breeding and early-brood-rearing typically occur from March 1 through June 30; use local information to further refine this period (MD VEG 5, p. 2-13).
 - Use adaptive management principles (for example, monitoring and adjusting seed mixes, planting methods or timing of planting to increase success rates) to provide for persistence of seeded or planted species important to GRSG (MD VEG 6, p. 2-13).
 - Use native plant materials for restoration and rehabilitation based on availability, adaptive capacity, and probability of successful establishment (see GRSG ARMPA Appendix I). Where native plant material availability or probability of successful establishment is low, use desirable nonnative plant materials that are of a similar functional/structural group as native plant species (e.g., deep-rooted, tall perennial bunchgrass, tap-rooted perennial forb) (MD VEG 8, p. 2-13).
 - When sufficient native plant materials are available, use native plant materials unless the area is immediately threatened by invasive plant species spread or dominance. Use nonnative plant materials as necessary to:
 - Limit or control invasive plant species spread or dominance.
 - Create fuel breaks along roads and rights-of-way (ROW).
 - Create defensible space within 0.5 mile of human residences (MD VEG 9, p. 2-13).

- Adjust discretionary land uses, such as active use for livestock grazing or recreational uses or seasons, as needed to facilitate attainment and persistence of vegetation restoration objectives (MD VEG 12, p. 2-13).
- Manage livestock grazing to maintain or improve GRSG habitat by achieving Standards for Rangeland Health (Objective LG 1, p. 2-17).
- When Standards are being met no changes in current management or activity plans or permits/leases are required but could occur to meet other resource management objectives (MD LG 2, p. 2-19).
- The timing and location of livestock turnout and trailing shall not contribute to livestock congregation on occupied or pending leks during the GRSG breeding season of March 1 through June 30 (MD LG 3, p. 2-19).
- During drought conditions use a recognized drought indicator, such as the Drought Monitor or Palmer Drought Severity Index, to determine when abnormally dry or drought conditions are developing, present, or easing. When such conditions are developing or present:
 - Conduct pre-season assessments prior to livestock turn out.
 - Monitor vegetation conditions during authorized livestock use periods to determine need for early removal or other changes to meet seasonal PHMA and GHMA objectives.
- If livestock grazing is deferred due to drought, reevaluate vegetation and GRSG habitat indicators that measure GRSG habitat prior to reauthorization of grazing (MD LG 5, p. 2-20).
- Design new and maintain existing water projects to avoid standing pools of shallow water that would spread West Nile Virus (MD LG 8, p. 2-20).
- Avoid construction of livestock facilities and supplemental feeding of livestock within 1.2 miles of occupied or pending leks in GRSG habitat unless it is part of an approved habitat improvement project or approved by the authorized officer to improve ecological health or to create mosaics in dense sagebrush stands that are needed for optimum GRSG habitat. Supplemental feeding in GRSG habitat must be part of an approved habitat improvement plan or approved by the authorized officer (MD LG 10, p. 2-20).
- The NEPA analysis for renewals and modifications of livestock grazing permits/leases that include lands within sagebrush focal area (SFA) and PHMA will include specific management thresholds based on GRSG Habitat Objectives Table 2-2, Land Health Standards (43 CFR 4180.2) and ecological site potential, and one or more defined responses that will allow the authorizing officer to make adjustments to livestock grazing that have already been subjected to NEPA analysis (MD LG 13, p. 2-20).

The following objectives are from the Steens Act of 2000 (Section 102(b)).

- To maintain and enhance cooperative and innovative management projects, programs and agreements between tribal, public, and private interests in the CMPA (Section 102(b)(1)).
- To promote grazing, recreation, historic, and other uses that are sustainable (Section 102(b)(2)).
- To conserve, protect and to ensure traditional access to cultural, gathering, religious, and archaeological sites by the Burn Paiute Tribe on Federal lands, and to promote cooperation with private landowners (Section 102(b)(3)).
- To ensure the conservation, protection, and improved management of the ecological, social, and economic environment of the CMPA, including geological, biological, wildlife, riparian, and scenic resources (Section 102(b)(4)).
- To promote and foster cooperation, communication, and understanding, and to reduce conflict, between Steens Mountain users and interests (Section 102(b)(5)).

The following objective is from BLM Manual 6330 Management of WSAs (Bureau of Land Management 2012a).

- Consistent with relevant law, manage and protect WSAs to preserve wilderness characteristics so as not to impair the suitability of such areas for designation by Congress as wilderness.

9 APPENDIX C: ISSUES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The BLM considered several other issues during development of the EIS but did not analyze them in detail. Below is the rationale for why these issues were removed from consideration.

9.1 ACEC

- How would the level and timing of proposed livestock use, and developments, affect the relevant and important values of the ACEC?

The Fir Groves ACEC covers 477 total acres of public land in two distinct locations on the western slopes of the Steens Mountain, with approximately 402 acres in the northern parcel and 75 acres in the southern parcel. The ACEC has approximately 16.5 acres of fir groves scattered throughout the area. The Fir Groves ACEC contains an isolated population of an ancient hybrid of grand fir, *Abies grandis*, and has ecological and social importance. There are three main stands of fir in the area, two of them residing all or partly within the ACEC. The stands are composed of even-age true fir (*Abies* sp.), which is most likely a hybrid of grand fir (*A. grandis*), and white fir (*Abies concolor*). Most of the fir trees within the ACEC are within the Little Fir Creek stand, which is the largest and densest of the two main stands. This stand resides mostly on private lands, with 15 of its 80 acres on BLM-managed land. The other stand within the ACEC, on BLM-managed land, is the Fence Creek stand, which is located 2 miles south and west of the Little Fir Creek stand. This stand is 1.5 acres, which is the smallest stand. The Big Fir Creek stand, though large, is entirely on private lands. In addition to the three main stands, there are also small groups and individual fir trees scattered throughout the ACEC. The main stands of fir trees contain a mature overstory, with large numbers of younger trees in the understory. These areas of fir trees are the only known stands of conifer vegetation within a 100-mile radius other than western juniper, which are abundant in the area and intermixed within the ACEC.

The other tree species in the area include quaking aspen (*Populus tremuloides*) and curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Mountain big sagebrush is intermixed within the area and is heavily concentrated in isolated patches. Sandberg's bluegrass, bluebunch wheatgrass, Idaho fescue, Nevada bluegrass, antelope bitterbrush, wax currant, snowberry, and grey rabbitbrush are all present and dispersed across the landscape. Neither of the two main stands of fir trees within the ACEC are accessible by public road or maintained trail, both requiring cross country travel to reach the area. The objective for this ACEC is to ensure "populations and habitat of rare plant species and their associated communities are stable or continue to improve in vigor and distribution" (Bureau of Land Management 2004).

The level and timing of livestock use within the ACEC would not negatively impact the stands of firs as livestock do not utilize fir trees as a source of nutrition when other sources are available; utilization thresholds would ensure other sources of forage are always available and prevent foraging on fir trees. Smith (1967) found that "open timber range was grazed much less than grasslands, and dense timber stands were scarcely grazed." However, Madany and West (1983) found that within the montane forests of Utah, where livestock grazing occurred it reduced herbaceous cover and encouraged the increase of woody species, reducing flammability and

decreasing fire frequency. If grazing within the ACEC continued at past grazing levels, it may indirectly benefit the ACEC by reducing fine fuel accumulation in the area and reducing the risk of a catastrophic wildfire that could irreparably damage the fir trees within the ACEC (Davies et al. 2015a; Davies et al. 2015b; Davies et al. 2017).

Only Alternative 3 includes developments (new fences) within the ACEC. The proposed fence would not have any effect on the ACEC as no vegetation would be removed during fence construction; vegetation would only be impacted at the site of posts, and the fence would not use any fir trees.

Due to that fact that none of the alternatives would result in major changes to the grazing levels and timing of use within the ACEC, and proposed developments within the ACEC are not expected to affect the relevant and important values of the ACEC, ACECs will not be further analyzed within this EIS.

9.2 Environmental Justice

- How would proposed developments impact environmental justice populations?

Harney County has a lower proportion of Hispanic/Latino residents, 5 percent, than the statewide level of 13 percent. The Burns Paiute Indian Reservation is located in Harney County, which contains a higher proportion of Native Americans (3.2 percent) than the statewide level of 1.1 percent. An additional 3.2 percent of Harney County residents reported being two or more races, compared to 4.6 percent of residents statewide. Considering both race and ethnicity, 13.2 percent of residents are considered minorities, compared to 23.5 percent statewide.

The presence of minority and low-income populations is of special interest due to BLM environmental justice policy (Bureau of Land Management 2005d: D.), which calls for the fair and equitable treatment and involvement of all people, and avoidance of disproportionate, negative effects on low-income and minority populations. Based on BLM definitions of environmental justice populations, Harney County is considered an environmental justice population due to its low-income status and proportion of Native Americans. Given that the alternatives would authorize between 0 and 4,485 AUMs out of a district total of approximately 248,740 AUMs permitted by the BLM Burns District in 2023 (BLM RAS) and would not impact or exclude environmental justice populations, there would not be environmental justice impacts. The issue is therefore not analyzed in detail because there is no potential for significant effects.

9.3 Geology and Minerals

- How would the proposed developments and livestock grazing impact geology and minerals?

Geology and minerals would not be affected by any proposed actions within this AMP EIS. For all the alternatives, there would be no perceptible change in the availability of land for mineral development or to the economics of exploration and extraction. This includes all the mineral

estate; locatable, leasable, and salable minerals. Therefore, this issue will not be analyzed in detail because there is no potential for significant effects.

9.4 Grazing Management

- What grazing districts are these allotments a part of and how would grazing districts be impacted?

All of the Bridge Creek allotments are entirely within Oregon Grazing District 2, named the Basin Grazing District, which was established July 9, 1935. The Basin Grazing District covered most of the public lands currently managed by the BLM Burns District (Bureau of Land Management 2019 Feb 19). As none of the alternatives would change or impact grazing districts, this issue is not further analyzed within the EIS.

- What allotments and/or pastures would be formalized as “chiefly valuable” for livestock grazing under the Taylor Grazing Act?

The 1934 Taylor Grazing Act (TGA), as amended, states that:

In order to promote the highest use of the public lands pending its final disposal, the Secretary of the Interior is authorized, in his discretion, by order to establish grazing districts or additions thereto and/or to modify the boundaries thereof, of vacant, unappropriated, and unreserved lands from any part of the public domain of the United States (exclusive of Alaska), which are not in national forests, national parks and monuments, Indian reservations, revested Oregon and California Railroad grant lands, or revested Coos Bay Wagon Road grant lands, and which in his opinion are chiefly valuable for grazing and raising forage crops...

All allotments and the pastures within the BCA have already been formalized as chiefly valuable for livestock grazing under the TGA when the Basin Grazing District was established on July 9, 1935. The Secretary of the Interior need only to make a chiefly valuable for grazing determination when the Secretary is creating a grazing district, adding to a district, or modifying the grazing district’s boundaries. When enacting FLPMA, Congress did not repeal or modify grazing provisions of TGA, rather set forth a new structure for the Secretary and BLM to manage lands. FLPMA requires the Secretary to “develop, maintain, and when appropriate, revise land use plans” for all Federal land uses. Land use planning decisions, including AMPs such as this one, control livestock grazing on Federal land. These plans determine grazing levels and periods of use in order to meet the objectives of multiple use and sustained yield. The land use planning process, as opposed to the classification process, establishes grazing use. Determining whether Federal land remains chiefly valuable for grazing is neither required nor appropriate during the planning process when establishing grazing levels, as in an AMP. As none of the alternatives would impact the designation of grazing districts, and no alternatives would limit uses to only grazing, this issue is not further analyzed.

- How would improved distribution homogenize grazing effects and increase ecological stress?

Under all proposed grazing alternatives, grazing would continue to be limited by a maximum utilization threshold of 50 percent utilization on natives and 60 percent on desirable non-native species, even in areas where distribution is increased. In addition, livestock graze at decreasing levels further away from water where the heaviest utilization occurs at the water site and decreased until near 0 percent utilization occurs (estimated to be approximately 2 miles from water within this EIS). Therefore, while there would be improved distribution, it would not be “homogenized” and ecological stress would not increase. Therefore, this issue is not further analyzed within this EIS.

- What thresholds and responses would be in place under each alternative?

Thresholds and responses apply to all alternatives except where the text specifically mentions they do not apply, and Alternative 5 (No Grazing). Refer to the Adaptive Management section, which includes discussion of thresholds and responses.

9.5 GRSG

- How would the alternatives, especially proposed livestock grazing, impact GRSG stress levels?

Jankowski and others (2014) compared fecal samples of GRSG in order to measure the levels of the stress hormone corticosterone in lekking male and pre-nesting female GRSG in both grazed and ungrazed areas, to evaluate whether increased stress levels were associated with the presence of cattle. The study found elevated levels of stress hormones in fecal samples from both male and female GRSG where cattle were present, when compared to fecal samples collected in areas where cattle were absent. Results also demonstrated an increased level of stress hormone proportional to the number of cattle within the sample area. However, while the Jankowski and others (2014) study was able to demonstrate a relationship between an increase in GRSG stress hormones corresponding to the presence and number of cattle, it did not determine if or by what degree the presence of stress hormone impacted reproductive success or if increased stress hormone levels posed a measurable increased risk of adult mortality. In addition, the study did not eliminate all other potential stressors that may have occurred at the same time as livestock grazing. Therefore, at this time, there is no research to ascertain if livestock presence directly or indirectly increases stress hormone, or the degree of increased stress hormones, or their measurable impact on either breeding success or adult survival. While there is potential that increased grazing may result in increased stress and decreased grazing may result in decreased stress, there is currently no available research that clearly isolates livestock grazing as the only variable nor how much the stress level may change due to grazing. At this time, it is expected that while some changes may result in changes to stress levels under the alternatives, it is not expected that grazing changes would result in measurable differences in stress hormones above what has occurred under past grazing. Therefore, this issue is not further analyzed.

- How would the alternatives comply with a potential GRSG listing under the ESA?

GRSG has been proposed for listing and the last USFWS determination in 2015 (U.S. Fish & Wildlife Service 2015) was “warranted but precluded from listing,” due to ongoing planning efforts undertaken by other Federal, State, and non-governmental organizations to manage for GRSG habitat maintenance or improvement. The alternatives as analyzed in this document characterize the extent of effects to GRSG habitat by different levels of livestock grazing and changes in season of use. Should the USFWS determine that GRSG needs to be listed as “endangered” or “threatened” under the ESA, and that livestock grazing is an action that needs to be approved in GRSG habitat, the probability exists that the BLM would need to enter into Section 7(a)2 consultation with the Service. However, that is not required until after GRSG is listed. Therefore, this issue is not further analyzed within this document.

- How would proposed livestock grazing management affect the percentage of sagebrush stands in GRSG habitat that are in advanced structural stages with sagebrush cover between 5-15 percent (Sagebrush Stand Class 3)?

Table 2-4 of the 2015 GRSG ARMPA (Bureau of Land Management 2015a) describes a desired mix of sagebrush classes by sagebrush type. For shallow-dry sagebrush type areas, approximately 70 percent (50-90 percent) of the site should be in Class 3, while in warm-dry sagebrush type areas, approximately 25 percent (10-40 percent) should be in Class 3, and on cool-moist sites, 20 percent (10-30 percent) should be in Class 3. Grazing management is designed in a manner that promotes desirable plant communities to maintain or move towards achieving S&Gs, promoting desired habitat conditions described in tables 2-2 and 2-4 of the 2015 Oregon GRSG ARMPA (Bureau of Land Management 2015a), and meet GRSG ARMPA Objective Veg 1 (Bureau of Land Management 2015a: 2–16), which states, “Within the boundaries of each Field Office establish a mix of sagebrush classes as identified in Table 2-4, Desired Mix of Sagebrush Classes by Sagebrush Type. Evaluate progress toward the objective every 10 years.” (See Vegetation section for grazing effects to sagebrush.)

When applied to the Steens Pueblo South Steens Fine-scale (Third Order), based on the 2023 Multi-Scale Habitat Assessment Report (Bureau of Land Management 2023d) (Appendix J), just over 61 percent of the fine-scale area has existing and associated suitable sagebrush cover; the other 39 percent has largely been altered by wildfires, which have reduced sagebrush cover, and by juniper encroachment (Bureau of Land Management 2023d). Projects to remove juniper within the PAC are occurring with the goal of improving the amount of sagebrush available for GRSG and other sagebrush dependent wildlife. In addition, restoration efforts to address the recovery of sagebrush and other native vegetation are underway with the goal of eventually meeting the desired habitat conditions described in 2015 GRSG ARMPA (Bureau of Land Management 2015a) tables 2-2 and 2-4 for management of GRSG habitat. These actions, described in the 2023 Mud Creek Restoration DNA (Bureau of Land Management 2023c), are outside the scope of this document. However, none of the alternatives would modify those restoration actions or measurably impact sagebrush structure across the BCA. Therefore, there is no potential for significant effects, and this issue is not considered in detail in this EIS.

9.6 Lands and Realty

- How would developments and livestock grazing impact the BLM's ability to issue ROWs or complete other lands and realty actions?

The proposed action would not affect or interfere with lands and realty, as no easement or right-of-way is actively present in the project area. For this reason, none of the alternatives would have a significant effect on lands and realty and, therefore, this issue will not be analyzed in detail.

9.7 Lands with Wilderness Characteristics

- How would the alternatives affect wilderness characteristics on BLM-managed land, outside of the Bridge Creek LWC, WSAs, and designated wilderness?

The BLM is not analyzing this issue in detail because it has determined that there are no lands with wilderness characteristics in the planning area outside of the Bridge Creek LWC, WSAs, and designated wilderness.

In 2002, Oregon Natural Desert Association (ONDA) presented information to the BLM on areas they believed needed to be reevaluated for designation as WSA (Oregon Natural Desert Association 2002). The units within the BCA were Krumbo (northeast of the Bridge Creek WSA), Mud Creek (west of the Bridge Creek WSA), and Bridge Creek (east of the Bridge Creek WSA).

In 2003, BLM updated the wilderness characteristics inventory after reviewing current conditions and citizen information submitted for the lands outside of WSAs and designated wilderness. The BLM used multiple resources to complete the inventory update, including input from an in-house IDT with field knowledge of the areas, aerial photographs, citizen submitted information, and BLM databases containing records of rights-of-way (ROW), mineral leases, mining claims, road developments, and vegetation treatments. BLM staff made site visits in areas where more information was needed. During this update, the BLM determined that no changes to conditions within the Krumbo Creek and Mud Creek units would modify the findings of the 1980 intensive inventory (Bureau of Land Management 1980) that had evaluated the presence of wilderness characteristics on BLM-administered lands. The Krumbo Creek unit of the citizen proposed area was determined not to meet the minimum roadless size requirement, as well as to lack naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. The Mud Creek unit of the citizen proposed area was determined to meet the size requirement but lacked naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. Therefore, in the Krumbo and Mud Creek units, the BLM determined in 2003 that wilderness characteristics are not present. LWCs were analyzed in the 2004 AMU/Steens CMPA FEIS (Bureau of Land Management 2004) and designated in the 2005 AMU/Steens CMPA RMPs and RODs (Bureau of Land Management 2005e; Bureau of Land Management 2005a). The 9th Circuit Court of Appeals, in December 2010, upheld BLM's 2003 findings that specific areas did not have wilderness characteristics.

During the 2003 review, the BLM did find that 1,530 acres of the citizen proposed Bridge Creek Unit did contain wilderness characteristics. Through the 2005 Steens Mountain CMPA RMPA (Bureau of Land Management 2005a), the BLM made decisions about the management of this area. Specifically, the BLM decided through the RMP to manage areas with wilderness characteristics to protect those characteristics and it determined that the general management direction for the CMPA would be sufficient to protect wilderness characteristics within the unit and did not provide specific management direction or limitations for the Bridge Creek LWC unit. Impacts to wilderness characteristics within the Bridge Creek LWC are analyzed in detail in Chapter 3.

In October of 2023, the BLM had an IDT meeting to review information pertaining to the remaining citizen proposed LWC units, including updated citizen provided information. At that time, the IDT determined the following:

- Krumbo Creek Citizen Proposed LWC Unit
 - Includes areas of crested wheatgrass and pipelines. All pipeline roads would be maintained as needed, as would the pipeline and troughs associated with the area. Therefore, this unit would not have wilderness characteristics as roads bisect the unit to such a degree that they would not meet the size requirement. However, the IDT agreed that an updated inventory of the roads should be completed, and recognized that within the CMPA, a road inventory is currently underway as part of the Steens CMPA Travel Management Plan (TMP) development. Once that road inventory is completed BLM will consider all areas of CMPA to see which areas may currently meet minimum size requirements.
- Mud Creek Addition Citizen Proposed LWC Unit
 - There are a number of roads in the area that would continue to be maintained as needed. However, some of these may be considered cherry stem routes, which would not decrease unit size. This area will be reconsidered for size once the TMP road inventory is completed. If it meets the size requirement, the IDT determined that a full updated inventory on this unit should be completed as in the past it was eliminated due to presence of seedings; however, these may no longer be obvious to the casual observer and may not take away from naturalness to the extent that wilderness characteristics would not be present.
- Frazier Field Citizen Proposed LWC Unit
 - Found to also need an updated inventory following completion of TMP road inventory to consider if it contains wilderness characteristics when considered not just on its own, but contiguous with existing WSA.

Other than conditions described above, the BLM determined in 2023 that conditions on the ground have not changed in a way that would result in findings being different from those reached in 2003, aside from a lack of permitted grazing beginning in 2014, which in and of itself, would not result in wilderness characteristics being present. In addition, none of the actions within the alternatives would be expected to have an overall negative impact on any wilderness characteristics present within the BCA, and the 2005 AMU/Steens CMPA RMPs and RODs

(Bureau of Land Management 2005b; Bureau of Land Management 2005a) would continue to protect any wilderness characteristics that are currently present. Therefore, this issue is not fully analyzed within this EIS.

The BLM's policy is to analyze those proposed units as soon as is "practicable." The BLM Burns District is currently working on updating road inventories; once those are completed, the BLM will be able to fully update wilderness characteristic inventories as appropriate.

9.8 Malheur National Wildlife Refuge

- How would the Malheur National Wildlife Refuge be impacted by the alternatives?

None of the alternatives would impact portions of the Malheur National Wildlife Refuge outside of the BCA. In pastures that contain Malheur National Wildlife Refuge-managed lands, impacts would be the same as analyzed for BLM-managed land under each alternative. Therefore, this issue is not further analyzed.

9.9 Noxious Weeds and Invasive Plants¹²⁰

- How would the alternatives affect the potential for introduction and establishment of noxious weeds and invasive plants?

The BLM's noxious weed database currently lists nine species, including medusahead, within the BCA, across 82 known sites, totaling approximately 79 acres. The numbers and acreages associated with each species¹²¹ are in table 9-1.

Table 9-1: Noxious Weeds in the BCA

NOXIOUS WEED SPECIES	NUMBER OF SITES	ACRES
Bull thistle	10	3.67
Canada thistle	39	37.09
Scotch thistle	17	37.35
Diffuse knapweed	3	0.004
Spotted knapweed	6	0.12
Perennial pepperweed	5	0.40
White top	1	0.0005
Dalmatian toadflax	1	0.0001
Totals	82	78.63

The BLM monitors for new infestations, and treatment of existing noxious weeds is an ongoing process that would continue under all alternatives, following direction in the Integrated Invasive Plant Management for the Burns District Revised Environmental Assessment Decision Record (Bureau of Land Management 2015c). Areas where cattle congregate and areas with new ground disturbance are, and would continue to be, priorities for monitoring and treatment.

¹²⁰ Invasive annual grasses, including cheatgrass, medusahead, and ventenata, are analyzed within Chapter 3 of the EIS and, therefore, not discussed within this section.

¹²¹ Medusahead is fully analyzed and discussed in Chapter 3 of the EIS and, therefore, not listed within this table.

The noxious weeds in the project area require continued BLM monitoring and treatment. They are inventoried periodically by BLM and Harney County Strategic Weed Attack Team (SWAT), with new documented sites and recently treated sites being monitored more frequently than older sites that have been successfully treated. From 2016 through 2018, a total of 21.08 acres were treated. In 2019 and 2020, an additional 0.3 acres and 0.4 acres were treated, respectively. Treatments are mostly for Canada thistle and spotted knapweed.

The new ground-disturbing activities proposed in the EIS have the potential to create opportunities for noxious weed establishment and spread. The risk of new weed introductions directly correlates to the numbers and types of ground-disturbing activities. Following PDEs listed in Section 2.2 and the Standard Operating Procedures in the 2010 Oregon Vegetation Treatments EIS (Bureau of Land Management 2010) would reduce opportunities for introduction of new noxious weeds. Maintaining a productive, healthy plant community, which is a required part of S&Gs and included within alternatives, would also reduce opportunities for noxious weed introduction and spread (Sheley and Krueger-Mangold 2003). This means that while noxious weed seeds may be spread, if a site is in good condition with a healthy perennial grass understory, it is less likely that these noxious weed seeds or propagules would be able to establish after germinating.

Livestock can serve as a vector for noxious weeds, introducing them to new areas. Alternatives with higher AUM levels (whether active or NR use) or including a longer season of use, would increase the potential for spread of noxious weeds. This is due to the presence of either more animals grazing within the area that can act as vectors or animals being present over a longer time period, which may result in livestock being present when noxious weeds are dispersing seeds. The duration and level of livestock grazing intensity, if left without prescribed use levels, can contribute to conditions that would favor weed establishment, such as improperly grazed areas resulting in disturbed soils. Additionally, if livestock are in the area for a longer period of use, the permittee would make more visits to the area, also serving as a potential weed vector. With more visits to the area, however, permittees also frequently see and report noxious weeds to the BLM for inventory and treatment, which in the long term helps reduce the amount of noxious weeds present in an area.

The proposed developments under some alternatives (fences, corrals, water pipelines, and troughs) could also increase the spread of weeds. These, as well as supplemental feeding (Alternative 3), cause ground disturbance and create new opportunities for noxious weed establishment and spread. Concentrated grazing at new troughs and in supplemental feeding areas creates small areas of heavy utilization, resulting in disturbed areas that could create sites where noxious weeds can more readily establish.

While some disturbed areas currently exist, especially around existing developments, authorizing grazing above potentially annually authorized active use and NR AUMs could result in an increase in size of existing disturbed areas. This could result in negative impacts to vegetation from trampling or heavy utilization in the immediate vicinity of the developments, which can expand niches for noxious weeds to become established.

Within the BCA, Hammond Allotment-Krumbo Creek Pasture and approximately 14 percent of the Mud Creek Allotment, there are areas with poor recovery of perennial grass understory following fire, which are largely dominated by invasive annual grasses. These areas are, and would continue to be, the most susceptible areas to invasion by noxious weeds.

While proposed actions on their own have the potential to increase noxious weed spread, it is unlikely they would have a measurable effect within the BCA, due to the implementation of RDFs, PDEs, limits on livestock utilization levels, the current overall health of the perennial understory within the majority of the BCA, and ongoing monitoring and noxious weed treatments that would occur regardless of alternative selected. One of the main RDFs that would prevent noxious weed establishment and/or spread is the requirement to power wash all vehicles and equipment involved with range development construction prior to allowing them to enter the project area. Livestock grazing, including NR use, would still be restricted by the utilization levels analyzed in the 2005 AMU/Steens CMPA RMPs (a maximum utilization threshold of 50 percent on native key species and 60 percent on desirable non-native species) (Bureau of Land Management 2005b; Bureau of Land Management 2005a), or lower levels analyzed in some of this EIS's alternatives. These limits would help preserve the plant community's ability to resist the invasion and weed spread.

Other factors also have the potential to affect weed spread, including recreational visitors that travel the road network and camp in both established campgrounds and in dispersed sites, as well as wildlife, wind, and water. Noxious weed inventory and treatment data show this travel corridor, specifically the Steens Mountain Back Country Byway as the primary vector for noxious weeds in the BCA. Additionally, hikers travel across existing livestock and wildlife trails as well as cross country, often in areas not frequently monitored for weeds, as do wildlife.

Each visit into an area, whether by humans or wildlife, creates opportunities for new noxious weed introductions or spread of existing noxious weeds, especially in areas that have limited understories (see Vegetation section for more details). New noxious weed introductions can spread quickly in disturbed areas, potentially infesting many new acres. Depending on weather conditions in any given year, weed infestations vary from a few plants to several acres. Once noxious weeds establish in an area, the seed may be viable onsite for over 25 years, depending on the species. Seeds that are windborne may travel miles, and some seeds may also be dispersed by water (Sheley and Petroff 1999), in addition to being spread through human and wildlife activities. Lehrer and Tisdale (1956) documented that seeds may remain viable even after digestion.

Design features of the alternatives, utilization limits, and ongoing noxious weed monitoring and treatment would result in a negligible difference on noxious weeds between alternatives. For these reasons, none of the alternatives would have a measurable effect and, therefore, noxious weeds (other than medusahead) will not be analyzed in detail.

9.10 Recreation

- How would the alternatives affect the public's ability to use BLM-managed lands for recreational opportunities?

Recreational use in the project area is dispersed in nature, including, but not limited to, hiking, camping, hunting, wildlife viewing, shed hunting, etc. There are no recreation management areas in the project area and no developed recreation sites. All recreation occurring in the area is dispersed in nature. None of the actions proposed in any of the alternatives would affect the public's ability to use BLM-managed land for recreational opportunities. Therefore, this issue is not analyzed in detail. The EIS does analyze impacts of the alternatives on recreation activities in Chapter 3.

9.11 Riparian/Fisheries/Water Quality

- How would proposed livestock grazing impact public drinking water supplies?

No known public drinking water supplies rely on surface water from the Blitzen system. Harney County relies on groundwater from wells as the source of drinking water for the public. Therefore, this issue is not further analyzed.

- How would the alternatives comply with Senator Ron Wyden's proposed River Democracy Act, where he proposes the designation of Mud, Bridge, McCoy, and Krumbo Creeks?

The River Democracy Act of 2021 (S. 192) was introduced in the U.S. Senate but has not been passed. Consequently, none of the waterways identified in the proposed Act have been included in the Wild and Scenic Rivers System. Therefore, there is no need for the BLM to consider these proposed designations, and this issue is not further analyzed.

- What would be the effect of proposed water developments on water quantity and availability?

The proposed water developments would not affect the available water quantity. The proposed water developments consist of a spring and pipeline development in Alternative 3, which would draw water through a closed pipe and float valve to livestock watering troughs. The pipe would run from a spring, consisting of a seep and excavated pool on private property, to the troughs. The spring is wholly contained on the private land, there is no surface or subsurface flow from it onto public lands, and BLM does not have any water rights associated with this spring. The pipe would not draw more water from the spring than it naturally produces. Water from the spring is currently used only for livestock watering, which is the same use that would occur under the proposal for the development. As the water is being used for livestock watering (which is exempted from the permit requirements of State law by ORS 537.141(f)) and in the same amounts, the development would not affect the available water quantity within the BCA or larger Harney County. Therefore, this issue will not be analyzed in more detail.

9.12 Soils

- How would the proposed livestock grazing, development construction, and proposed maintenance impact soils?

There are seven different soil associations found within the project area. These are Felcher-Skedaddle, Fury-Skunkfarm-Housefield, Ninemile-Westbutte-Carryback, Poujade-Ausmus-Swalesilver, Raz-Brace-Anawalt, Reallis-Vergas-Lawan, and Baconcamp-Clamp-Rock outcrop (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Felcher-Skedaddle association consists of very shallow to moderately deep, well-drained soils that formed in colluvium and residuum derived from andesite, basalt, and volcanic rocks. Textures ranges from very stony clay loam to very cobbly loam. This association is found on mountains, hills, and plateaus with slopes of 4–75 percent. Erosion potential is moderate for water and slight for wind. Native vegetation associated with this soil association includes: bluebunch wheatgrass, Thurber's needlegrass, Wyoming big sage, purple sage (*Salvia dorrii*), and squirreltail. (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Fury-Skunkfarm-Housefield soil associations consists of very deep, somewhat poorly to very poorly drained soils that are formed in alluvium. They consist of fine silty to fine loamy soils that are found in lake basins, floodplains, floodplain steps, in depressions on stream terraces, and along drainageways. Slopes are generally 0-4 percent. Ponding in this soil association is frequent, especially following precipitation events, with occasional flooding. Native vegetation associated with Fury-Skunkfarm-Housefield soils include: hardstem bulrush (*Schoenoplectus acutus*), sedges (*Carex* spp.), tufted hairgrass (*Deschampsia cespitosa*), rushes (*Juncus* spp.), quackgrass (*Elymus repens*), Sandberg bluegrass (*Poa secunda*), inland saltgrass (*Distichlis spicata*), yarrow (*Achillea* spp.), lupine (*Lupinus* spp.), three-tip sagebrush (*Artemisia tripartite*), silver sagebrush (*Artemisia cana*), shrubby cinquefoil (*Dasiphora* spp.), willow (*Salix* spp.), wildrye (*Leymus cinereus*), creeping wildrye (*Leymus triticoides*) and wild rose (*Rosa woodsii*). (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

Ninemile-Westbutte-Carryback association is composed of well-drained, shallow, and moderately deep soils that formed in residuum and colluvium and tend towards gravelly to very cobbly loams or stony to cobbly clays with areas of silty clay loam. It is found on plateaus, hills, and mountains that receive 12 to 16 inches of precipitation. Slopes range from 0-65 percent leading to a moderate hazard of water erosion. The associated native vegetation communities are mountain big sagebrush (*Artemisia tridentata vaseyana*) and low sagebrush (*Artemisia arbuscula*) with needlegrass species (*Achnatherum* spp.) and Idaho fescue (*Festuca idahoensis*). (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Poujade-Ausmus-Swalesilver soil association consists of very deep, somewhat poorly to moderately well drained soils formed from lacustrine deposits derived from volcanic rocks and ash. The complex consists of very fine sandy loams to ashy silt loams and are generally found on low lake terraces and depressions on plateaus with slopes ranging from 0–5 percent. These soils are susceptible to frequent ponding from November through May, depending on the annual

precipitation. Potential native vegetation associated with this complex is basin big sagebrush (*Artemisia tridentata tridentata*), black greasewood (*Sarcobatus vermiculatus*), basin wildrye, inland saltgrass, silver sagebrush, Sandberg's bluegrass, creeping wildrye, and mat muhly (*Muhlenbergia richardsonis*). (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Raz-Brace-Anawalt association includes cobbly or stony loams that evolved on hills and tablelands. These soils are shallow to moderately deep, generally well drained, and have a low potential for wind erosion and low to moderate potential for water erosion. These soils of cold plateaus and uplands support native vegetative communities dominated by Wyoming big sagebrush, low sagebrush, needlegrass species, and bluebunch wheatgrass. (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Reallis-Vergas-Lawen soil association consists of very deep, well-drained soils that formed in gravelly or loamy alluvium and eolian materials derived from volcanic rocks and wind and water deposited sediments. This complex is found on alluvial fans, lake terraces, and in depressions on plateaus and has slopes of 0–8 percent. The association ranges from a loamy to sandy loam texture and is well drained with slow to moderate permeability resulting in a low to moderate wind and water erosion risk. Native vegetation commonly found in this soil association is basin big sagebrush, Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), bluebunch wheatgrass, Thurber's needlegrass (*Achnatherum thurberianum*), Sandberg's bluegrass, needle and thread grass (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), basin wildrye, and western needlegrass (*Achnatherum occidentale*). (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

The Baconcamp-Clamp-Rock outcrop association includes very cobbly loam to loamy textures and consists of very shallow to moderately deep, well-drained soils that have a moderate to high water erosion potential and low to moderate wind erosion potential. Soils are located on mountains, hills, and canyons with slopes of 3 to 80 percent. Associated native vegetation communities include mountain big sagebrush and low sagebrush with Idaho fescue and needlegrass species. (U.S. Department of Agriculture, Natural Resources Conservation Service 2006).

Currently, there are a total of 43 water developments within the BCA, 28 are on BLM-managed and 15 are on private lands within the project area. Livestock tend to congregate around water developments creating areas where soils are compacted, and vegetation is removed. Within the BCA allotments, the current estimated areas with soil disturbance associated with water developments is approximately 270 acres (5 acres/development); this is approximately 1.02 percent of the BLM-managed acres within the BCA (26,378 acres). This is considered the area soils are most impacted compared to their potential, and functions as the baseline. This number was determined by estimating the area around water developments in the BCA where grass and/or shrubs appear to have been reduced or removed adjacent to the development, using 2017 OSIP 1-foot imagery in GIS, and averaging them. The range of disturbed or reduced vegetation areas around the water sources was 0.5–10 acres. For the purposes of this analysis, 5 acres per development, regardless of water development type or reliability was used to show maximum potential impact.

Additionally, livestock create trails leading to and from the water developments where soils are impacted. Trails generally have the most intense and obvious use closest to the water development and the use diffuses the farther away the livestock travel out to graze. Cattle naturally tend to trail one animal after another (head to tail), so the trailing widths are based on about the width of one adult animal. Industry average for cattle widths (based on working facility designs) is 16 inches width and thus used for trailing width calculations. For the purposes of this analysis a 1.5-mile trail is used as the assumed distance livestock are willing to go from water or would move their grazing activities to access water (Ganskopp 2001). To estimate the maximum extent of soil disturbance by trailing, an approximately 16-inches-wide trail over 1.5 miles would result in approximately 0.24 acre of soil disturbance per trail. Actual disturbance per water development would vary because of landscape position and topography; many developments have only one trail in and one out (two total). A conservative estimate is that there would be four access trails per development (about one from each cardinal direction) up to 1.5 miles long, which would equate to 0.96-acre soil disturbance per development. Since there are 54 water developments in the BCA it is estimated that there would be a total of 51.84 acres of soil disturbance because of trailing related to water developments. This is an estimated 0.19 percent of soils within the BCA on BLM-managed acres. Combined with the maximum potential impact from the water developments and area adjacent, there are an estimated 321.84 acres of soil disturbance, which is approximately 1.22 percent of the BCA on BLM-managed land.

Livestock may or may not trail along fences depending on topography (or difficulty of walking on the terrain), location and distribution of reliable water, and spatial distribution of high-quality forage. The same assumption of a 16-inches-wide trail is used to account for the maximum extent of impact to soils because of soil disturbance from trailing. This equates to a maximum extent of 0.16 acre of disturbance per mile of fence if trailing is considered on one side of the fence, and 0.32 acre per mile if considering trailing on both sides. Currently there are approximately 82.5 miles of fence in the BCA allotments; therefore, the existing condition is assumed and estimated at 26.4 acres of trailing impact to soils due to trailing along fence; this estimate assumes trailing on both sides of the fence and may overestimate current impacts to soils from fences. This does not consider where trailing may occur on roads adjacent to fencing or other co-located disturbed areas.

Soil erosion would have the greatest impact around water developments where soils are most exposed to the elements. Because water developments are placed in areas where they are mostly flat, or level on the landscape, water erosion would not have as great an impact as wind erosion. Additionally, because trails are relatively narrow and wind through vegetation, especially farther from water developments, livestock trails are not a primary source for water or wind erosion. Livestock grazing can impact soils by reducing soil cover temporarily (annual utilization of grass) or longer term (if repeated, over-grazing kills perennial grass and BSCs), making soils more susceptible to erosion from wind, rain, and overland flow. Livestock can also compact soils in congregation areas, reducing soil productivity as well as increasing potential erosion. Moist soil is more easily compacted than dry or saturated soil (Hillel 1998). Recovery processes (e.g., earthworm activity and frost heaving) may be sufficient to limit compaction by livestock in many upland systems (Thurrow et al. 1988). On desert grasslands, increasing grass cover can result in a long-term reduction in compaction layers and an increase in water infiltration (Castellano and Valone 2007).

These potential impacts from livestock would not be significant because PDEs in all grazing alternatives limit annual utilization on native grass to 50 percent or less and incorporate periodic rest during the perennial grass growing season. Livestock utilization at this level has been shown to maintain soil function, and periodic rest during the growing season allows perennial grasses to recover from grazing (Holechek et al. 2011).

Developments can affect soils primarily by direct disturbance during construction or installation. Maintaining developments can also affect soils, for example redefining a waterhole may remove vegetation and soils in certain areas of the development. Development use can also affect soils, such as soil disturbance from livestock grazing that is concentrated around waterholes, troughs, and corrals. The greatest impact to soils would be from the 2.6-mile new buried water pipeline in Alternative 3, disturbing soil on approximately 2.52 acres of the project area. This disturbance would be small and temporary (perennial grass would be expected to revegetate the disturbed area within three years), and PDEs would ensure soil erosion is minimized by immediate rehabilitation (seeding if needed) and continued treatment (including weed control). Fence construction (at most 13.4 miles) would result in very little soil disturbance since blading along the fence would not be allowed and only spot removal of rock or vegetation would occur. The proposed new corral would impact three acres, and the proposed new troughs (three) would impact less than one acre combined; both of these areas would be expected to be re-disturbed each year, and weeds monitored/treated annually.

The S&Gs completed on all four allotments in 2023 (Bureau of Land Management 2023a; Bureau of Land Management 2023b) found upland soils were supporting deep-rooted perennial vegetation (in areas where annual grasses were not dominating), exhibiting infiltration and appropriate permeability rates, and storing available moisture. There were no signs of rills, gullies, or water flow patterns.

Under all proposed alternatives, the small number of proposed developments and removals would only result in a small change in impacts to soils across the allotment. In addition, many of the impacts would be short-term impacts to soils, less than five years, as sites recover from construction and maintenance actions. Small impacts may be associated with fencing because livestock trail along the fences, compacting soils, determining pasture and allotment boundaries. Once livestock determine their trailing routes, the initial routes that are not used would revert back to natural conditions as vegetation regrows. However, the degree of change in impact would not result in a meaningful change that would impact the decision on this document, and none of the alternatives including livestock grazing or developments would impair soil function at the watershed scale. Therefore, there would be no potentially significant effects on soil function; therefore, the issue is not analyzed in detail in this EIS.

9.13 Special Status Species (SSS) - Flora

- How would the alternatives impact or affect SSS flora found within the BCA?

The BLM has conducted surveys for SSS plants, including those on BLM lists, as well as those designated as threatened or endangered (T&E), when ground-disturbing activities have been proposed. The closest BLM designated SSSs are located on the west side of the Steens Loop

Road and fully within the Fraser Field Allotment, include cordilleran sedge (*Carex cordillerana*) with a patch approximately 6.6 acres, and dusky onion (*Allium campanulatum*) with a patch less than 1 acre.

No SSS plants have been observed in any of the allotments associated with the BCA. In areas of new rangeland developments, project areas would be surveyed prior to implementation occurring. Any SSS plant sites found would be avoided per PDEs. Since there are no known SSS plants within the BCA, and PDEs would be followed, the BLM does not expect the proposed actions to have any effect on SSS plants and there is no potential for significant effects. Therefore, this issue will not be analyzed in detail.

9.14 Steens Mountain CMPA

- How would the alternatives comply with the Steens Act and impact the values protected under the CMPA?

All alternatives would comply with the Steens Act itself. Multiple sections of the Steens Act that states “[t]he Secretary shall manage...in a manner that ensures the conservation, protection, and improved management of the ecological, social and economic environment of the Cooperative Management and Protection Area, including geological, biological, wildlife, riparian, and scenic resources, North American Indian tribal and cultural and archaeological resource sites, and additional cultural and historic sites.” One purpose of the Steens Act is “[t]o promote viable and sustainable grazing.” If grazing were found not to be sustainable, then eliminating grazing in the areas where it is not sustainable would be a valid option and remain consistent with the Steens Act. In addition, the inclusion of a “No Grazing” alternative helps inform the decision maker of possible consequences of an appropriate range of alternatives as required by NEPA. Section 113(e)(1) of the Steens Act specifies that unless specifically specified within the law, grazing would continue under existing law.

The developments proposed in this document are designed to be minimal in nature, would not be substantially noticeable from a long distance, and would comply with the Steens Act and the 2005 Steens CMPA RMP/ROD (Bureau of Land Management 2005a). The proposed developments are consistent with the following purposes of the Steens Act: “(1) To maintain the cultural, economic, ecological, and social health of the Steens Mountain area in Harney County, Oregon....(10) To maintain and enhance cooperative and innovative management practices between the public and private land managers in the CMPA. (11) To promote viable and sustainable grazing and recreation operations on private and public lands. [and] (12) To conserve, protect, and manage for healthy watersheds and the long-term ecological integrity of Steens Mountain.” Any proposed developments that were selected would also be necessary for the management of livestock, meeting all three requirements of the Steens Act for new facilities. The BLM must follow all applicable laws, including the Steens Act. Therefore, this issue will not be further addressed.

9.15 Threatened and Endangered Species

- How would the proposed livestock grazing and developments impact T&E species and their critical habitat?

Currently, no plant, wildlife, or fish species determined eligible by USFWS for protection as a T&E species under the ESA or designated critical habitat occur within or near the BCA. Therefore, this issue will not be further analyzed.

9.16 Transportation and Roads

- How would the alternatives affect the condition of existing roads within the allotments?

None of the alternatives include new road construction or a change in the condition or maintenance of existing roads. Roads to be utilized under all alternatives are currently open and allow for vehicle use. Any changes to the configuration or condition of existing roads would be analyzed under separate NEPA documentation and decision. This issue will not be analyzed in detail because there is no potential for significant effects.

9.17 Vegetation

- How would juniper spread affect forage quality and quantity?

None of the actions proposed in this EIS would have a measurable effect on the spread of juniper, and livestock and associated developments are not known to be major vectors of spreading juniper berries. There would be no measurable difference in effects between alternatives; therefore, the issue is not considered in detail. Juniper treatments are not proposed in this EIS. The entire area is included in the analysis of the North Steens Ecosystem Restoration Project (Bureau of Land Management 2007d), which encompasses multiple juniper treatment activities. Therefore, this issue is not further analyzed.

- How would recovery following future fires be affected by proposed livestock grazing?

If there was a fire within the BCA, the BLM would follow existing policy from the 2005 Andrews/Steens RMPs/RODs (Bureau of Land Management 2005e; Bureau of Land Management 2005a) as modified by the 2015 GRSG ARMPA (Bureau of Land Management 2015a). In addition, the BLM would follow policy for emergency stabilization and restoration, including ensuring all NEPA requirements are met. In areas where seeding occurs, the BLM would exclude livestock from the seeded areas for two growing seasons or until objectives are met. Livestock closure may be done through voluntary agreement, a decision, or by constructing a fence to protect the seeded area while leaving other portions of the pasture open to grazing. This issue would be addressed in an emergency stabilization and rehabilitation plan and associated NEPA and is outside the scope of this document. Therefore, this issue is not fully analyzed.

- How would the proposed livestock grazing management address drought and site resiliency?

Livestock grazing management is designed to maintain or move towards maintaining S&Gs and includes a utilization threshold. This requires annual management to be modified based on annual conditions and the ability of the site to recover from grazing. Adaptive management also allows for the modification of grazing management in response to monitoring and assessment. Therefore, under all grazing alternatives, management would be adjusted annually as appropriate to ensure that S&Gs continue to be achieved, or livestock grazing is not a causal factor in not achieving them. Therefore, this issue will not be analyzed further.

9.18 Wilderness

- How would proposed grazing in these allotments affect the no livestock grazing area of the Steens Mountain Wilderness?

On October 20, 2000, Congress enacted the Steens Mountain Cooperative Management and Protection Area Act of 2000, creating the 425,550-acre CMPA and a 97,229-acre no livestock grazing area; the current acreage is 99,859 acres due to land exchanges that occurred within the boundaries of the no livestock grazing area. Within the Hardie Summer Allotment there are 38 acres of the Steens Mountain Wilderness; however, these acres are outside of the no livestock grazing area designated in Section 113(e) of the Steens Act. As such, none of the alternatives would have any potential for effects on this area and this issue will not be analyzed in detail.

9.19 Wildlife, T&E, and SSS - Fauna

- How would the alternative actions impact wildlife SSS (other than GRSG) habitats and life cycles?

Table 9-2 discusses SSS wildlife that occur in Eastern Oregon. However, habitat may not occur within the BCA for all species listed.

Table 9-2: Status of Wildlife Species in the Project Area

SPECIES AND DESIGNATION	OBSERVED IN BCA	LIKELY TO BE IN BCA	REASON FOR ELIMINATION FROM FURTHER ANALYSIS
Birds			
American peregrine falcon (<i>Falco peregrinus</i>)	No	No	There is no potential for significant effects because no suitable habitat is present within the BCA due to a lack of high cliff bands.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	No	No	No suitable nesting habitat is present in the BCA due to distance to large water bodies and lack of trees of adequate size to support nest structures. Atypical foraging habitat is present.
Black-necked stilt (<i>Himantopus mexicanus</i>)	Yes	Yes	As proposed, the proposed actions maintain grazing utilization level not to exceed 50% on native vegetation. For these reasons, no measurable impacts to Black-necked stilt or its habitat are expected, and further evaluation will not be carried forward in this analysis.
Bobolink	Yes	Yes	Occurs in areas of contiguous shrubs with abundant grass and forb understory within the BCA. The proposed grazing would maintain

SPECIES AND DESIGNATION	OBSERVED IN BCA	LIKELY TO BE IN BCA	REASON FOR ELIMINATION FROM FURTHER ANALYSIS
<i>(Dolichonyx oryzivorus)</i>			utilization levels not to exceed 50% and would, thereby, not alter the amount of habitat available. For these reasons, no measurable impacts to bobolink or its habitat are expected, and further evaluation will not be carried forward in this analysis.
Franklin's gull <i>(Leucophaeus pipixcan)</i>	No	No	No suitable habitat is present in the project area due to a lack of marshes and lakes within or adjacent to the BCA.
Black rosy-finch <i>(Leucosticte atrata)</i>	No	No	Habitat, including rocky areas and cliffs, as well as sagebrush steppe, is present within the BCA. Only known use areas are at the top of the Steens Mountain. Proposed actions would have no effect on black rosy-finch.
Lewis' Woodpecker <i>(Melanerpes lewis)</i>	No	No	No open pine woodland habitats are present within the BCA; therefore, no effects are expected.
Snowy egret <i>(Egretta thula)</i>	Yes	Yes	As snowy egrets are associated with riparian, marsh, and tree habitats occurring next to water, which are limited within the BCA, proposed grazing of perennial and annual grasses would not impact this species.
Western snowy plover <i>(Charadrius alexandrinus nivosus)</i>	No	No	No suitable habitat is present within the BCA due to a lack of alkali playas; therefore, no effects would occur.
White-headed woodpecker <i>(Picoides albolarvatus)</i>	No	No	No open ponderosa pine or other woodland habitats are present within the BCA. Therefore, no impacts would occur.
Yellow-billed cuckoo <i>(Coccyzus americanus)</i>	No	No	No suitable habitat is present within the BCA due to a lack of large expanses of riparian woodlands. Therefore, no impacts would occur.
Golden Eagle <i>(Aquila chrysaetos)</i>	Yes	Yes	Known golden eagle nests and habitat occur within and adjacent to the BCA. Ground squirrels, rabbits, and other golden eagle prey species are abundant in the area. Proposed actions are unlikely to impact golden eagles or have measurable effects to golden eagle habitat.
Reptiles			
Columbia spotted frog (CSF) <i>(Rana luteiventris)</i>	No	No	CSFs have been found on the Steens Mountain in small lakes where consistent water provides habitat, despite fluctuations in annual precipitation. CSF have also been found in wetland areas of Malheur Wildlife Refuge. However, no CFS habitat occurs within the BCA; therefore, no measurable effects are expected.
Mammals			
Gray wolf <i>(Canis lupis)</i>	No	No	See wolf discussion below.
Canada lynx <i>(Lynx canadensis)</i>	No	No	No habitat is available within the BCA due to the lack of boreal coniferous forest. Therefore, this issue is not further analyzed.
Wolverine <i>(Gulo gulo)</i>	No	No	No montane boreal habitat is present the BCA and there are no recent records of wolverine occurrence. Therefore, no measurable effects are expected.
Pygmy rabbit <i>(Brachylagus idahoensis)</i>	No	No	See pygmy rabbit discussion below.
Kit fox <i>(Vulpes macrotis)</i>	No	No	No large expanses of alkali shrub habitats required for kit fox are present within the BCA. Therefore, no measurable effects would occur.
Pronghorn <i>(Antilocarpa americana)</i>	Yes	Yes	Year-round habitat for pronghorn occurs within and adjacent to the BCA. Based on annual monitoring by ODFW, pronghorn populations continue to remain stable in the North Steen area with grazing by cattle ongoing

SPECIES AND DESIGNATION	OBSERVED IN BCA	LIKELY TO BE IN BCA	REASON FOR ELIMINATION FROM FURTHER ANALYSIS
			throughout the area. No measurable effects are expected as a result of proposed actions.
Rocky Mountain Elk (<i>Cervus canadensis</i>)	Yes	Yes	No designated elk winter range habitat occurs within the BCA. Grazing by cattle occurs throughout elk habitat in the area, while the elk population has steadily increased in the North Steens. As such, no measurable effects are expected as a result of proposed grazing. Effects to elk and other big game resulting from existing and proposed fences are discussed in chapter 3.
Pallid bat (<i>Antrozous pallidus</i>)	No	Yes	Proposed actions would have no effect on bat hibernacula or roosting and breeding habitats. Impacts of proposed grazing on habitat would be immeasurable; however, grazing changes that incorporate growing season rest periods may improve foraging habitat to a small degree over time. As no measurable effects are expected, further analysis is not carried forward.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	No	Yes	Proposed actions would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis is not carried forward.
Spotted bat (<i>Euderma maculatum</i>)	No	Yes	Proposed actions would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis is not carried forward.
Fringed myotis (<i>Myotis thysanodes</i>)	No	Yes	Proposed actions would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis is not carried forward.
Insects			
Western bumblebee (<i>Bombus occidentalis</i>)	No	No	No habitat occurs for Western bumblebees within the BCA; therefore, no effects would occur.

779

780 • How would the alternatives impact frogs and snails?

781

782 Columbia spotted frogs (CSF) have been found on the Steens Mountain in small lakes where
783 consistent water provides habitat, despite fluctuations in annual precipitation; CSFs have also
784 been found in wetland areas of Malheur Wildlife Refuge. However, no CFS habitat occurs within
785 the BCA; therefore, no measurable effects are expected. The only other known frog species
786 likely to occur in the area is the Pacific tree frog (*Pseudacris regilla*), otherwise known as the
787 Pacific chorus frog. This species occurs in some of the constructed waterholes and natural water
788 features throughout the Steens and is common in the BCA. Their presence or absence is based on
789 water availability that is determined primarily by annual precipitation and not based on presence
790 or absence of cattle. No measurable impacts to frogs are expected; therefore, they are not fully
791 analyzed within the EIS.

792

793 Terrestrial and aquatic snails have been documented on the Steens but have not been surveyed
794 expansively in the area. No records exist for snail presence in the BCA streams; however, if
795 present, it is not expected that any proposed actions would have a measurable impact. Therefore,
796 these species are not fully analyzed.

797

798 • How would grazing impact insect populations, including pollinators?

799

800 Livestock prefer grass species for forage but do consume some forbs when grazing, especially
801 when in close proximity with grass leaves, as livestock are non-selective eaters and cannot

separate out the different plants (see Grazing Management section). Should cattle grazing occur within a pasture during the growing season for forbs, it is expected that consumption of forbs that pollinators would use, could occur. However, as cattle prefer grass, forb herbivory would likely be incidental, and forbs would still be available in grazed, and more so in ungrazed, areas within and outside the pasture. As cattle grazing currently occurs throughout the Steens area, and pollinators and other insects, including beetles and ants, are still abundant within and adjacent to actively grazed areas, the effects of forb herbivory by cattle seem negligible for pollinators and other insects. The presence, abundance, and diversity of insect species is likely dependent on factors such as soil type, elevation, and annual precipitation that heavily influence vegetative productivity, including forb occurrence and vigor, and would not be measurably impacted by any of the alternatives. Therefore, this issue is not discussed further.

- How would proposed livestock grazing impact big horn sheep through disease, specifically *Mannheimia haemolytica* originating in cattle?

Disease transmission from cattle to wild bighorn sheep is not known to occur with the same ease as transmission of disease, such as *Mannheimia haemolytica*, between domestic sheep and bighorn sheep. The ODFW, who manage bighorn sheep on Steens Mountain and elsewhere in Oregon, have not expressed concern with regard to potential disease impacts to bighorn sheep resulting from direct or indirect contact with cattle, though they have expressed concern of disease spread to bighorns with the presence of domestic sheep and goats.

Bighorn sheep populations within the Steens generally occupy the steep, rocky cliffs above the gorges and on the east side of the mountain that provide their preferred habitat. As these habitat features do not occur within the BCA, the presence of bighorn sheep, while not impossible, is highly unlikely. As no sheep or goat grazing is considered under any alternative, the risk of disease transmission from grazing cattle to bighorn sheep within the Steens is low and any impacts to bighorn sheep from cattle grazing the BCA would be immeasurable as cattle grazing already occurs in many areas on the Steens, including within allotments closer to bighorn sheep habitat. Therefore, this issue is not analyzed fully.

- How would grazing conflict with predators, specifically the grey wolf?

Grey wolves are known to occur in parts of southeastern Oregon, but ODFW has not indicated any suspected use areas or established packs in the Steens Mountain area. Livestock grazing occurs throughout the Steens and surrounding areas on both private and public lands, so there is currently potential for wolf and livestock interactions to occur on Steens Mountain; however, there has been no known wolf predation reported to-date. As more wolves continue to travel through or become established in the area, conflict incidents would be expected to increase. As ODFW is responsible for management of predation incidents and other interactions between wolves and cattle throughout the eastern portion of the state, where wolves are not listed under ESA, wildlife biologists from that agency would be responsible for assessment and implementation of appropriate policy and procedures. As grey wolves are not known to use the Steens Area and no conflicts have been reported, this issue is not fully analyzed.

In addition to wolves, mountain lions and coyotes occur throughout the Steens Mountain area. Mountain lions typically prey on mule deer and bighorn sheep, with incidents of cattle predation being very rare. Coyote predation of adult cattle is very uncommon; however, coyotes are known to opportunistically prey upon calves, which may result in a lethal response if detected.

As cattle and native predators have simultaneously occupied the same areas with negligible affect to resident predator populations, none of the proposed actions would result in notable impacts. Therefore, this issue is not fully considered.

- How would the alternative impact pygmy rabbits?

Pygmy rabbits may have occupied lower elevations of the Steens Mountain historically, but no pygmy rabbits have been observed in the Steens in recent times (at least since 1991 and potentially earlier than that). Hansen (1956) completed an extensive search of the Steens, documenting wildlife species as part of his Ph.D. at Oregon State University and mentioned that pygmy rabbits had previously been found in the Steens at lower elevations, but he found none during his search. Weiss and Verts (1984) looked at historical occurrences of pygmy rabbits in southeastern Oregon but did not find any pygmy rabbits at or near the site documented for the Steens Mountain. In addition, professional observation by BLM staff has not found or documented pygmy rabbits within the BCA. Therefore, none of the alternatives would impact pygmy rabbits and this issue is not fully analyzed within this document.

- How would the alternatives affect pronghorn migration patterns?

While research is currently ongoing that would identify areas of concentrated pronghorn migration in the North Steens, no such corridors are currently known or designated in the area (Foster 2020). Pronghorns follow general elevational migration patterns that progress up Steens Mountain as the snowline recedes in the spring and back down in elevation as snow accumulates on the mountain in the fall (Foster 2020). Currently, pronghorn populations are stable in the North Steens, and no population fluctuations are thought to be associated with livestock related impediments to migratory corridors (Foster 2020). Livestock fences occur throughout the transition from low to high elevations in the north Steens, are currently present within the BCA, and new fence construction is proposed in Alternatives 2 and 3 of the EIS. Should either of these alternatives be selected, newly constructed livestock fence would be compliant with pronghorn permeable standards that include a fence design with smooth bottom wire placed 18" above the ground. Fences requiring replacement over the course of the permit period would also be constructed utilizing pronghorn permeable design. Due to the PDEs, it is not expected that there would be measurable effects to pronghorn migration patterns; therefore, the issue is not considered in detail.

- How would the alternatives affect migratory birds?

The Migratory Bird Treaty Act (MBTA) of 1918 *protects* migratory birds regardless of their status as common or rare. Past and present actions that have led to the current conditions of populations and habitat of resident and migratory birds within the BCA include current and historic grazing, noxious weed and invasive species establishment and spread, fires, prescribed

fires, juniper expansion, juniper cutting, and drought. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including feathers or other body parts, nests, eggs, or migratory bird products. In addition, Executive Order 13186 sets forth the responsibilities of Federal agencies to implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

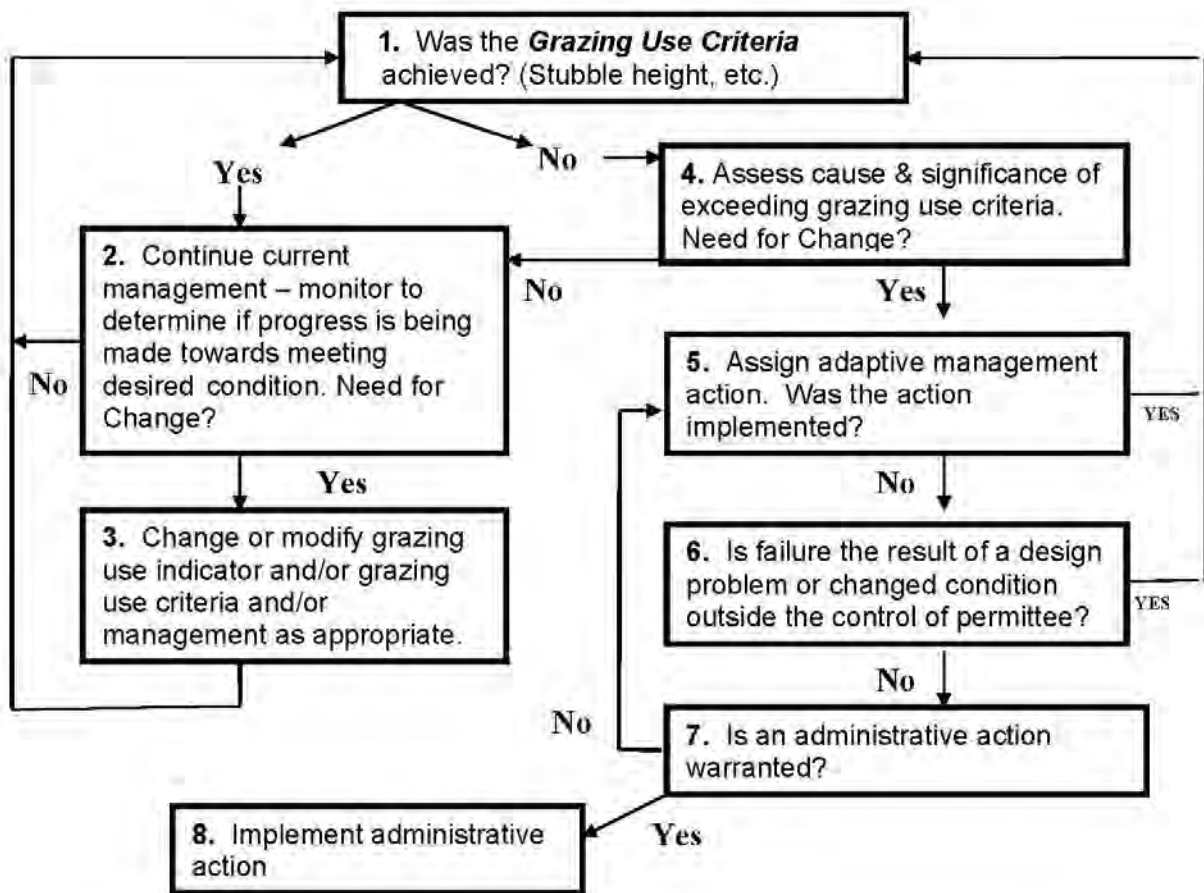
No breeding bird or other extensive migratory bird surveys have been conducted directly within the BCA. However, as habitats occurring within the nearest breeding bird survey route are similar to those present within the BCA, it is assumed that similar trends in species composition and abundance would be expected in coinciding habitats within a relatively close proximity. Common migratory birds observed or expected to occur in the area based on available habitat in a given area include Western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), Brewer's blackbird (*Euphagus cyanocephalus*), red-tailed hawk (*Buteo jamaicensis*), cliff swallow (*Petrochelidon pyrrhonota*), savannah sparrow (*Passerculus sandwichensis*), gray flycatcher (*Empidonax wrightii*), common raven (*Corvus corax*), vesper sparrow (*Pooecetes gramineus*), Brewer's sparrow (*Spizella breweri*), and sage thrasher (*Oreoscoptes montanus*).

Oregon Breeding Bird Atlas (Adamus et al. 2001) was used to identify potential birds in the area and habitat requirements were considered. Grazing cattle can directly affect migratory birds by reducing the amount of ground vegetation and subsequently decreasing availability of potential nest sites (U.S. Forest Service 1980: 51–66; Walsberg 2005). Decreased ground vegetation also decreases the amount of hiding cover for ground nesting species, which can result in increased nest predation (U.S. Forest Service 1980: 51–66; Keyser et al. 1998: 19; Fondell and Ball 2004). Anderson and McCuiston (2008) found grazing management, when upland birds are present, should be flexible, but limited to a light to moderate use (30-50 percent utilization), using deferred or rest-rotation grazing to limit grazing disturbances during critical bird life stages, such as nesting. They concluded light to moderate use can increase forb quality and quantity since grazing can delay the maturation of forbs, extending their availability throughout the growing season (Anderson and McCuiston 2008). Adams and others (2004) found deferred grazing can improve both the plant vigor and the productivity of grass communities, which in turn increases the amount of vegetative cover. Cattle present during nesting season may trample the nests, eggs, and nestlings of ground nesting birds (Sabatier et al. 2015; Sharps et al. 2017); however, as livestock typically move around, and not through sagebrush, this risk would be limited in areas where shrubs are present. Utilization thresholds and grazing management proposed under all alternatives would allow an adequate amount of vegetation to remain in place across the BCA, which would limit these negative impacts. As none of the proposed actions would result in measurable impacts to migratory birds, this issue is not further analyzed.

10 APPENDIX D: PROCESS FOR ASSESSING GRAZING USE CRITERIA

This flow chart is from the Livestock Grazing Permit Renewal Desk Guide produced by the Idaho BLM (Bureau of Land Management 2009).

Process for Assessing Grazing Use Criteria



11 APPENDIX E: GRAZING TREATMENT DESCRIPTIONS

The dates provided below are approximations based on general plant phenology. Year-to-year variation in phenology would occur based on climatological phenology. Treatments that may occur across multiple treatments are displayed with a “/” or “-“ between them. For example, a graze/defer treatment would begin during the graze treatment and end during the defer treatment.

Early - (Approximately March 1 to April 30) - This treatment provides the plants an opportunity to recover after utilization of early plant growth. By removing livestock before all spring and summer precipitation occurs, the plants would be able to store carbohydrates, set seed, and maintain their vigor. This “Early” treatment can be used every year with little effect on the plant.

The dates of April 1 to April 30 are a guideline for the “Early” treatment. Early use must take place before grass plants are in the boot stage. There must also be enough soil moisture in the ground to provide for regrowth after grazing. Therefore, flexibility in the early treatment would allow for use prior to April 1, but generally not after April 30, and would depend on climate.

Early grazing is generally before or just as the perennial bunchgrasses initiate growth and can occur with no to little short-term injury to perennial bunchgrasses. If there is adequate moisture, invasive annual grasses that tolerate colder temperatures are growing and may be grazed during this period without injury to the perennial bunchgrasses. Both perennial bunchgrass and invasive annual grass biomass from the previous growing season is grazed during this period, without injury to perennial bunchgrass plants and with varying levels of injury (because they are actively growing during this period) to invasive annual grass.

Graze - (Approximately May 1 to July 1–15) - This treatment allows for grazing during the critical growth period of most plants. Carbohydrate reserves are utilized when the plant grows or regrows because the green parts of the plants are removed by a grazing animal.

Utilization levels affect the amount of potential short-term injury to perennial bunchgrasses. At the individual plant level, grazing during the growing seasons immediately removes photosynthetic tissue that may, but not always, place grazed plants at a competitive disadvantage with ungrazed plants (Caldwell, M.M. 1984; Caldwell et al. 1987; Hartnett 1989). However, perennial grasses have many structural and physiological adaptations that permit them to be grazed on an annual or near annual basis (Davies et al. 2014). When compared to long-term grazing rest, studies have shown that moderate grazing results in few differences in sagebrush communities (West et al. 1984; Rickard 1985; Courtois et al. 2004; Manier and Hobbs 2006). During drought years the injury may be magnified because water resources to support growth are more limited. Heavy to severe grazing, which is not proposed under any alternative, may impact perennial bunchgrasses into the following growing season because above ground growth (leaves) is removed to a level that below ground growth (roots) may be compromised. Repeated heavy to severe grazing during this period is known to have negative impacts to perennial bunchgrasses.

Grazing rotations designed so that the same plants are not getting grazed in consecutive growing seasons, also considered growing season rest, are a Guideline and are one method used to negate plant injury caused by grazing during the graze season of use. While previous season’s growth (biomass) may be grazed during this season, studies have shown that the livestock prefer and target grazing green growth because it has higher nutritional qualities (Davies et al. 2014) and is easier (softer) to eat. Invasive annual grasses are green early in this period and start to die (senesce) later into this period depending on the year. When invasive annual grasses mature, the seed heads become sharp and tough to eat. As that occurs livestock shift to the perennial bunchgrasses that tend to remain greener and easier to eat during this period. After fall precipitation, invasive annual grasses soften and are effectively available again for grazing (Hull and

Pechanec 1947). Therefore, livestock grazing management on invasive annual grasses is discussed and often targeted for early, early within graze, later within fall, and winter season of use.

Defer - (Approximately July 1-14 to October 15) - Grazing during this treatment would not begin until after most plants have reached seed ripe and have stored adequate carbohydrate reserves. This treatment would assist in meeting objectives by providing all plants an opportunity to complete their lifecycles and produce the maximum amount of cover and forage.

Deferment allows plants to complete their lifecycle without stress from livestock grazing (defoliation), and allows plants to maintain leaf and basal area, production potential, and to periodically reproduce (Hyder and Sawyer 1951; Ratliff et al. 1972; Holechek et al. 2011). As a result, moderate grazing during a deferred season is considered to have no to little injury to perennial bunchgrasses (Schroeder and Johnson 2019). Later into this grazing season (September and October) there is often a precipitation event that softens invasive annual grasses to the point that livestock would graze them again. Also, this period is when the nutrition in all the grasses has decreased. With the help of supplementation of protein to cattle, which fuels microbes in the rumen for better digestion, cattle can more readily consume the current and past year's dried biomass.

Winter - Grazing during this treatment would occur when most plant species are dormant. Most plants would have completed their lifecycles and stored maximum carbohydrates for the next growing season.

From a vegetation standpoint, winter use is similar to deferred use, however, all the plants have fully senesced and are in fully dormant phase. The dormant period is the least critical period for forage removal (Holechek et al. 2011) because the plant is photosynthetically inactive. Moderate grazing has little to no negative effects to the perennial bunchgrass species during this season because by this time they are not growing and have stored resources to facilitate growth in the spring. Moderate grazing during this time period is likely a surrogate for complete rest (Davies et al. 2014). However, heavy to severe grazing even during dormancy can have detrimental effects on plants and future forage production (Holechek et al. 2011). Livestock during this season are grazing on the current growing season's biomass and, depending on the grazing rotation, the previous season's biomass.

Rest - This treatment provides the plants a full year of growth in the absence of livestock grazing. They are allowed to store maximum carbohydrate reserves, set seed, and provide carryover herbage for the following year's turnout.

12 APPENDIX F: LIST OF EXISTING DEVELOPMENTS

Table 12-1 provides a list of existing range developments on BLM-managed land, from the BLM Vegetation Management Action Portal (Bureau of Land Management 2024c). The process to move developments into this system is slow and requires thorough review, which has not been completed on the BLM Burns District. Therefore, there is potential that some existing developments may not show up on this list at this time. Prior to issuing any grazing permits, if that decision is made, this list would be updated to match all BLM records.

Table 12-1: List of Existing Developments within the BCA

ALLOTMENT	RIP #	DEVELOPMENT NAME
Mud Creek	710544	Bridge Creek Fence
	714561	Bridge Creek Fence
	715044	Bridge Creek Fence 2
	714223	Cooley Reservoir
	711259	Cooley Sec 17 Reservoir
	711260	Cooley Sec 18 Dugout
	710791	Fir Seep Dugout
	716497	Gap Reservoir
	714089	Grandad Reservoir
	710913	Lambing Cr Reservoir
	710931	Little Mud Creek Reservoir
	714083	Long Draw Reservoir
	714082	Model A Reservoir
	714088	Model T Reservoir
	714125	Mud Cr Fence
	710402	Mud Cr Poison Fence
	714031	Mud Cr W/L Seeding
	714048	Mud Creek Mgt Fence
	710327	Mud Creek Reservoir
Hammond	9075	N Steens Ecosystem Restoration Project
	711413	Antelope Creek Reservoir
	711410	Antelope Creek Reservoir 2
	711409	Antelope Creek Reservoir 4
	711423	Antelope Spring Reservoir 3
	715232	Artesian F R Seeding
	714467	Baca Lake Rehab Seeding
	710618	Baca Lake Seed
	710620	Baca Lake Seed Pr Fence
	710869	Baca Lake Test Plots
	715047	Backfire Reservoir
	710849	Bird Waterhole
	715044	Bridge Creek Fence 2
	711425	Davis Road Reservoir
	715027	Dutch Oven Cattleguard
	710621	Dutch Oven Seed Fence
	714225	Dutch Oven Seeding
	714851	Dutch Oven/Webb Spring Pipeline
	715454	Dutch Oven Division Fence
	710943	East Rim Reservoir
	710947	End Reservoir
	710624	Knox Spg Seed Pr Fence

ALLOTMENT	RIP #	DEVELOPMENT NAME
	710813	Knox Spring
	711408	Knox Spring Reservoir
	715045	Knox Spring Reservoir 2
	714602	Krumbo Creek Fence
	710628	Krumbo Seed Pr Fence
	711426	Krumbo Tr Reservoir
	5011	Krumbo Butte Seeding
	715958	Landing Strip Fence
	710945	Larkspur Reservoir
	710130	Ld Critchlow Fence
	710941	Lower Antelope Reservoir
	710939	Lower Road Reservoir
	9075	N Steens Ecosystem Restoration Project
	715623	Pork Noodle Dugout
	711424	Red Rock Creek Reservoir
	22697	Refuge Boundary Fence
	715455	Spring Cr Div Fence
	715043	Spring Cr Fire Rehab
	715048	Upper Reservoir
Hardie Summer	715992	Big Bridge Reservoir
	715734	Carmen Reservoir
	711258	Fence Creek Reservoir
	710108	Frazier Spray Exclosure
	716643	Hardie Summer Fence
	715995	Humpback Reservoir
	716156	Krumbo Mtn Juniper Control
	715990	Little Bridge Reservoir
	715993	Log House Reservoir
	716208	Lower Fence Creek Reservoir
	9075	N Steens Ecosystem Restoration Project
	715991	North Face Reservoir
	715994	Rock Garden Reservoir
	711508	Silvies Cattleguard
	711562	Silvies Place Br Spray
	715996	Sunflower Reservoir
	22696	Sylvies Fence
	22695	Thompson Fence
	22694	Witzel Fence
Hammond FFR	711058	School Sec Field Fence

13 APPENDIX G: GRAZING MANAGEMENT DATA

13.1 Actual Use Data

Table 13-1: Actual Use (AUMs) by Allotment by Year from 1992

YEAR	HAMMOND ALLOTMENT ACTUAL USE ¹²²	MUD CREEK ALLOTMENT ACTUAL USE	HARDIE SUMMER ALLOTMENT ACTUAL USE
1992	1,385	811	882
1993	1,321	811	1,080
1994	1,148	820	938
1995	1,342	477	1,098
1996	1,341	326	1,225
1997	1,783	280	1,171
1998	1,957	323	1,075
1999	1,434	328	1,298
2000	1,723	351	1,334
2001	1,138	414	919
2002	1,142	625	1,308
2003	1,478	676	1,240
2004	1,062	322	1,272
2005	1,725	273	1,066
2006	1,226	418	529 ¹²³
2007	985	61 ¹²⁴	827
2008	1,383	825	1,102
2009	1,108	1,103	1,124
2010	1,362	696	281
2011	1,551	596	1,246
2012	1,460	763	1,495
2013	493	756	1,191
2014	Short Grazing Season	Grazing Not Authorized	Grazing Not Authorized
2015	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2016	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2017	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2018	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2019	2,975	Only Trailing Authorized (15 days)	795 ¹²⁵
2020	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2021	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2022	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
2023	Grazing Not Authorized	Grazing Not Authorized	Grazing Not Authorized
Average¹²⁶	1,414	571	1,089

¹²² Actual use displayed here does not include Kern Reservoir, Knox Pond, and Baca Lake because of the high percentage of private land within those pastures; they have been managed as custodial and have been proposed as additions to the Hammond FFR.

¹²³ Grazing season cut short due to Granddad Fire.

¹²⁴ This is the year after the Granddad Fire in which most of the Mud Creek Allotment burned. Therefore, it was only used for trailing in 2007.

¹²⁵ Grazing season abbreviated to August and September only.

¹²⁶ Actual use averages are calculated for the years where grazing occurred, and do not count years that grazing was not authorized or when the allotment was used for trailing only.

13.2 Utilization Monitoring

Table 13-2: Hammond Allotment Annual Utilization Levels by Pasture

YEAR	KRUMBO CREEK	NORTH DUTCH OVEN	SOUTH DUTCH OVEN	HOLE IN THE GROUND	LARKSPUR RESERVOIR	KNOX SPRING	WEBB SPRINGS	LANDING STRIP	ARTESIAN
1993	No Use	48	No Use	58	41	15	46	42	No Use
1994	No Use	36	33	No Use	No Data	No Data	No Use	No Data	No Data
1995	No Use	29	34	65	51	18	62	23	No Use
1996	No Use	No Use	No Use	22	51	47	46	46	56
1997	No Use	48	39	No Use	No Use	43	23	39	53
1998	No Use	57	70	55	53	No Data	No Use	47	No Use
1999	No Use	No Data	No Use	No Data	No Data	No Data	No Data	No Data	No Data
2000	No Use	No Use	No Data	No Use	No Data	No Data	No Data	No Data	No Use
2001	No Use	No Data	No Use	No Use	No Data	No Data	No Data	No Use	No Data
2002	No Use	No Use	50	42	No Data	No Data	52	62	67
2003	No Use	40	No Use	48	64	No Data	No Use	No Data	20
2004	32	38	34	No Use	No Use	53	38	No Use	No Use
2005	No Use	57	No Use	51	51	57	39	No Data	46
2006	No Use	No Use	No Data	No Use	No Use	70	No Data	No Data	No Use
2007	No Use	61	61	No Data	No Use	No Data	No Data	No Data	No Data
2008	No Data	No Data	No Use	No Use	No Data	No Data	No Data	No Data	No Data
2009	No Use	No Use	No Data	No Data	No Data	No Data	No Use	No Data	No Data
2010	No Data	No Data	No Data	No Data	No Data	No Use	No Data	No Data	No Use
2011	No Use	No Data	No Data	No Data	40	25	No Data	No Use	41
2012	No Data	No Data	No Data	No Data	No Data	No Use	No Data	No Data	No Data
2013	No Data	No Use	No Data	No Use	No Data	No Use	No Data	No Use	No Data
2014	No Use	No Data	No Use	No Use	No Use	No Use	No Data	No Data	No Use
2015	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2016	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2017	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2018	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2019	No Data	24	38	65	No Data	No Data	No Data	No Data	No Data
2020	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2021	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2022	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
2023	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use

Table 13-3: Mud Creek Allotment Annual Utilization Levels by Pasture

YEAR	LOWER FIELD	UPPER FIELD
1993	68	30
1994	57	61
1995	53	55
1996	51	19
1997	34	40
1998	No Data	No Data
1999	No Data	No Data
2000	No Data	No Data
2001	No Data	No Data
2002	64	25
2003	61	61
2004	No Data	No Data
2005	No Data	47
2006	No Data	No Data
2007	Trailing Only	Trailing Only
2008	No Data	No Data
2009	No Data	No Data
2010	No Data	No Data
2011	No Data	No Data
2012	No Data	No Data
2013	No Data	No Data
2014	No Use	No Use
2015	No Use	No Use
2016	No Use	No Use
2017	No Use	No Use
2018	No Use	No Use
2019	Trailing Only	Trailing Only
2020	No Use	No Use
2021	No Use	No Use
2022	No Use	No Use
2023	No Use	No Use

Table 13-4: Hardie Summer Allotment Annual Utilization Levels by Pasture

YEAR	NORTH FIELD	CABIN	BRIDGE CREEK	SYLVIES¹²⁷
1994	43	58	No Data	
1995	13	50	44	
1996	No Data	54	49	
1997	36	51	47	
1998	No Data	No Data	38	
1999	No Data	No Data	No Data	
2000	No Data	35	54	
2001	No Data	No Data	No Data	
2002	No Data	No Data	No Data	
2003	40	No Data	43	
2004	50	No Data	No Data	
2005	No Data	51	41	
2006	No Data	No Data	No Data	No Use
2007	No Data	No Data	No Use	No Use
2008	No Data	No Data	No Use	No Use
2009	No Data	No Data	No Data	No Data
2010	No Data	No Data	No Data	No Data
2011	No Data	No Data	No Use	No Use
2012	No Data	No Data	No Use	No Use
2013	No Data	No Data	No Data	No Data
2014	No Use	No Use	No Use	No Use
2015	No Use	No Use	No Use	No Use
2016	No Use	No Use	No Use	No Use
2017	No Use	No Use	No Use	No Use
2018	No Use	No Use	No Use	No Use
2019	13	13	24	13
2020	No Use	No Use	No Use	No Use
2021	No Use	No Use	No Use	No Use
2022	No Use	No Use	No Use	No Use
2023	No Use	No Use	No Use	No Use

¹²⁷ Sylvies Pasture was created in 2006, prior utilization readings within the current pasture boundary were accounted for in Cabin Pasture.

14 APPENDIX H: PREDOMINANT ECOLOGICAL SITES

Appendix H depicts the general expected vegetation within the BCA by ecological site name. The naming convention for ecological sites is a brief description of what it is, often the general soil texture or a major characteristic is the first word (for example, loamy is a texture, claypan is a restrictive soil layer for some plants), the second part is a range of numbers that is the expected precipitation (example 10-12 or 16-35 is inches of precipitation per year expected), words such as north or south slopes is related to the site aspect, and tablelands or subalpine refers to a feature on the landscape or elevation. Information on ecological sites can be found online through the Ecosystem Dynamics Interpretive Tool (EDIT), maintained by USDA Natural Resources Conservation Service, the USDA Agricultural Research Service Jornada Experimental Range, and New Mexico State University (U.S. Department of Agriculture, Natural Resources Conservation Service 2024b).

Table 14-1: Main Ecological Sites with the BCA

ECOLOGICAL SITE NAME	POTENTIAL VEGETATION	ACRES BY ECOSITE	% BY ALLOTMENT	% OF AREA
HAMMOND				
LOAMY 10-12	Wyoming big sagebrush, Thurber's needlegrass	4,631	40.21%	15.70%
LOAMY 10-12; CLAYEY 10-12	Wyoming big sagebrush, Thurber's needlegrass, bluebunch wheatgrass	4,298	37.32%	14.57%
LOAMY 12-16	Mountain big sagebrush, Idaho Fescue, Thurber's needlegrass	642	5.58%	2.18%
CLAYEY 10-12	Wyoming big sagebrush, bluebunch wheatgrass	481	4.18%	1.63%
DROUGHTY LOAM 11-13	Basin big sagebrush, Idaho Fescue, Thurber's needlegrass	435	3.78%	1.48%
SOUTH SLOPES 8-12; MISC LAND	Wyoming big sagebrush, bluebunch wheatgrass, Thurber's needlegrass	363	3.15%	1.23%
CLAYPAN 12-16; JUNIPER TABLELAND 12-16	Low sagebrush, Idaho Fescue, bluebunch wheatgrass, Sandberg's bluegrass, Western juniper	272	2.36%	0.92%
SOUTH SLOPES 12-16; MISC LAND	Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass	211	1.84%	0.72%
NORTH SLOPES 12-16	Mountain big sagebrush, Idaho fescue	121	1.05%	0.41%
CLAYPAN 12-16	Low sagebrush, Idaho fescue, bluebunch wheatgrass, Sandberg's bluegrass	62	0.54%	0.21%
HARDIE SUMMER				
LOAMY 16-25; MISC LAND	Mountain big sagebrush, Idaho fescue	5,106	52.21%	17.31%
ASPEN 16-35	Quaking aspen, Mountain snowberry, upland sedges	2,132	21.80%	7.23%
LOAMY 12-16; ROCKY RIDGE 12-16	Mountain big sagebrush, Idaho fescue, Thurber's needlegrass, mountain mahogany	1,657	16.94%	5.62%
SOUTH SLOPES 12-16; MISC LAND	Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass	615	6.28%	2.08%
NORTH SLOPES 12-16	Mountain big sagebrush, Idaho fescue	198	2.02%	0.67%
CLAYPAN 12-16	Low sagebrush, Idaho fescue, bluebunch bluegrass, Sandberg's bluegrass	47	0.48%	0.16%
ROCKY RIDGES 12-16	Mountain mahogany, mountain big sagebrush, Idaho fescue	12	0.12%	0.04%
MISC LAND; SUB ALPINE SLOPES 16-35	Mountain big sagebrush, mountain snowberry, Idaho fescue	8	0.08%	0.03%
LOAMY 12-16; CLAYPAN 12-16	Mountain big sagebrush, Idaho fescue, Thurber's needlegrass, low sagebrush, bluebunch wheatgrass, Sandberg's bluegrass	7	0.07%	0.02%
MUD CREEK ALLOTMENT				
CLAYPAN 12-16	Low sagebrush, Idaho fescue, bluebunch wheatgrass, Sandberg's bluegrass	6,062	73.87%	20.55%
CLAYEY 10-12	Wyoming big sagebrush, bluebunch wheatgrass	1,045	12.74%	3.54%
LOAMY 10-12; CLAYEY 10-12	Wyoming big sagebrush, Thurber's needlegrass, bluebunch wheatgrass	706	8.60%	2.39%
SOUTH SLOPES 12-16; MISC LAND	Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass	286	3.48%	0.97%
NORTH SLOPES 12-16	Mountain big sagebrush, Idaho fescue	107	1.31%	0.36%
GRAND TOTAL		29,504		100.0%

15 APPENDIX I: DISTURBANCE RESPONSE GROUP (DRG) CHARACTERISTICS

DRGs are groupings of ecological sites based on a similar response to disturbances. The following DRGs are from Stringham (2009), unless otherwise noted.

Table 15-1: DRGs within the BCA

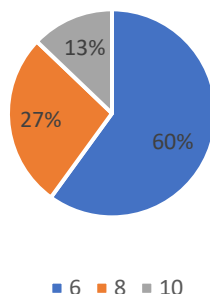
DRG NO.	ELEV. RANGE (FT.)	PRECIP. RANGE (IN.)	DOM. SOIL TYPE	DOM. VEG (GRASS/ SHRUB)	PLANT COMMUNITY RESPONSE TO FIRE	PLANT COMMUNITY RESPONSE TO IMPROPER GRAZING
6	4,000-6,000	6-13	Loamy	Thurber's needlegrass/ bluebunch wheatgrass Wyoming big sagebrush. Undisturbed sites shrub dominant; managed crested wheatgrass	Infrequent fire (greater than 50-year intervals). Sites with cheatgrass pre-fire could transition to cheatgrass dominant if burned. If not burned western juniper may increase.	Increase in sagebrush, decrease in Thurber's needlegrass. Temporary increase squirreltail. Increased annual forbs and grass would lead to decrease in squirreltail and increase in bare ground.
8	4,200-8,000	11-18	Loamy	Idaho fescue / Thurber's needlegrass / mountain big sagebrush. Undisturbed sites shrub dominant.	50-70-year interval fire frequency, interval decreasing with elevation (Miller et al. 2005). Reduction in fire frequency leads to increased western juniper cover in both good and poor condition sites. As western juniper cover increases a decrease in sagebrush cover is followed by a decrease in herbaceous cover / production. As juniper woodland increases the understory plant cover declines and increased soil erosion potential results. Catastrophic wildfire in juniper-controlled sites may lead to annual weed dominated site.	Decrease in deep-rooted perennial bunchgrass, primarily Idaho fescue and bluebunch wheatgrass. Loss of bunchgrass increases potential for invasive species (cheatgrass) increases. Sagebrush and western juniper increase, along with Sandberg's bluegrass.
10	4,000-8,500	9-25	Clayey (claypan)	Idaho fescue (with bluebunch wheatgrass on drier sites)/ low sagebrush / western juniper (not all sites). Shrubs dominant on site.	Infrequent fire (greater than 80- to 100-year intervals). Western juniper may increase with control of fire. Presence of annual weeds (cheatgrass, medusahead) reduces ability of site to recover to disturbance. If sagebrush and western juniper control site resources, and are burned in catastrophic wildfire, an annual dominate plant community likely results.	Low sagebrush, Sandberg's bluegrass, squirreltail increase while Idaho fescue, bluebunch wheatgrass, and one-spike oatgrass decrease.

DRG NO.	ELEV. RANGE (FT.)	PRECIP. RANGE (IN.)	DOM. SOIL TYPE	DOM. VEG (GRASS/ SHRUB)	PLANT COMMUNITY RESPONSE TO FIRE	PLANT COMMUNITY RESPONSE TO IMPROPER GRAZING
11	6,500-9,700	16-40	Loamy	Idaho fescue, mountain big sagebrush. Sites grass dominant.	Fire interval frequent, estimated 15-30 years. With managed fire, subdominant deep-rooted perennial bunchgrasses (Columbia needlegrass, basin wildrye) and forbs increase.	Improper grazing leads to decrease in fescue and other bunchgrasses and increase in mountain big sagebrush, Sandberg's bluegrass, mountain brome, Kentucky bluegrass, and bare ground.

The Hammond Allotment is about 60 percent DRG 6, which is characterized by loamy soils with the potential for Wyoming big sagebrush, Thurber's needlegrass, and bluebunch wheatgrass as the stronghold native species of such ecological sites. However, currently crested wheatgrass seedlings are a large part of the area, considered DRG 6 within the Hammond Allotment. The remaining area within the allotment is DRG 8 and 10, which both have the potential for dominant deep-rooted perennial bunchgrass such as Idaho fescue. DRG 8 consists of loamy soils that can support mountain big sagebrush, while DRG 10 soils have a higher clay content that supports more low sagebrush and western juniper, on very rocky ridgetops. Sites with invasive annual grass before fire could transition to invasive annual grass dominant sites if there are not enough surviving deep rooted perennial bunchgrasses to hold the site together.

Figure 15-1: Hammond Allotment DRGs by Percent

Hammond Allotment
Disturbance Response Group Distribution



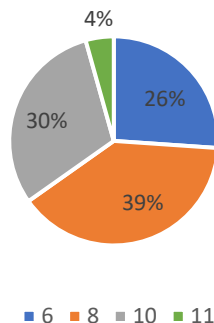
The Mud Creek Allotment is divided between DRGs 6, 8, and 10. The soils and vegetation potential are like the Hammond Allotment as described above; however, the distribution is more mixed due to the landscape position and rising elevation of the allotment from west to east. The lower elevation, most westward, is DRG 6, which has the potential to be a Wyoming big sagebrush/bluebunch wheatgrass/Thurber's needlegrass site. The part along the Malheur National Wildlife Refuge has been planted to crested wheatgrass. The mid elevation area, which spans both pastures, is a combination of DRGs 8 and 10, both of which are vulnerable to juniper encroachment without disturbance, such as fire or mechanical treatments. As the DRG transitions from 6 to 10, the potential vegetation shifts to low ridges that have a higher clay

content in the soil and are shrub dominated with low sagebrush. On these sites, Idaho fescue would be the predominant deep-rooted perennial bunchgrass in areas with more moisture and bluebunch wheatgrass on drier sites. DRG 8 sites tend to lay between DRG 6 and 10 sites and are located more on side slopes in basins. Mountain big sagebrush is the predominant shrub in DRG 8 area, which would dominate without disturbance. The high elevation portion of the allotment is also a combination of DRGs 10 and 8, which gets more precipitation and is higher in production.

For the Mud Creek Allotment, the portion that is DRG 6 is dominated by grass due to the 2006 Granddad Fire. Shrubs, such as sagebrush, have not had enough time to return to the site. In many burned areas the return of shrubs will be slow because seed sources from unburned patches are very limited. Historically these sites would have seen infrequent fire (greater than 50-year return intervals). Invasive annual grasses have been able to take advantage of the resources released by the fire and have invaded in some areas. The portions of the allotment that are DRGs 10 and 8 burned more variably in 2006 due to the stage of mature juniper encroachment and available understory fuels at the time of the fire. Where mature western juniper did burn in 2006 the fire had a higher intensity. Both DRGs 10 and 8 would have had infrequent historically fire frequency from 50-100 years. Low sagebrush sites in DRG 10 would have had an even more infrequent fire return interval. Approximately 4 percent is DRG 11, located at the highest elevation area and precipitation zone within the allotment boundary. DRG 11 is characterized by mountain big sagebrush and Idaho fescue. Historically, fire would have been more frequent in this site at an estimated 15- to 30-year return interval. More frequent fire would have kept the site dominated by deep-rooted perennial bunchgrass, specifically Idaho fescue, rather than dominated by shrubs.

Figure 15-2: Mud Creek Allotment DRGs by Percent

Mud Creek Allotment
Disturbance Response Group Distribution

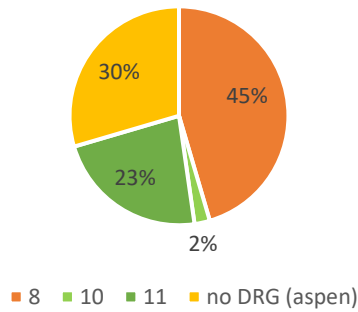


The Hardie Summer Allotment is approximately 45 percent DRG 8, which is characterized by loamy soils with mountain big sagebrush and Idaho fescue on north slopes, and Thurber's needlegrass on south slopes. Fire return intervals historically would have been 50-70 years, with shorter return intervals corresponding with elevation increase. Undisturbed sites would have become shrub dominant. Historically wildfire would have kept western juniper from encroaching. Approximately 23 percent of the allotment falls within DRG 11, which is also a mountain big sagebrush and Idaho fescue site; however, the difference is even higher elevation, more precipitation, and a frequent historic fire return interval that favors grass dominance, such

as Idaho fescue, over mountain big sagebrush. Many sites within this DRG are largely aspen stands in draw bottoms and were not included in the analysis.

Figure 15-3: Hardie Summer Allotment DRGs by Percent

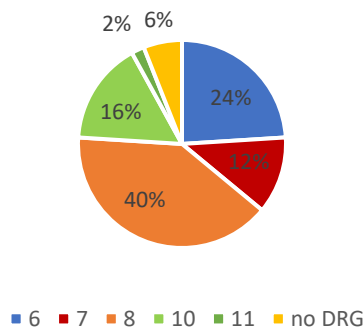
Hardie Summer Allotment
Disturbance Response Group Distribution



The Hammond FFR Allotment is a mixture of the DRGs discussed in the Hammond, Mud Creek, and Hardie Summer Allotment sections. The percentage that falls within DRG 7 is entirely on private land and will not be discussed. Because the FFR is in two main portions with largely differing site characteristics on either end of the project area, the FFR has more DRGs represented than the other allotments. The FFR portion next to the Hammond Allotment is primarily DRGs 6 and 8, with DRG 10 mixed in towards the eastern allotment boundary. The FFR portion adjacent to the Hardie Summer Allotment is a mix of DRGs 8 and 10.

Figure 15-4: Hammond FFR Allotment DRGs by Percent

Hammond FFR Allotment
Disturbance Response Group Distribution



**APPENDIX J: GREATER SAGE-GROUSE (CENTROCERCUS UROPHASIANUS)
STEENS HABITAT ASSESSMENT SUMMARY REPORT¹²⁸**

**Greater Sage-Grouse (*Centrocercus urophasianus*)
Steens Habitat Assessment Summary Report
Oregon/Washington State Office**

Burns Field Office

December 2023



**Photo 16-1: Vegetation on Steens looking East. Photo Credit: Holly Higgins, Wildlife Biologist, Burns District
BLM**

¹²⁸ Citations have been updated within this document for consistency with the EIS. The context has not been modified from the stand-alone report.

16.1 Executive Summary

In this Habitat Assessment Summary Report, habitat for the Greater Sage-Grouse (*Centrocercus urophasianus*; hereafter GRSG) is described at three spatial scales (i.e., mid, fine, and site). For both the Steens Pueblo South Steens fine-scale and Warner-Meinzer mid-scale sections of this assessment, the BLM interdisciplinary team (IDT) gave an overall rating of suitable. At the mid-scale there were highly connected mosaics of sagebrush shrublands that allow for bird dispersal and movements between habitat patches. Linkage area between patches and edge effect were not limiting factors and occurred mostly along the outer boundaries of the mid-scale. Anthropogenic disturbances that can disrupt dispersal and cause mortality were generally not widespread within the largest mosaics of intact suitable sagebrush. At the fine-scale, habitat availability was greater than 60% for all three seasonal use areas. There was suitable connectivity with high seasonal use area overlap, and 89% of the anthropogenic disturbance were minor roads and surface streets. Total disturbance density was below thresholds for lek persistence described in Knick et al. (2013).

Of the 56 leks that were rated, 64% (n = 36) were suitable, 30% (n = 17) were marginal, and 5% (n = 3) were unsuitable. Suitable leks had protective sagebrush cover within 100m of the lek center and were relatively remote with no detrimental land uses within line of sight of the lek. The primary factors associated with unsuitable, or marginal lek suitability determinations were the encroachment of conifers, sagebrush habitat converted to other land cover types, and anthropogenic disturbance. Overall, plot suitability at the site-scale analysis relied on a limited number of ground-based plots (breeding n = 34, upland summer late brood-rearing n = 38, and winter n = 105). For breeding habitat, upland summer/late brood-rearing habitat, and winter habitat, 77%, 84%, and 75%, respectively, of the area was rated either suitable or marginal (Table 16-5), and riparian summer/late brood-rearing was rated suitable due to a larger percentage (64%) of the riparian sites at proper functioning condition (PFC).

While habitat conditions at both the mid-scale and fine-scale were mostly rated suitable and did not indicate significant limiting factors in this assessment, all three seasonal habitat types were not meeting desired conditions for the majority of indicators as described in Table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015d) (HAF Appendix A in this report). At the site-scale, lack of suitable sagebrush cover appeared to be the primary limiting factor for breeding (nesting/early brood-rearing), late brood-rearing and winter habitat types which contributed to the relatively low percentage of overall suitable habitat.

The BLM will use the Habitat Assessment Summary report as a line of evidence to inform Land Health Assessments and land Health Evaluations associated with the land use authorizations within the assessment area, as required by the BLM Instruction Memorandum IM 2022-056 (Bureau of Land Management 2022b). This habitat assessment will be periodically updated as new data, analyses, and other information become available.

16.2 Introduction

Bureau of Land Management (BLM) field offices that manage habitat for GRSG are required to use the GRSG Habitat Assessment Framework (HAF) (Bureau of Land Management 2015f) to rate habitat suitability at multiple scales and to summarize the findings in a Habitat Assessment Summary Report. The purpose of the HAF is “to empower managers to implement project-level actions that make sense at landscape scales” (Bureau of Land Management 2015f). The Summary Report is one of several sources of information the BLM will use to inform wildlife and special status species habitat quality when completing Land Health Assessments, Land Health Evaluations (Bureau of Land Management 2001a) and associated National Environmental Policy Act documentation (40 CFR 1500-1508).

The focus of this summary report is the Steens Pueblo South Steens fine-scale analysis area which covers approximately 4,820 km² and is nested within the larger Warner-Meinzer mid-scale boundary (Figure 16-1). The HAF mid-scale boundary is approximately 56,524 km² and spans portions of Oregon, Nevada, and California. HAF mid-scale, fine-scale, and seasonal habitats boundaries were delineated in partnership with the Oregon/Washington BLM state and field offices, their respective state wildlife agencies, and the BLM National Operations Center. Located in southern Harney County, Oregon and part of northern Humboldt County, Nevada, the Steens Pueblo South Steens analysis area falls within the Western Great Basin GRSG population (U.S. Fish & Wildlife Service 2013) and the larger Northern Great Basin Management Zone (WAFWA MZ V).

The site-scale portion of this report analyzed data collected at Landscape Monitoring Framework (LMF) (Taylor et al. 2014) and Assessment, Inventory and Monitoring (AIM) (Bureau of Land Management 2011b) plots within the Steens Pueblo South Steens fine-scale seasonal use areas. Plots were rated based on GRSG seasonal habitat suitability indicators as described in Table 2-2 of the Oregon GRSG ARMPA (Bureau of Land Management 2015a). Habitat Objectives Table 2-2 (Bureau of Land Management 2015a) is included in HAF Appendix A of this report. While the mid and fine-scale sections of this report analyzed GRSG habitat across the landscape and beyond administrative boundaries or land ownership, the site-scale analysis was an assessment of BLM lands only.

16.3 Steens GRSG Population Status

GRSG was a candidate species for federal listing under the Endangered Species Act from 2000–2015. In 2010, the U.S. Fish and Wildlife Service (USFWS) determined that listing GRSG was “warranted but precluded” and the BLM initiated the development of a conservation strategy to improve GRSG habitat and populations on BLM-administered lands. The USFWS was then directed to decide by the end of 2015, either to list GRSG or demonstrate that listing was no longer warranted. As a result of the large-scale cooperative conservation effort by Federal, State, and private entities, in September 2015, the USFWS determined that Federal listing was no longer warranted (U.S. Fish & Wildlife Service 2015). In September 2015, the BLM approved its Oregon GRSG ARMPA (Bureau of Land Management 2015a), which amended the AMU and Steens CMPA RMPs and RODs (Bureau of Land Management 2005e; Bureau of Land Management 2005a). The State of Oregon issued its Oregon Sage-Grouse Action Plan (Sage-

106 Grouse Conservation Partnership 2015), also in 2015, in response to the potential for listing the
 107 species.

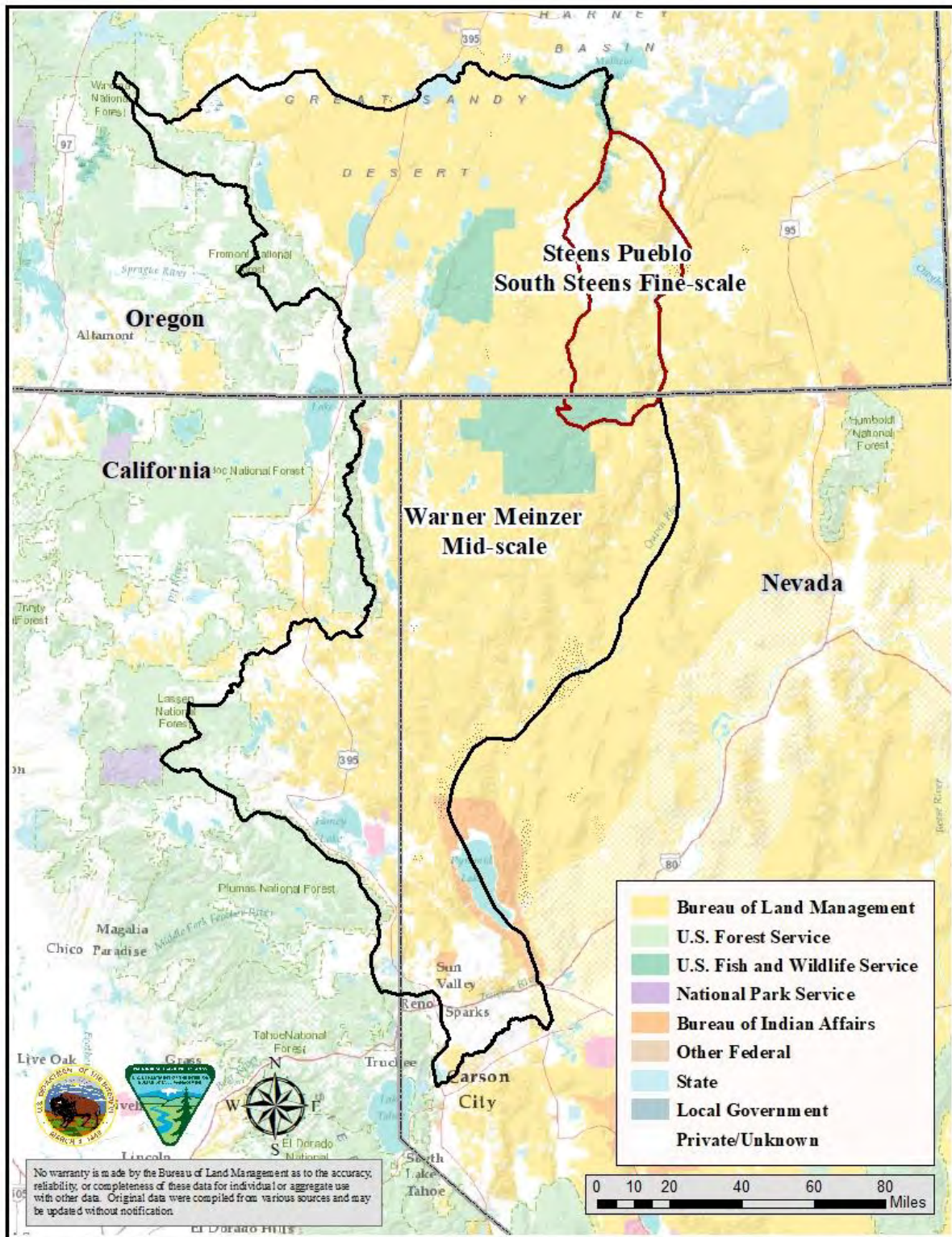


Figure 16-1: The Steens Pueblo South Steens Fine-Scale Analysis Area, Northeastern Portion of the Warner-Meinzer Mid-Scale

In 2011, the Oregon Department of Fish and Wildlife (ODFW) identified core areas that encompass approximately 90% of the state's breeding populations of GRSG within 38% of the species' current range statewide. In 2015, ODFW grouped these core areas into 20 Oregon Priority Areas of Conservation (PAC) that encompass all BLM-designated Priority Habitat Management Areas (PHMA).

GRSG populations have been trending downward across the Western Great Basin (U.S. Fish & Wildlife Service 2013). During 1965 to 2007, the population estimate generally fluctuated between 3,000 and 10,000 males (Garton et al. 2011). In 2013, the estimated minimum population size was 1,934 males (SE = 212), which represented a 69% decline from the 2007 population estimate of 6,327 males (SE = 1,345) and approximately 16% of average values counted in the 1970s and 1980s (Garton et al. 2015). The GRSG population in Oregon declined 11.4% in 2023 (Vold 2023). Oregon's annual population estimates have followed a 6- to 7-year cycle, with the population decline in 2023 following 3 years of population increases from 2020–2022, which followed 3 years of population decline from 2017–2019. The population during 2023 was -43.3% below the 2003 baseline population estimate of 29,327 individuals (Vold 2023).

GRSG leks are monitored between 15 March and 30 April to obtain counts of breeding male GRSG. Lek status is defined by ODFW (Hagen 2011). Leks are "active" when attended by ≥ 1 male GRSG during the breeding season. A regularly visited lek that has had ≥ 1 male counted in one or more of the last seven years is "occupied." An "inactive" lek has sufficient survey data to suggest that there was no male attendance throughout a breeding season. Absence of male grouse during a single visit is insufficient documentation to establish that a lek is inactive. A lek that has been counted annually and has had no birds for eight or more consecutive years is considered "unoccupied."

The Adaptive Management Strategy, revised for 2020 (Bureau of Land Management 2021), and again for 2023 (Bureau of Land Management 2024b) outlines the process BLM Oregon/Washington (OR/WA) in cooperation with the ODFW and the USFWS use to determine the annual status of GRSG adaptive management triggers. Hard triggers were tripped in 2021 and 2022 in the same six PACs. The BLM transmitted the 2022 trigger calculations to ODFW and FWS on December 29, 2022, and both agencies concurred with the results on February 15, 2023. Under the Adaptive Management Strategy, the required hard trigger responses listed on page J-8 of the ARMPA (Bureau of Land Management 2015i) remain in effect in the six PACs that have tripped hard triggers. These responses will remain in effect until either a plan amendment makes a change to the ARMPA, or the BLM's annual review of the relevant conditions listed in the Adaptive Management Strategy indicate the trigger has reversed.

Population triggers were tripped in 11 of Oregon's 20 PACs in 2019 including the Steens PAC, which tripped a soft population trigger for the first time since the triggers went into effect. Overall lek attendance in the Steens PAC has declined 77.4% since 2003 (Foster and Vold 2020). However, the number of males counted at common leks in the Steens PAC increased +15.1% in 2020, +6.2% in 2021, +23.9% in 2022 (Vold 2022). The 2023 ODFW GRSG Population Report (Vold 2023) indicates an additional +10% population increase in 2023. As such, the 5-year moving average population size of the Steens PAC has remained above the PAC's threshold despite three consecutive years of >10% decline prior to 2020 (Figure 16-2).

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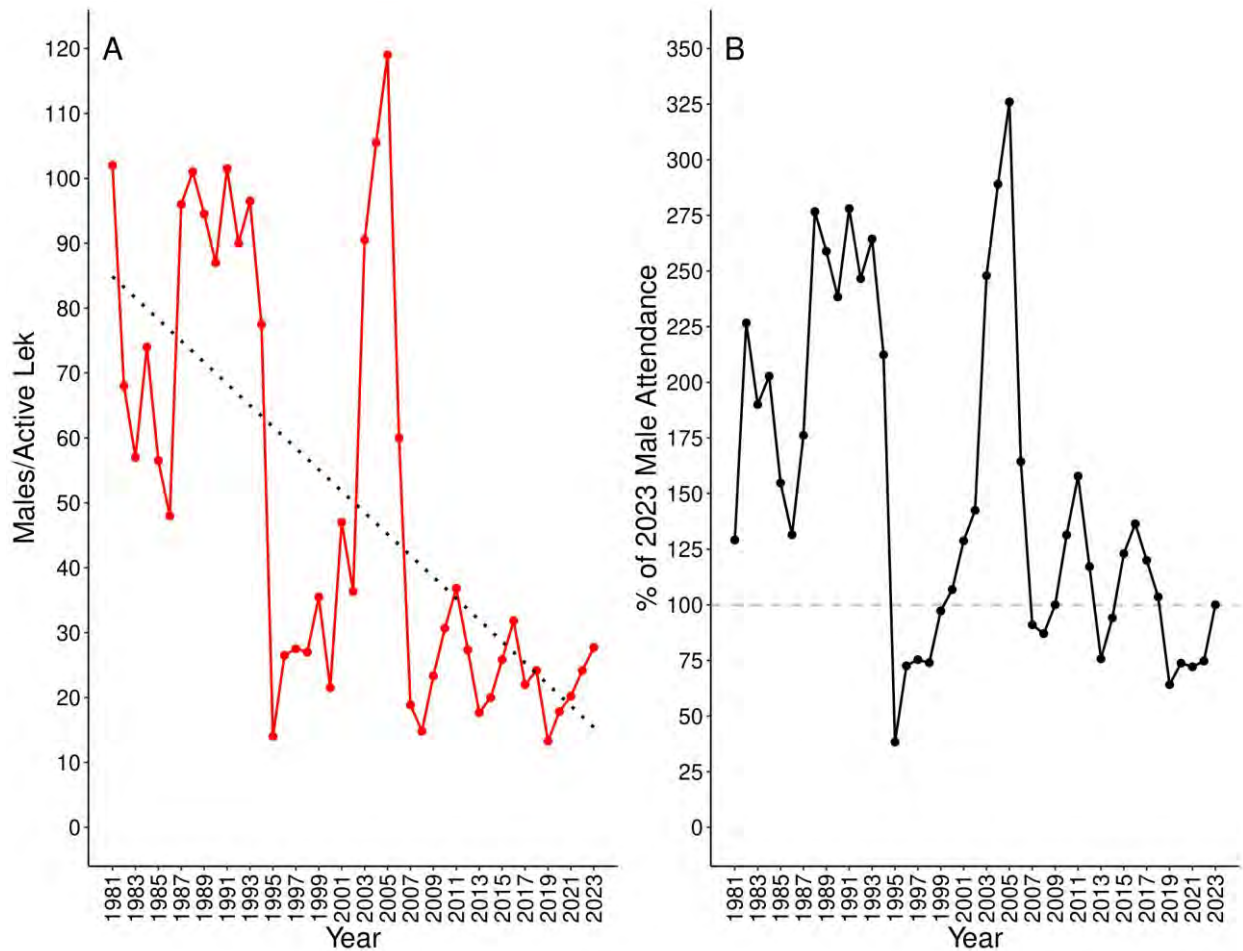


Figure 16-2: Male GRSG Observed at Active Leks and Percent of Male Lek Attendance for the Steens PAC 1981 – 2023: ODFW, BLM

The Pueblo/South Steens PAC also tripped a soft population trigger in 2019 following three consecutive years of declining lek attendance. However, attendance has increased in each of the following four years by 29.6% placing the population well above the soft trigger threshold. While lek attendance has improved overall, population increases are not evenly distributed and have occurred primarily in the southern and northeastern portions of the PAC while a negative population trend persists at leks located in the northwestern portion of the PAC. Relatively low habitat suitability in all seasonal habitats at the site-scale was determined to be the result of frequent fires with poor or slow recovery of sagebrush habitat and/or juniper encroachment and large seedings of crested wheatgrass occurring primarily at low elevations adjacent to the Malheur Wildlife Refuge. Low habitat suitability within this portion of the PAC is likely associated with persistent localized population declines.

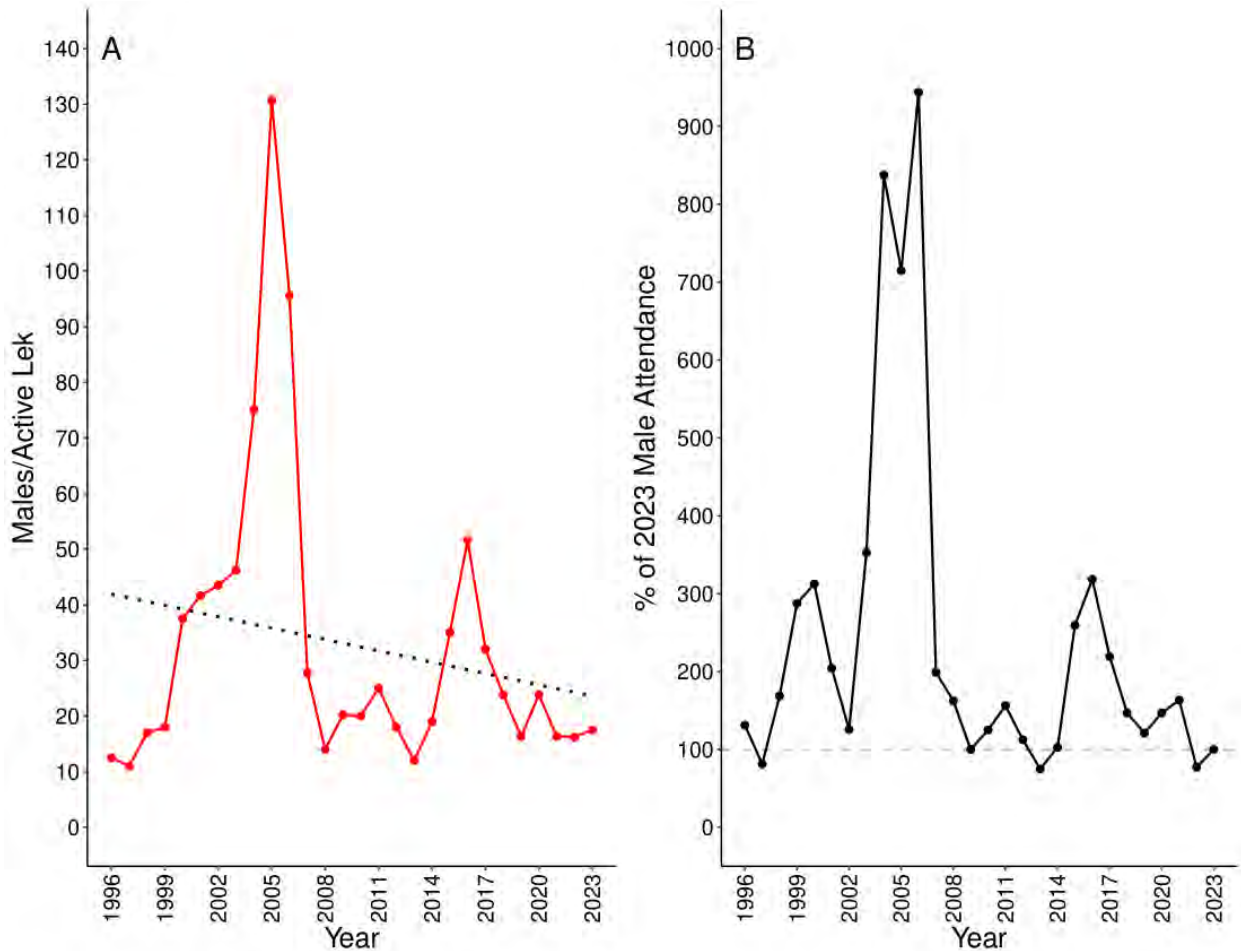


Figure 16-3: Male GRSG Observed at Active Leks and Percent of Male Lek Attendance for the Pueblo South Steens PAC, 1996 – 2023: ODFW, BLM

16.4 Methods and Sample Design

16.4.1 Data Sources

The BLM interdisciplinary team selected the mid/fine-scale boundary extent, the seasonal habitat delineations, and the data sources used in this assessment (Table 16-1). Agencies providing data include Bureau of Land Management (BLM), Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service (USFWS), Natural Resource Conservation Service (NRCS), United States Geologic Survey (USGS), the Institute for Natural Resources (INR), Oregon State University (OSU), Sage-grouse Initiative (SGI), and The Nature Conservancy (TNC).

16.4.2 Assessment, Inventory, and Monitoring (AIM)

AIM uses the core terrestrial methods described in BLM Core Terrestrial Indicators and Methods Technical Note 440 (Bureau of Land Management 2011b) to inform habitat indicators at the site-scale. In addition to these core methods, supplemental protocols were implemented including visual obstruction, sagebrush shape, and GRSG preferred forb diversity and availability.

Table 16-1: Data Sources Used in the Mid-Scale, Fine-Scale, and Site-Scale Assessments

Data	Source	Mid-Scale	Fine-Scale	Site-Scale
Existing Vegetation Types (EVT)	LANDFIRE v2.0	X	X	
Biophysical Settings (BpS)	LANDFIRE v2.0	X	X	
Sage-grouse lek locations	ODFW	X	X	X
Sage-grouse Telemetry	ODFW, OSU	X	X	X
Anthropogenic Features	BLM	X	X	
Oregon Seasonal Habitat Model	BLM, INR		X	X
Assessment Inventory and Monitoring	BLM			X
Landscape Monitoring Framework	NRCS			X
NLCD Shrubland Sagebrush Cover	USGS			X
Integrated Landscape Assessment Project (ILAP)	INR			X
ESRI Streetmap	ESRI			X
Fences (High risk, Moderate Risk)	TNC			X
Structures (Meteorological and Communication Towers)	BLM			X
Tall Woody Vegetation Cover Class	INR, TNC			X

The AIM approach is based on a statistically valid survey design that includes a spatially balanced random sample (Taylor et al. 2014). The establishment of plots in a probabilistic sampling framework allows estimates to be calculated for specific indicator values (e.g., sagebrush cover), over various areas of interest, with known confidence levels. Each plot has a sample weight based on the original sample design. Plots from multiple sample designs can be merged to provide statistically valid estimates. Some plots are rejected due to access, etc. For the site-scale analysis, AIM indicator metrics were used to rank plots as suitable, marginal, or unsuitable. Each plot's suitability ranking was then weighted to determine the proportion of suitable area in each GRSG seasonal habitat.

16.4.3 Landscape Monitoring Framework (LMF)

LMF was initiated in 2011 in cooperation with the Natural Resources Conservation Service to provide estimates of vegetation, soil condition, and trend using a statistically balanced sample design across BLM lands. LMF uses the same AIM standard core indicators, comparable probabilistic sample design, and separate but similar electronic data capture.

16.4.4 GRSG Habitat Assessment Framework (HAF)

The HAF (Bureau of Land Management 2015f) provides a structured approach to rate indicators of habitat suitability at multiple spatial scales and uses a hierarchical order of habitat selection described in Johnson (1980). The broad scale is the first order of habitat selection and represents the full extent of the species range. The mid-scale is the second order and represents populations or subpopulations within the broad scale. The fine-scale is third order representing the selection of home ranges of individuals and the availability of resources between breeding, late brood-rearing, and winter seasonal habitats. Site-scale is fourth order and represents habitat selection at nesting, feeding, roosting sites within a particular seasonal habitat. The mid, fine, and site-scales

are nested within one-another, and indicators vary with the order or scale of GRSG habitat selection and season of use. Analysis for this report is done at three of the four spatial scales. A suite of habitat suitability indicators assessed at each scale is used to rate the scale-dependent analysis area as suitable, marginal, or unsuitable for GRSG. An IDT, typically including resource professionals from the BLM and its partners, conducts the habitat assessment and provides rationale for the habitat suitability ratings.

The BLM adjusted the site-scale indicator values and data forms provided in the HAF (Bureau of Land Management 2015f) during the ARMPA planning process to reflect sub-regional ecological potential. The BLM established indicator values for marginal and unsuitable ratings following procedures set forth in the HAF (Bureau of Land Management 2015f) and BLM Instructional Memorandum (IM) 2022-056 (Bureau of Land Management 2022b).

16.4.5 Mid-Scale (Second Order)

Assessment at the mid-scale describes habitat characteristics that are linked to bird dispersal capabilities in population and subpopulation areas (Bureau of Land Management 2015f). The BLM and state wildlife agencies delineated the mid-scale boundary using topographic features, telemetry data, lek locations, modeled resistance data, and expert knowledge from state wildlife agency and BLM personnel. Suitability at the mid-scale is determined by evaluating six indicators important for assessing GRSG habitat. These include Habitat Availability, Habitat Patch Size and Number, Habitat Patch Connectivity, Linkage Area Characteristics, Edge Effect Matrices, and Anthropogenic Disturbance.

Occupied areas were identified by combining multiple GRSG observation datasets including: four-mile buffers of occupied, occupied pending, and active leks observed within the last 7 years, and a 99% kernel density surface using GRSG telemetry locations (Titolo 2017). The occupancy data was intersected with the existing suitable habitat layer (EVT) and potential habitat layer (BpS) to determine how much of each habitat designation was occupied or unoccupied.

16.4.5.1 Habitat Availability

Habitat availability essentially refers to the amount of sagebrush cover in an area of interest. GRSG occupancy and dispersal capabilities are dependent upon the extent and pattern of sagebrush within a landscape of non-habitat and unsuitable habitat. The more existing suitable sagebrush relative to potential habitat, the greater the suitability (Bureau of Land Management 2015f). Three metrics were used to assess habitat suitability within the mid-scale habitat assessment area: area of occupied habitat, area of potential habitat, and area of non-habitat. Occupied habitat includes occupied suitable areas, defined in the HAF as all sagebrush and associated plant communities known to be used by GRSG within the last 10 years. Potential habitat includes areas that are currently unoccupied and may be currently suitable (i.e., in a sagebrush community or sagebrush associated plant community) or are currently unsuitable/marginal but have the potential for occupancy in the foreseeable future (<100 years) through succession or restoration. Non-habitat includes all other land cover types.

Suitable and potential habitat types were identified using two land cover data sets. The LANDFIRE V2.0 (U.S. Department of the Interior et al. 2023) existing vegetation (EVT) data set was reclassified into sagebrush communities, sagebrush associated communities, and non-habitat to identify areas with currently suitable habitat (Bureau of Land Management 2015f: B). The LANDFIRE 2.0 biophysical settings (BpS) dataset was reclassified to identify areas that could potentially support sagebrush and sagebrush associated communities in the future. Both reclassifications were based on BLM guidance (Interagency Greater Sage-Grouse Disturbance and Monitoring Subteam 2014) with minor state-specific modifications.

16.4.5.2 Patch Size and Number

Two metrics were used to assess habitat patches: mean size of occupied habitat patches, and number of occupied patches. Generally, the larger and more contiguous the sagebrush patches of a population or subpopulation are, the greater the suitability of that area. Habitat patches were defined according to select environmental variable criteria found in Knick et al. (2013). Habitat patches were mapped by applying land cover criteria to the LANDFIRE 2.0 EVT data set and ESRI Street Map premium data using a 5-km radius ($\approx 78.54 \text{ km}^2$) moving window analysis that identified areas meeting the land cover criteria in Table 16-2. Each 78.54 km^2 moving window had to meet these land cover values to be defined as a patch. The 5-km analysis window corresponds to the area Knick et al. (2013) found significant relationships between environmental variables and lek presence.

Table 16-2: Thresholds for Inclusion of a Focal Area in GRSG Habitat Patch Availability

Variable	Percent Land Cover
Sagebrush Land Cover	> 79%
Developed Areas Land Cover (urban and suburban areas)	< 3%
Interstates/Highways	0%

Patches were mapped 10 km beyond the mid-scale boundary to reduce artificial truncation of patches caused by analysis bounds and to provide a more complete representation of the landscape pattern; however, patches were clipped to the mid-scale boundary to calculate mean patch size and number of patches. Occupied patches were determined by intersecting the occupancy layer mentioned above with the habitat patches.

16.4.5.3 Patch Connectivity

The closer suitable habitat patches are to each other, the more likely GRSG can move freely between them (Bureau of Land Management 2015f). Patch connectivity was assessed by measuring the mean distance to the nearest occupied patch. Shortest Euclidean distance between every adjacent pair of occupied patches was mapped and measured, and summary statistics of those distances were calculated.

16.4.5.4 Linkage Area Characteristics

A linkage area is a landcover type, other than occupied sagebrush shrubland that GRSG frequently use and may move through to another habitat patch (Bureau of Land Management 2015f). Three metrics were used to assess linkage area characteristics: percent suitable, percent marginal, and percent unsuitable land cover in the linkage areas. The EVT dataset was reclassified into suitable, marginal, and unsuitable classes (HAF Appendix B) and was then clipped to represent only the areas between patches (i.e., patches were erased from the landcover). Reclassification was guided by the methods used in Jones et al. (2015). The percentage of the linkage area in each suitability class was calculated and the resulting map was assessed.

16.4.5.5 Landscape Matrix and Edge Effect

Two metrics were used to assess the landscape matrix and edge effect: mean percent positive and mean percent negative patch edges. Edge was defined as areas within 5 km of the habitat patches. Positive, negative, and neutral values for this metric reflect the inference that cover type or land use immediately adjacent to a habitat patch can positively or negatively affect the quality of that patch's suitability as GRSG habitat (Bureau of Land Management 2015f). As the amount of sagebrush edge in contact with plant communities or land uses that positively influence shrubland patch habitat increases, the landscape matrix and edge suitability increase. The LANDFIRE 2.0 EVT dataset was reclassified into positive, negative, and neutral classes (Bureau of Land Management 2015f: B). Neutral values accounted for classes that could not be determined as having either a positive or negative effect on patch suitability. The percent of positive, negative, and neutral classes was calculated for the analysis area.

16.4.5.6 Anthropogenic Disturbance

Anthropogenic features can affect GRSG in two significant ways at both the mid and fine scales. First, anthropogenic features directly and indirectly increase mortality or decrease recruitment. Second, GRSG may eventually avoid seasonal use areas with a high density of anthropogenic features even if site-scale conditions are suitable. Three metrics were used to assess anthropogenic disturbance: density of linear disturbance features, density of point disturbance features, and area of non-habitat inclusions (area-based disturbance features) within occupied patches. Occupied habitat patches, as described above, were intersected with the BLM Disturbance Compilation dataset to calculate the density and area of disturbance features within them. BLM (Interagency Greater Sage-Grouse Disturbance and Monitoring Subteam 2014) describes the disturbance feature types and data sources included in the disturbance dataset.

16.4.6 *Fine scale (Third Order)*

The fine-scale assessment characterizes breeding, summer, and winter habitat within a GRSG home range (Bureau of Land Management 2015f). As with the mid-scale boundary, the BLM delineated the fine-scale boundary using topographic feature, telemetry data, modelled resistance data, as well as expert knowledge from the ODFW agency, and BLM personnel. The fine-scale boundary is located entirely within the mid-scale boundary.

Fedy et al. (2012) reported high variability of movement distances within seasonal habitats and GRSG generally inhabit large, interconnected areas of sagebrush where birds may move long distances (>30 km) from breeding to summer and from summer to winter seasonal use areas. There are three indicators of habitat suitability affecting GRSG at the fine-scale, seasonal habitat availability, seasonal use area connectivity, and anthropogenic disturbance. The existing habitat dataset (EVT), the potential habitat dataset (BpS), and the occupancy dataset developed for the mid-scale analysis were also used in the fine-scale analysis.

16.4.6.1 Seasonal Habitat Availability

While the amount of habitat that GRSG require has not been determined due to the variability in quality and juxtaposition within the landscape, in general, the more sagebrush shrubland within seasonal use areas in the home range, the more suitable the habitat (Bureau of Land Management 2015f). Breeding, summer, and winter seasonal habitats were informed using existing GRSG habitat models developed by the Institute of Natural Resources (Henderson 2019; Henderson et al. 2019), LANDFIRE 2.0 EVT, telemetry, and on-the-ground field observations.

At the fine-scale, six metrics were used to assess seasonal habitat availability of both occupied and potential breeding, summer, and winter habitats. Seasonal habitat was identified as occupied or unoccupied/unknown occupancy by intersecting each seasonal habitat dataset with the occupancy dataset. Additionally, the amount of existing suitable habitat, potential habitat, and non-habitat were calculated by intersecting the seasonal use areas with the EVT and BpS habitat availability datasets used in the mid-scale analysis. Specifically, areas with the following occupancy and suitability ratings were calculated for each season: occupied suitable habitat, occupied potential habitat, occupied non-habitat, unknown occupancy suitable habitat, unknown occupancy potential habitat, and unknown occupancy non-habitat.

16.4.6.2 Seasonal Use Area Connectivity

In general, the more contiguous the sagebrush cover between seasonal use areas the more suitable the habitat. Three metrics were used to assess seasonal use connectivity: breeding to summer overlap, summer to winter overlap, and winter to breeding overlap. The metrics were calculated by overlaying the two seasons and taking the ratio of the amount of edge between both seasons to the total area of the seasons combined.

16.4.6.3 Anthropogenic Disturbance

Three metrics were used to assess anthropogenic disturbance: density of linear disturbance features, density of point disturbance features, and area of non-habitat inclusions (area-based disturbance features) within the fine-scale boundary. The fine-scale boundary was intersected with the BLM Disturbance Compilation dataset to calculate the density and area of disturbance features within the home range. BLM (Interagency Greater Sage-Grouse Disturbance and Monitoring Subteam 2014) describes the disturbance feature types and data sources included in the disturbance dataset. Buffers were not applied to disturbance feature types.

16.4.7 Site-Scale (Fourth Order)

The BLM Interdisciplinary Team (IDT) used the HAF methodology (Bureau of Land Management 2015f) to assess the site-scale suitability ratings based on indicators and threshold values listed in the Oregon GRSG ARMPA Habitat Objectives Table 2-2 (Bureau of Land Management 2015a) and provided in HAF (Bureau of Land Management 2015f) Appendix A of this report. Habitat indicator values for breeding habitat, upland summer/late brood-rearing habitat, and winter habitat were extracted from AIM and LMF plot data collected between 2013 and 2018. Only plots within a delineated seasonal habitat, measured at the appropriate time of year were rated. Seasonal habitats and associated periods of use defined in HAF (Bureau of Land Management 2015f) Appendix A are breeding season from March 1-June 30, brood-rearing and summer season from July 1-October 31, and winter season from November 1-February 28.

The site-scale (fourth order) analyzes suitability within each of the three seasonal habitats. The ecological potential of a site and drought conditions observed during plot sampling are considered when interpreting habitat conditions recorded at the site-scale. Suitable habitats provide the appropriate protective cover, food, and security from predators for GRSG to survive and reproduce. Marginal habitats include some of the appropriate components required to support GRSG; however, habitat conditions are lacking certain criteria and/or the quality is lower than that of suitable habitat. Typically, survival and reproduction are considered lower in marginal habitats than in suitable habitats. Unsuitable habitats may be missing appropriate indicators although there may be the potential for the habitat to provide necessary life requirements in the future (Bureau of Land Management 2015f).

The number and relative abundance of certain forb species preferred by GRSG is an indicator of the quality of breeding and summer/late-brood-rearing habitat (Bureau of Land Management 2015f). Individual forb species are ranked as high, medium, or low preference and a list of preferred forbs found in the Great Basin (Luna et al. 2018) is updated and maintained at the Oregon/Washington BLM State Office.

Suitability of leks within the fine-scale assessment area were rated using on the ground observations as well as remote analysis methods in ArcMap (ESRI) using appropriate supplemental data sources. Applying a 3-km buffer around each lek has also been used in other HAF analyses. Indicators include availability of sagebrush cover within 100 meters, proximity of detrimental land uses, and proximity of trees or other tall structures.

Riparian summer habitat suitability was based on assessment of riparian stability and GRSG preferred forb availability. A BLM interdisciplinary team conducted Proper Functioning Condition (PFC) for all lentic and lotic sites within late brood-rearing habitat. Proper Functioning Condition at lentic sites were assessed following the process described in BLM TR 1737-16 (Bureau of Land Management 2003b). The PFC at lotic sites were assessed following the process described in BLM TR 1737-15 second edition (Bureau of Land Management 2015d).

Preferred forb availability and diversity was assessed concurrently with riparian stability. Plant species were documented at that time. Preferred forbs (Luna et al. 2018) in the low, medium, or high palatability group were then tallied to estimate species richness of GRSG preferred forbs.

The relative availability was considered based on how common or rare forbs were in the transition area between the shore and upland.

Additionally, perennial herbaceous cover was considered an indicator in mesic riparian habitat (Bureau of Land Management 2015f). The BLM IDT determined whether each riparian area assessed had greater than or equal to 50% perennial herbaceous cover by ocular estimation. Professional judgement was used to determine if cover was unsuitable or marginal if there appeared to be less than 50% perennial herbaceous cover. A cover estimate was recorded at some sites. Other sites only had cover reported as either unsuitable, low-marginal, marginal, or high-marginal. The Palmer Drought Index (National Oceanic and Atmospheric Administration (NOAA) 2023) was used to determine the long-term meteorological conditions during the time of site assessment.

Proximity of sagebrush cover to mesic riparian areas is an indicator for summer/late brood-rearing habitat suitability in the Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool (2015f). Since the distance to sagebrush cover is not a habitat objective in Oregon, it was not weighed heavily in a suitability decision. Distance to suitable sagebrush cover (10% to 25% canopy cover) indicated in the USGS data layer (Xian et al. 2015) to the nearest riparian polygon edge was estimated using the measure tool in ArcGIS (ESRI)). If at least one-half of the riparian polygon was within 100 meters of suitable sagebrush cover, the indicator was considered suitable.

During winter, foraging GRSG rely on sagebrush exposed above snow (Connelly et al. 2000). Winter habitat suitability was based on measurement of sagebrush cover and estimated sagebrush height above snow. The height above snow depth indicator was calculated using the Snow Data Assimilation System (SNODAS) data product from the National Snow and Ice Data Center (National Operational Hydrologic Remote Sensing Center 2004). SNODAS provides daily snow depth profiles at 1 km² resolution from 2004 – 2018. BLM used these rasters to calculate the median snowpack December 1 to February 28 for each water year (i.e., the maximum snow depth for 50% of the winter season, or approximately 6.5 weeks). To account for inter-annual variability in snowpack, BLM aggregated years to calculate the 10th, 50th and 90th percentiles of the seasonal snowpack for each pixel across water years. These were used to represent the 15-yr low, normal, and high snow depth. Sagebrush height above snow was calculated using the difference between sagebrush height (inches) as measured in the field at AIM and LMF plots, and the snow depth (millimeters) of the spatially assigned pixel for 50th percentile of the median 15-year normal snow depth.

The proportion of suitable, marginal, and unsuitable habitat within each seasonal use area was assessed to identify limiting seasonal habitats within the fine-scale assessment area. The BLM National Operations Center (NOC) ran post stratification/point weighted calculations in a custom script developed in R (R Core Team 2017) and generated proportional area estimates of suitability with an 80% confidence interval for the sample frame(s) within each seasonal habitat delineation.

16.5 Results and Discussion

16.5.1 Warner-Meinzer Mid-scale (Second Order)

The Warner-Meinzer mid-scale boundary encompasses approximately 56,524 square kilometers (13,967,345 million acres) and covers a large area of southern Oregon as well as parts of northwestern Nevada and northeastern California. Due to the Warner-Meinzer mid-scale boundary spanning multiple states, the ID team used various state-specific data layers to generate the multi-state occupancy dataset used in the analysis. While all three states used similar methods, the Oregon portion of the mid-scale occupancy polygon layer was built using the most recent lek locations and any available telemetry datasets.

For the Warner-Meinzer mid-scale, approximately 76% of the analysis area was existing or potential habitat with 37% (21,164 km²) of the GRSG occupancy had existing or potential suitable landcover types (Figure 16-4), 39% had unoccupied existing or potential (Figure 16-5), and 24% classified as non-habitat which includes all other EVT and BpS unsuitable landcover classes (Bureau of Land Management 2015f).

Generally, the larger and more contiguous the habitat patches are relative to the total mid-scale analysis area, the greater the suitability. Mean size of the occupied habitat patches ($n = 11$) was approximately 2,647 km² (654,088 acres) with the two largest contiguous patches (12,487 km² and 9,835 km²) covered nearly 40% of the entire mid-scale. Eleven of the thirteen habitat patches were occupied and cover approximately 52% of the total analysis area (Figure 16-6). Visual inspection showed that several disjunct and smaller occupied habitat patches occurred in the southernmost portion of the mid-scale. This was due primarily to a lack of existing and associated suitable sagebrush landcover types and the >79% minimum suitable sagebrush cover model parameter used to build the habitat patch dataset.

Generally, the larger and more contiguous the sagebrush patches of a population or subpopulation are, the greater the suitability of that area, and the closer suitable habitat patches are to each other, the more likely GRSG can move freely between them (Bureau of Land Management 2015f). For the Warner-Meinzer mid-scale, the large habitat patches were well connected with most occupied patches either adjacent or very close (<9.2 km) to other occupied patches (Figure 16-7). The largest distances (41.8 km and 50.1 km) between habitat patches were in the southern portion of the mid-scale area where several distinct and disjointed patches occurred. Wisdom et al. (2011) noted habitat fragmentation in the Western Great Basin population area increases to the south and west.

Suitable habitat important for GRSG movement between patches was based on landcover types found in linkage areas (Bureau of Land Management 2015f). Nearly 50% of the matrices and total linkage area between patches was unsuitable. This is primarily due to large areas of conifer cover along the western boundary of the mid-scale, some human development, and the inclusion of sparsely vegetated landcover classes along the eastern portion of the mid-scale boundary. Given the large size of the occupied habitat patches and the relatively low mean distance between patches (9.3 km), the high amount of unsuitable linkage area was not considered a limiting factor for overall habitat suitability at the mid-scale.

As the amount of sagebrush edge in contact with plant communities or land uses that positively influence shrubland patch increase, the landscape matrix and edge suitability also increase (Ries and Sisk 2004). For the Warner-Meinzer mid-scale, the amount of negative and neutral edge within 5 km (3.1 miles) of patches was about equal with 48% (4,737 km²) of the edge effect classified as positive, 29% (2,852 km²) was neutral, and 24% (2,379 km²) was negative. Much of the negative classification was to the southwest and along the eastern mid-scale boundary. To the southwest, most of the negative edge was due to dense unsuitable conifer and other EVT classes. Along the eastern boundary, negative edge was due to both an increase in exotic herbaceous species and sparse vegetation adjacent to the High Rock and Black Rock deserts.

Roads and transmission lines across the occupied habitat patches resulted in a moderate density (0.40 km/km²) of linear feature disturbance (Figure 16-10). The majority (97%) of the linear disturbance are from surface streets including roads with minor use, as well as some roads on the Sheldon-Hart National Wildlife Complex that are closed seasonally to protect sensitive areas such as active leks. A major power transmission line (400-699 kV) occurred from the furthest north extent to southern most extent and crossed the approximate center of the Warner-Meinzer mid-scale, and lower voltage lines were found in the habitat patches at the south and north ends of the analysis area. There are 15-point features (7 communication towers, 3 oil and gas, and 5 other vertical structures) and no recorded surface area features.

The BLM's interdisciplinary team reviewed the mid-scale indicator values and determined the analysis area was suitable. There are highly connected mosaics of sagebrush shrublands that allow for bird dispersal and movements between habitat patches. Linkage area between patches and edge effect were not limiting factors and occurred mostly along the outer boundaries of the mid-scale. And anthropogenic disturbances that can disrupt dispersal and cause mortality were generally not widespread within the largest mosaics of intact suitable sagebrush shrublands.

Figure 16-4: Mid-Scale Occupied Suitable Habitat

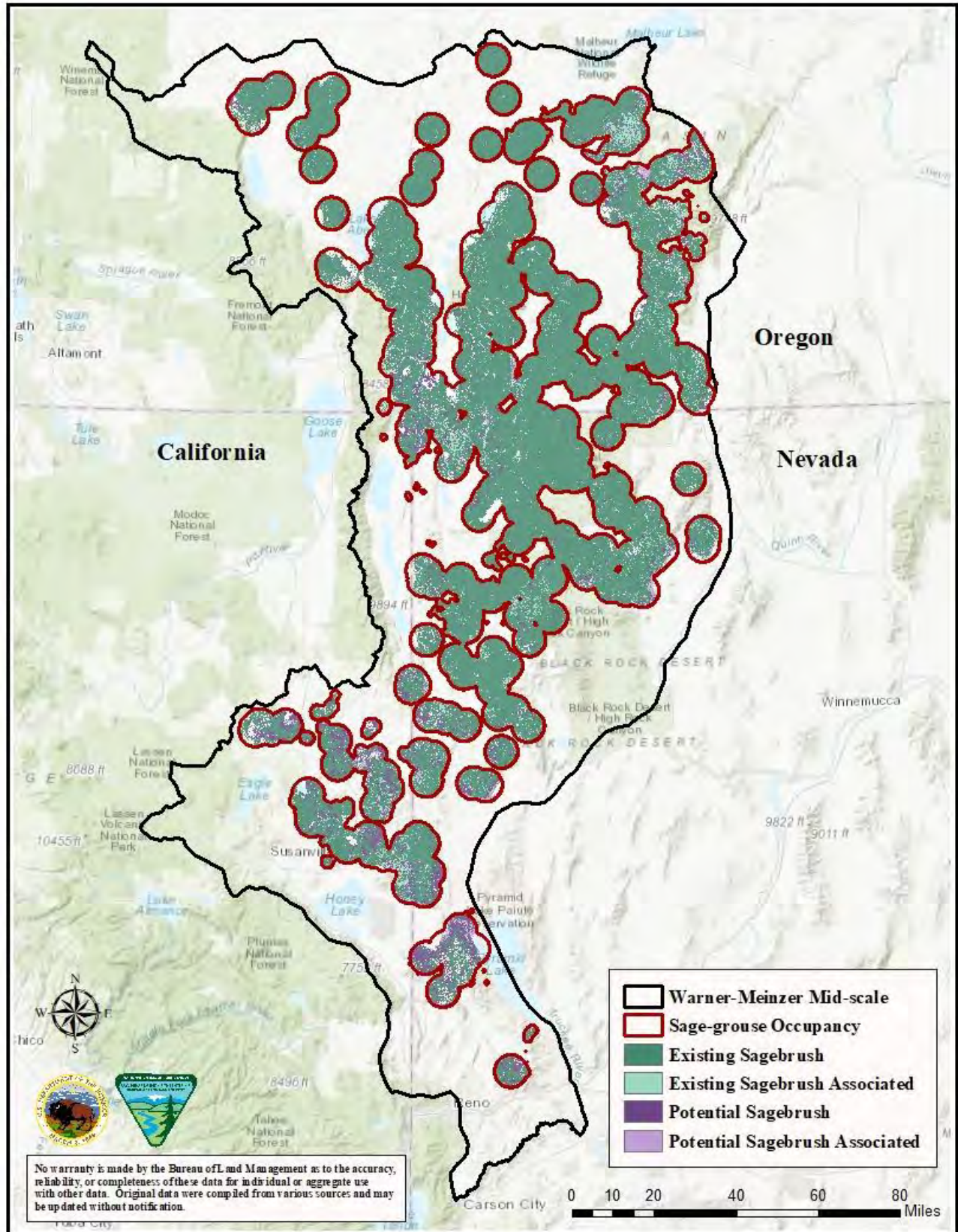


Figure 16-5: Mid-Scale Unoccupied Suitable Habitat

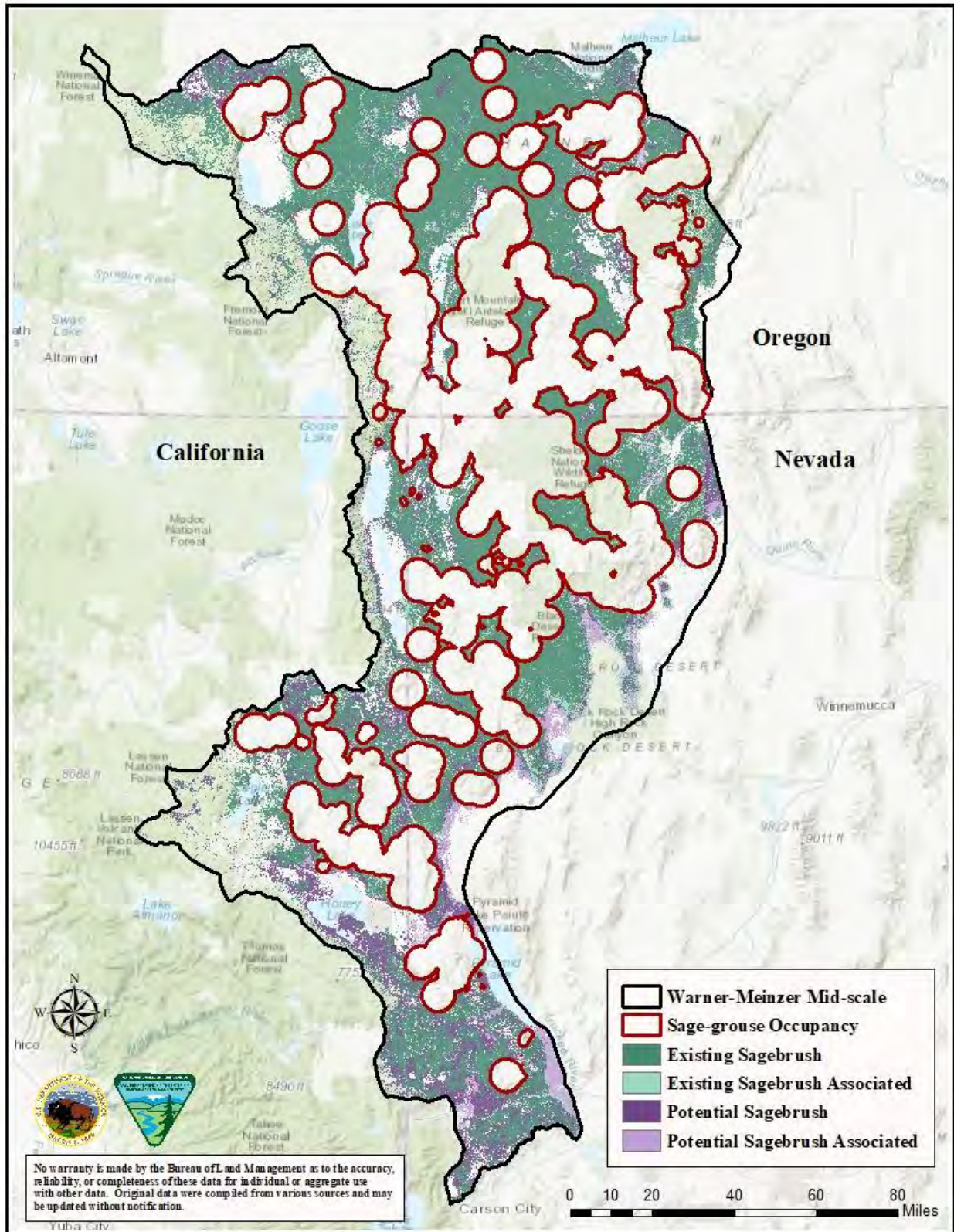


Figure 16-8: Mid-Scale Linkage Area Characteristics

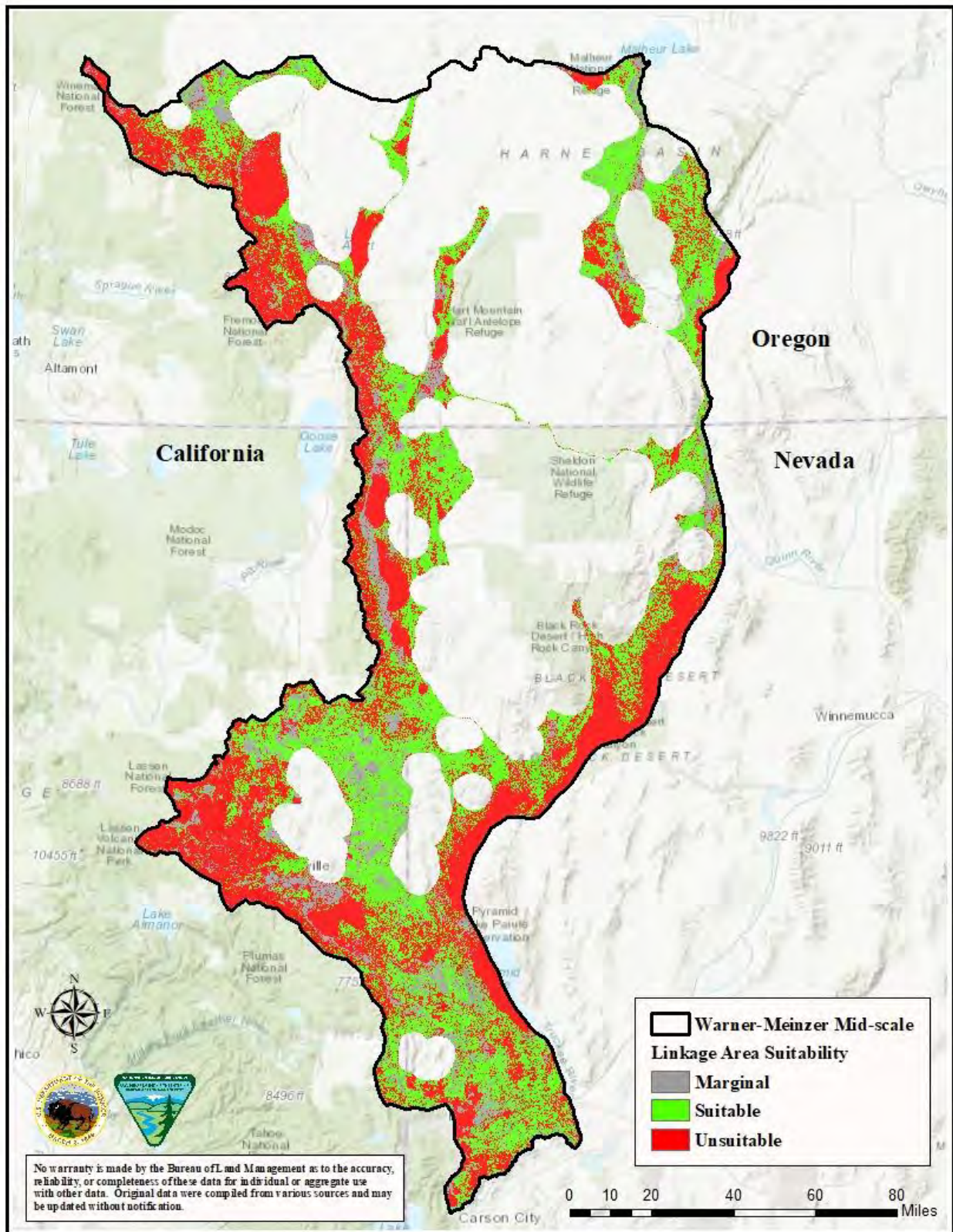


Figure 16-9: Mid-Scale Landscape Matrix and Edge Effect

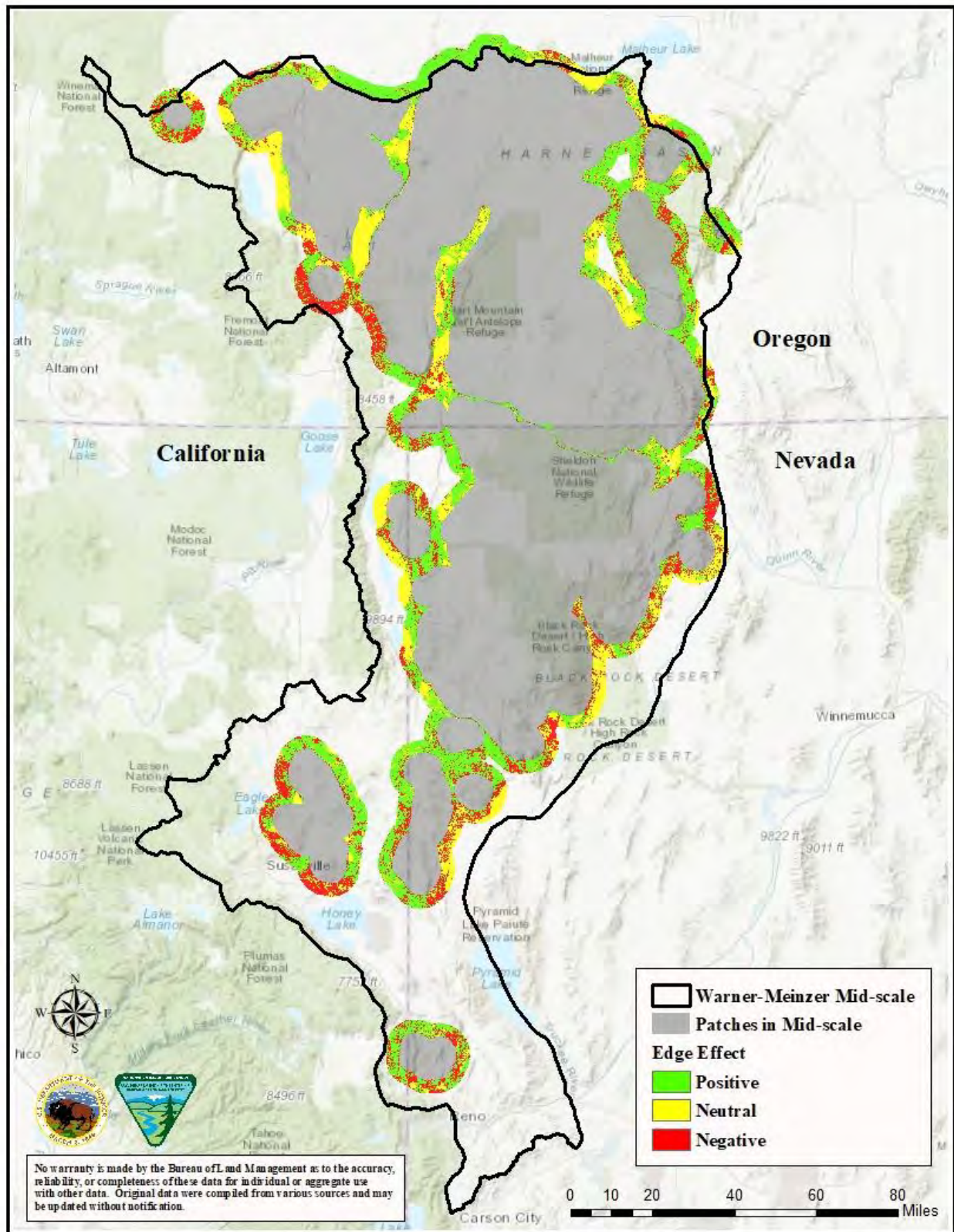
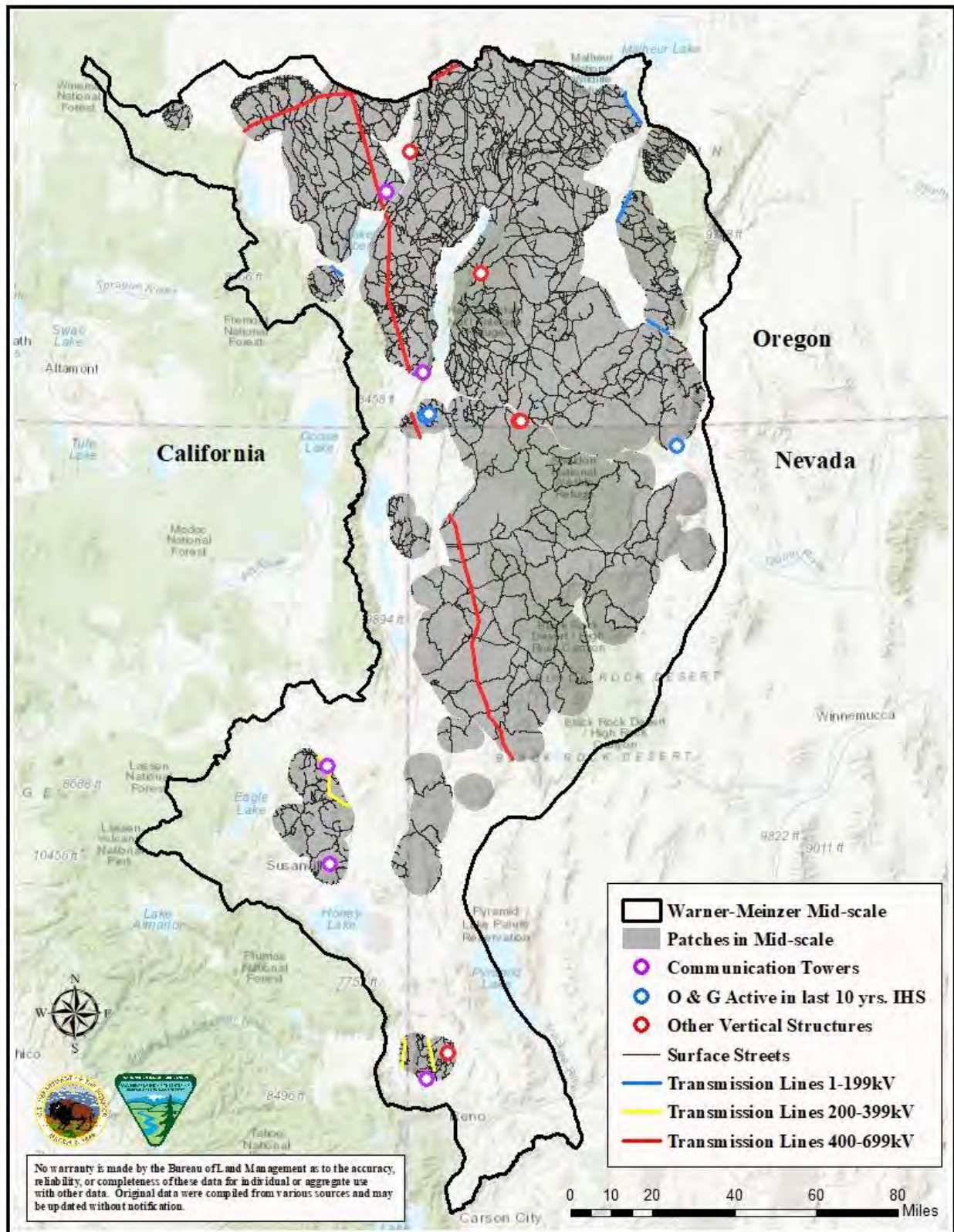


Figure 16-10: Mid-Scale Anthropogenic Disturbance in Habitat Patches



16.5.2 Steens Pueblo South Steens Fine Scale (Third Order)

At the fine-scale, seasonal home ranges for GRSG associated with a lek or lek grouping within a population or subpopulation should be the habitat focus. Although, in some instances small and isolated populations or subpopulations could potentially be the focus of fine-scale descriptions (Bureau of Land Management 2015f). For the Steens Pueblo South Steens fine-scale (nested within the larger Warner-Meinzer mid-scale) the analysis area covered approximately 4,820 square kilometers (1,191,048 acres). Indicators at the fine scale included seasonal habitat availability, seasonal use area connectivity, and density of anthropogenic disturbance. The BLM, in coordination with ODFW and Nevada Department of Wildlife, delineated seasonal habitat using topographic features, lek locations, telemetry data, seasonal habitat probability modeling, resistance/resilience data, and expert knowledge. Seasonal habitat availability within the fine-scale boundary was the initial habitat indicator at this scale. While GRSG are considered a landscape species, the amount of habitat required has not been determined due to the variability in habitat quality and juxtaposition within the landscape (Knick and Connelly 2011).

Habitat availability metrics at the fine scale summarized indicator suitability within areas of known occupancy and the percent of existing and associated EVT and BpS suitable landcover types for each delineated seasonal use area (SUAs; breeding, summer, winter). Within the Steens Pueblo South Steens known GRSG occupancy, breeding SUA had 70% existing and associated suitable sage-brush habitat. Summer SUA had 62% suitable habitat and winter had 61% suitable habitat. Within the entire fine-scale boundary, 61% of analysis area had existing and associated suitable sagebrush with only 17% of the fine-scale classified as potential habitat. Existing “other”, which included all other landcover classes (riparian, conifer, exotic herbaceous etc.), was 22%. While this indicated a relatively high amount of non-habitat, higher elevations were likely bare ground or rock, and the entire eastern fine-scale boundary of the Steens Pueblo South Steens fine-scale bisected the Alvord Desert including large areas of unsuitable landcover classes. With all three seasons having had greater than 60% suitable available habitat within known GRSG occupancy (Figure 16-3), habitat availability may not be a limiting factor for sustaining the current population.

Table 16-3: Fine-Scale SUAs and Habitat Suitability of Total Existing Sagebrush and Associated.

Habitat Availability	% Breeding	% Summer	% Winter	% In Dissolved SUAs
Total in Seasonal Habitat	68%	54%	68%	65%
Total in Occupied Seasonal Habitat	70%	62%	61%	58%
Total in Unoccupied Seasonal Habitat	15%	10%	23%	23%

In general, the more contiguous the sagebrush cover between seasonal use areas the more suitable the habitat. While the connectivity matrices for all three seasons showed only 43% total overlap (Figure 16-12), the larger delineation of the winter habitat had a considerable effect on the total three season combined area and overlap percent. For the transition of the breeding

seasonal use area to late brood-rearing there was a combined area of 3,045 square kilometers, and a 56% overlap, the transition from winter to breeding had a combined area of 3,681 square kilometers and a 76% overlap, and the transition from late brood-rearing to winter had a combined area of 3,874 square kilometers and a 43% overlap. GRSG in Oregon generally exhibit one-stage migratory behavior with the largest movements (approximately 10 miles) occurring between breeding and summer habitats, which corresponds with elevational movements in mountainous terrain (Hagen 2011). While juniper cover and burn scars reduce connectivity for GRSG movement, hens with broods appeared to have adequate habitat connection between nesting, brood-rearing, and summer range. Due to the high overlap percent between all three seasons and considering the larger winter habitat delineation, at the fine-scale seasonal use areas were well connected and likely not limiting GRSG movement.

Table 16-4: Seasonal Use Area Overlap.

Seasons	Combined Area km ²	Overlapping Area km ²	% Overlap
Spring to Summer	3,045.24	1,714.58	56%
Winter to Spring	3,681.42	2,789.02	76%
Summer to Winter	3,874.27	1,652.30	43%
All Seasons	3,874.80	1,652.29	43%

There is increasing evidence that anthropogenic disturbance within a home range can cause local extirpations even if other habitat conditions appear suitable (Aldridge 2005; Holloran 2005; Aldridge et al. 2008). Anthropogenic disturbance suitability at the fine-scale was assessed by evaluating the density of linear, point, and area disturbance features relative to the entire fine-scale spatial extent (Figure 16-12). For the Steens Pueblo South Steens fine-scale there was 2,254 kilometers of total linear disturbance with a density of 0.47 kilometers per square kilometer. However, 89% of the total fine-scale linear disturbance was classified as surface streets or minor roads which are less likely to have a considerable impact to GRSG than major, well-traveled roads. Even though the fine-scale did have one major road (OR-205 S) and one low voltage (1-199 kV) transmission line that bisects the northern Steens Mountain from the southern Pueblos Mountains, anthropogenic disturbance was much lower (0.47 km/km²) than the Knick et al. (2011) identified as the threshold (0.67 km/km²) for positive lek persistence.

Upon review of the three habitat indicators at the fine scale, the BLM interdisciplinary team rated the Steens Pueblo South Steens as suitable. Habitat availability was greater than 60% for all three seasonal use areas. There was suitable connectivity with a high seasonal overlap percent and anthropogenic disturbance was 89% minor roads and surface streets with an overall density below recommended thresholds for lek persistence.

Figure 16-11: Fine-Scale Occupied Seasonal Use Areas with Sagebrush Habitat

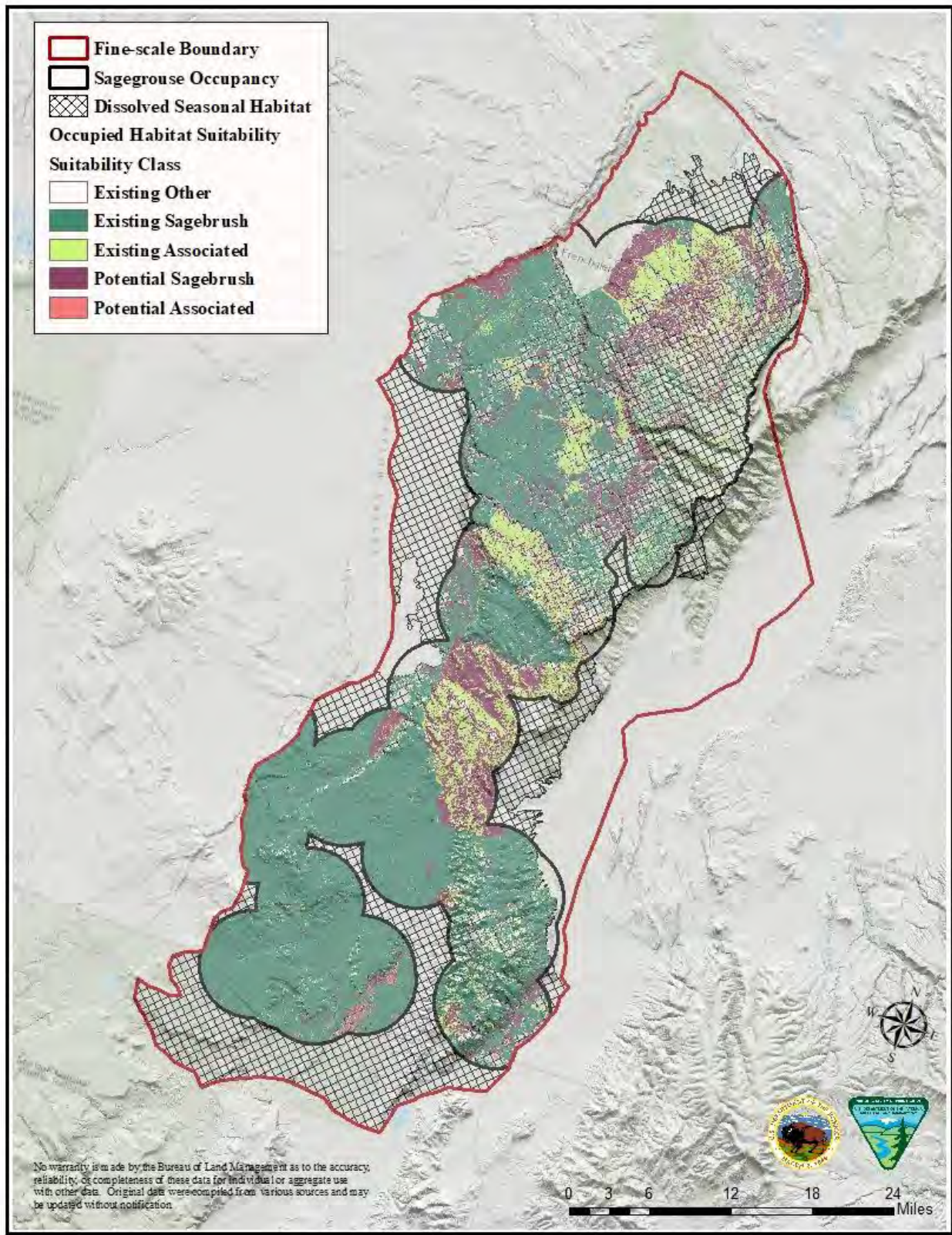


Figure 16-12: Fine-Scale Connectivity Matrix and Overlap of Seasonal Habitats

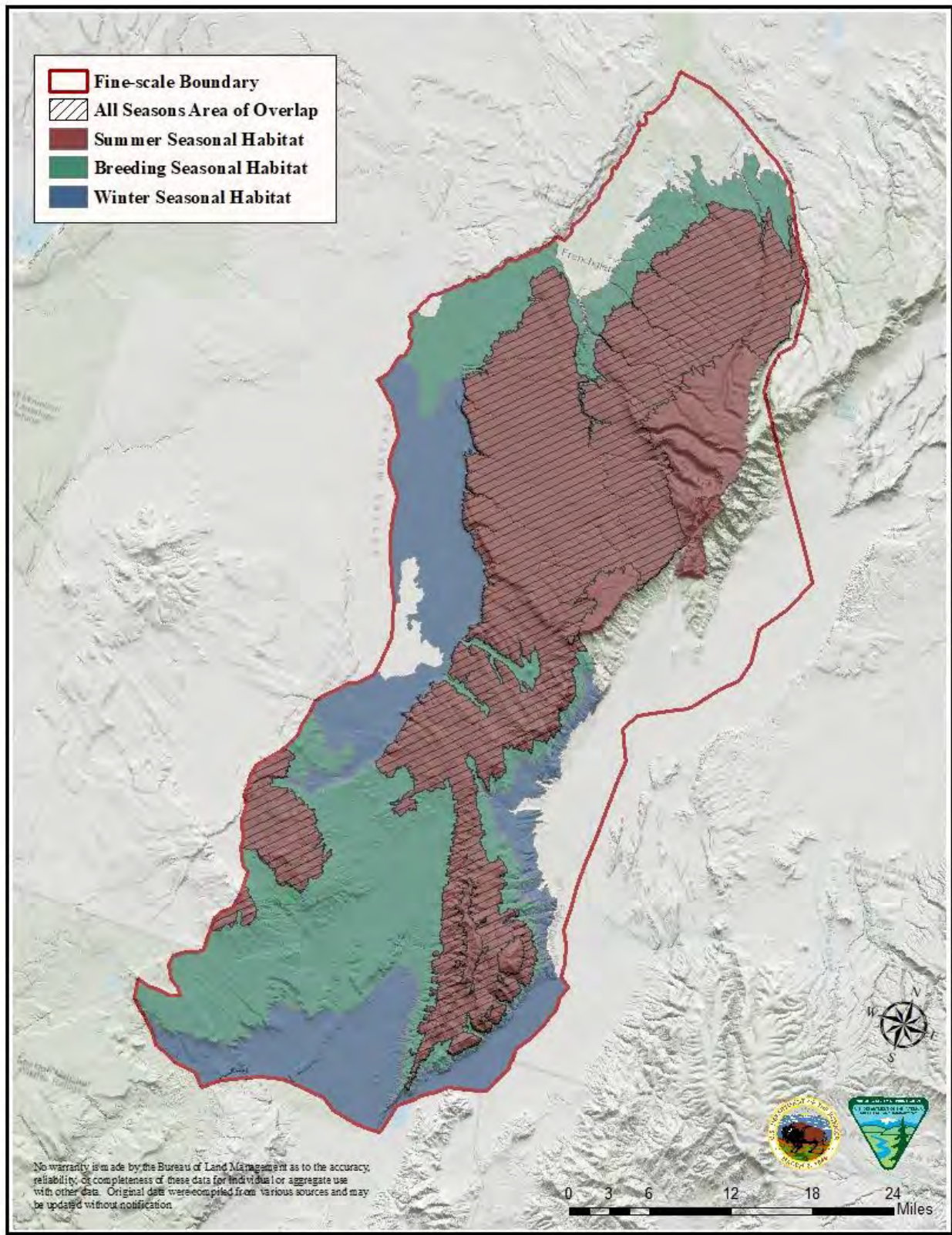
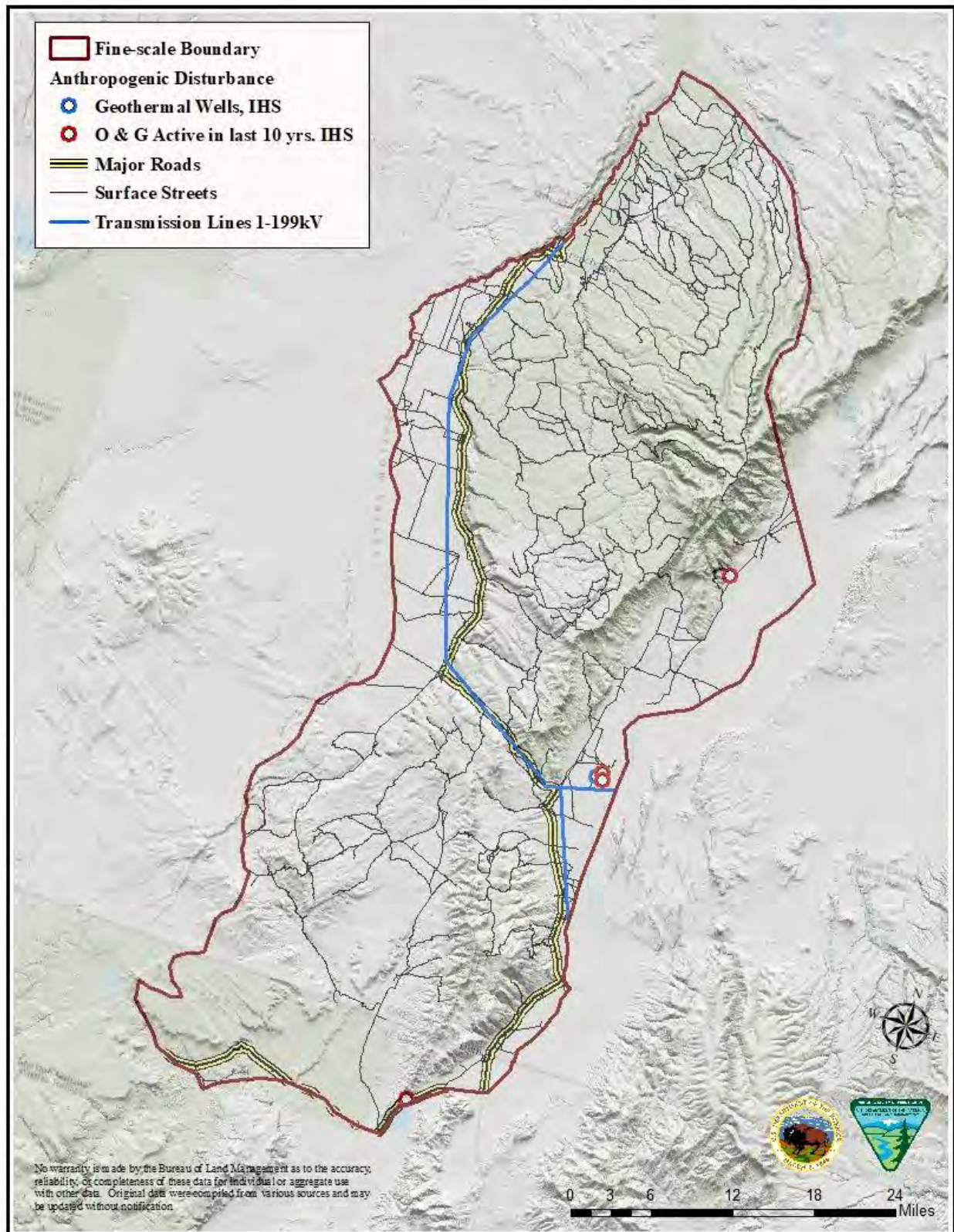


Figure 16-13: Density of Disturbance Features within Fine Scale



16.5.3 Site-Scale (Fourth Order)

Site-scale habitat suitability assessments were summarized as a proportion of surveyed plots within seasonal habitat range for lek habitat, and riparian summer/late brood-rearing habitat. For breeding habitat, upland summer/late brood-rearing habitat, and winter habitat, suitability assessments were summarized as the proportion of the seasonal habitat area within a known area of inference calculated using sample design weights. These proportional area estimates were evaluated relative to the landscape context habitat objectives and desired conditions as described in Table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015d; Bureau of Land Management 2015f) (Appendix A). Table 16-5 provides a summary of site-scale GRSG habitat suitability ratings and proportional area estimates (80% confidence interval) for seasonal habitat types on BLM land in the Steens Pueblo South Steens fine-scale.

Table 16-5: Plot Suitability Summary

Seasonal Habitat	Number of Leks, Plots or Sites			Proportional Area Estimates		
	Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
Breeding (Lekking)	36	17	3	NA	NA	NA
Breeding (Nesting/Early Brood-rearing)	8	16	10	44.6% CI [35.5%, 54.1%]	32.4% CI [24.3%, 41.8%]	23.0% CI [16.0%, 31.8%]
Upland Summer/Late Brood-rearing	15	15	8	46.7% CI [38.0%, 56.0%]	36.6% CI [28.4%, 45.5%]	16.7% CI [11.0%, 24.4%]
Riparian Summer/Late Brood-rearing	PFC 86	FAR 44	NF 4	NA	NA	NA
Winter	46	26	33	53.3% CI [47.8%, 58.6%]	21.9% CI [17.8%, 26.7%]	24.8% CI [20.5%, 29.8%]

16.5.3.1 Breeding Season Habitat: Lek Security

Lek sites are typically adjacent to sagebrush that provides nesting habitat and protection from avian predators, and support short, sparse vegetation, if any at all (Connelly et al. 2004; Dinkins et al. 2012). Leks are characterized by low, sparse vegetation or bare ground; no evidence exists indicating that suitable habitat for leks is limiting for GRSG (Schroeder et al. 1999). Juniper encroachment is a primary threat to leks and more broadly to the Western Great Basin GRSG population (U.S. Fish & Wildlife Service 2013).

Of the 56 leks that were rated, only 3 were unsuitable. Suitable leks had protective sagebrush cover within 100m of the lek center and were relatively remote with no detrimental land uses within line of sight of the lek. The primary factor associated with unsuitable, or marginal lek suitability determinations were the encroachment of conifers, sagebrush habitat converted to other land cover types, and anthropogenic disturbance.

16.5.3.2 Breeding Season Habitat (Nesting and Early Brood-Rearing)

Of the 2,853 square kilometers of mapped breeding season habitat, 2,117 square kilometers (74%) were BLM lands. From the proportional weighted analysis results, approximately 2,083 square kilometers (73%) of the BLM lands within the breeding season habitat was within the area of inference (Figure 16-15). 34 plots were rated that occur in mapped breeding season habitat, visited during the relevant timeframe (April 1 – June 30 in Oregon), and came from sample designs appropriate for a weighted analysis. Within the inference area, 45% was rated suitable, 23% was rated unsuitable, and 32% was rated marginal (Table 61). Available suitable breeding habitat (nesting/early brood-rearing) was not meeting the majority of the desired conditions (arid sites 70% CI [55%, 85%], mesic sites 75% CI [60%, 90%]) as described in table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015d; Bureau of Land Management 2015f) (Appendix A). Landscape habitat objectives apply to BLM lands only.

Vegetation indicators summarized for breeding season plots (Figure 16-16) showed that half of the plots had suitable sagebrush height (50%), sagebrush shape (91%), perennial grass and forb height (93%), perennial grass cover (86%), and preferred forb diversity and availability (50%). Sagebrush cover and perennial forb cover at the site-scale was either marginal or unsuitable at most of the plots sampled. Perennial grass cover, perennial herbaceous height, sagebrush height, and forb cover all contributed to suitable habitat conditions and would provide significant benefit to GRSG during breeding, nesting, and early brood-rearing.

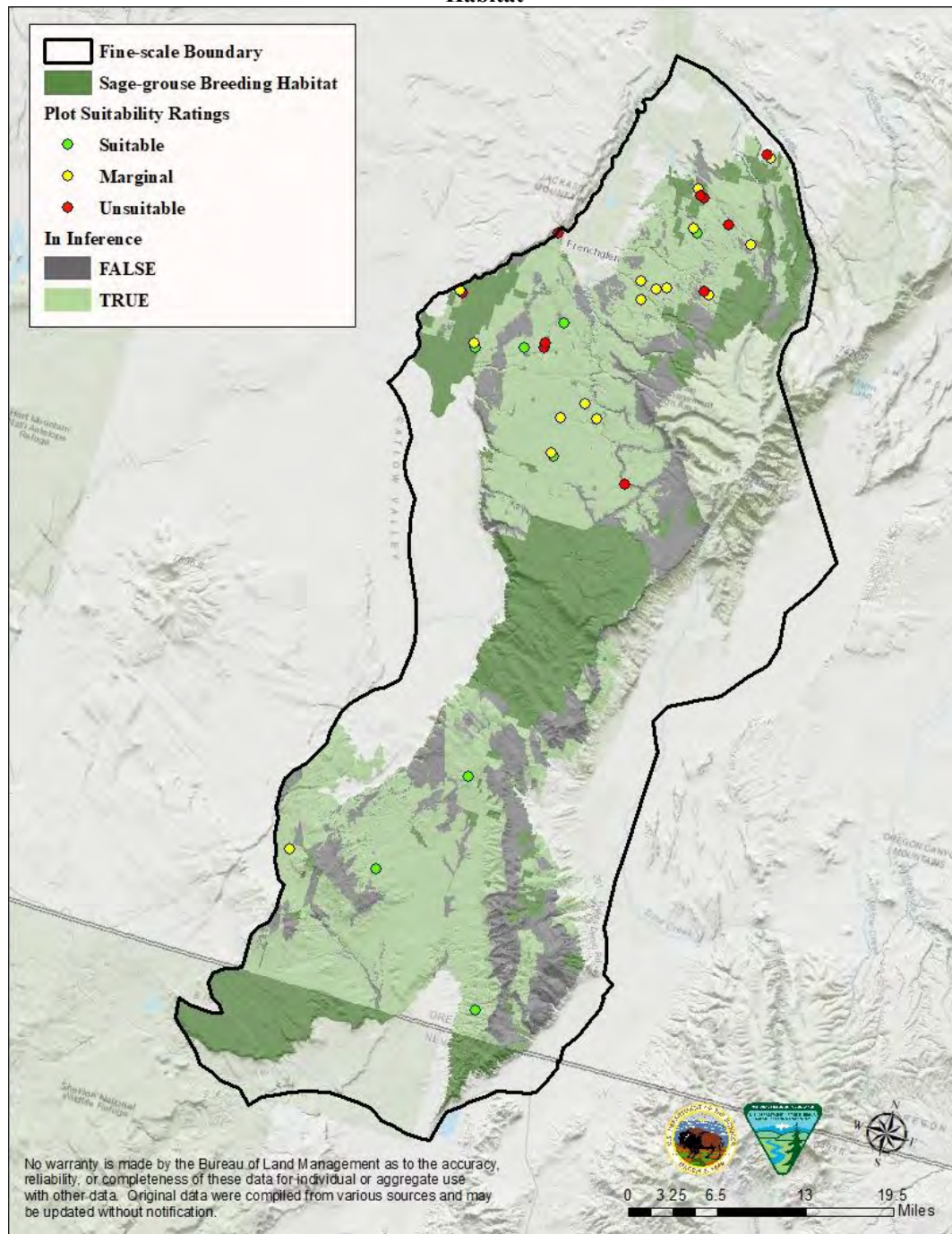
16.5.3.3 Upland Summer and Late Brood-Rearing Habitat

Of the 1,909 square kilometers of mapped upland summer and late brood-rearing season habitat, 1,436 square kilometers (75%) were BLM lands and approximately 1,424 square kilometers (75%) of the BLM lands were within the area of inference (Figure 16-17). 38 plots were rated that occur in mapped summer seasonal habitat, visited during the right time of year (July 1 – October 31), and came from sample designs appropriate for a weighted analysis. Within the inference area, approximately 53% was rated either marginal or unsuitable and approximately 47% was rated suitable (Table 16-5). Available suitable upland summer habitat was not meeting the majority of the desired conditions (arid sites 70% CI [55%, 85%], mesic sites 75% CI [60%, 90%]) as described in Table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015d; Bureau of Land Management 2015f) (Appendix A). Landscape habitat objectives apply to BLM lands only.

Vegetation indicators summarized for all summer season plots (Figure 16-18) were suitable for sagebrush height (52%), perennial herbaceous cover (91%), and preferred forb diversity and availability (67%) but marginal for sagebrush cover (40%). With a low sample size of 38 plots,

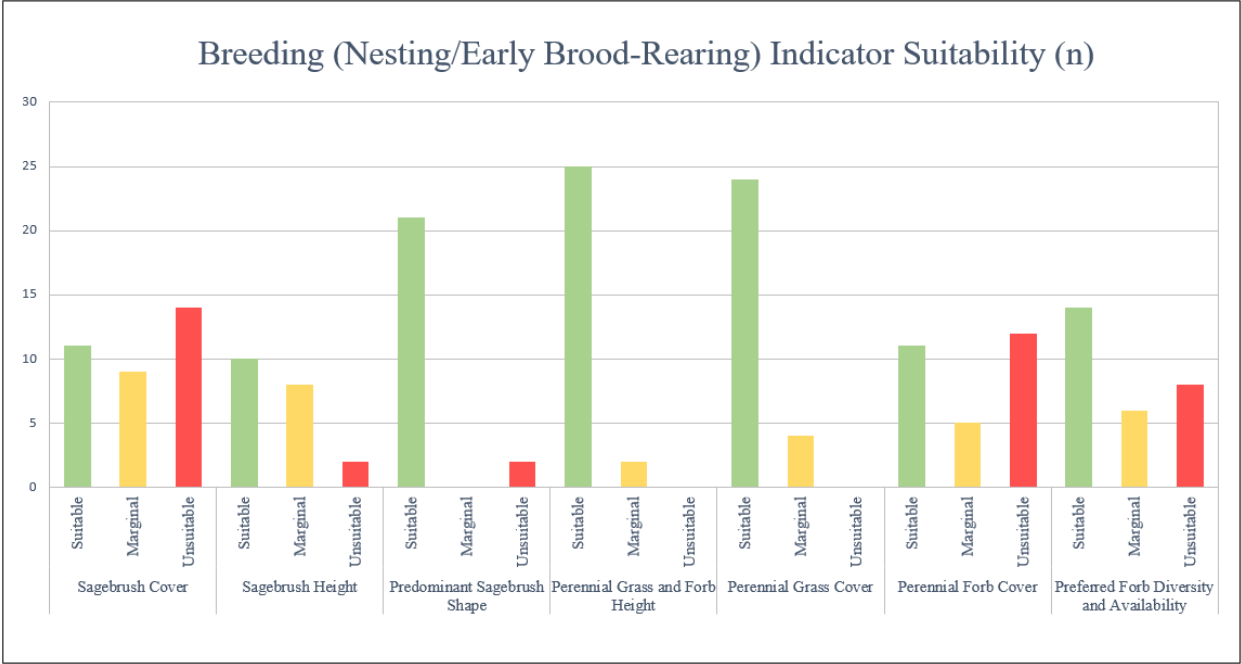
summarized vegetation indicators may not represent actual site-scale conditions across the entire summer seasonal habitat. Future analysis should consider intensification of plot sampling in

Figure 16-14: Site-Scale Suitability Ratings and Area of Inference in Breeding (Nesting/Early Brood-Rearing) Habitat



underrepresented portions of the landscape to better understand GRSJ seasonal use of upland summer and late brood-rearing habitat.

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Figure 16-15: Site-Scale Vegetation Indicator Suitability for Breeding (Nesting/Early Brood-Rearing) Habitat Plots

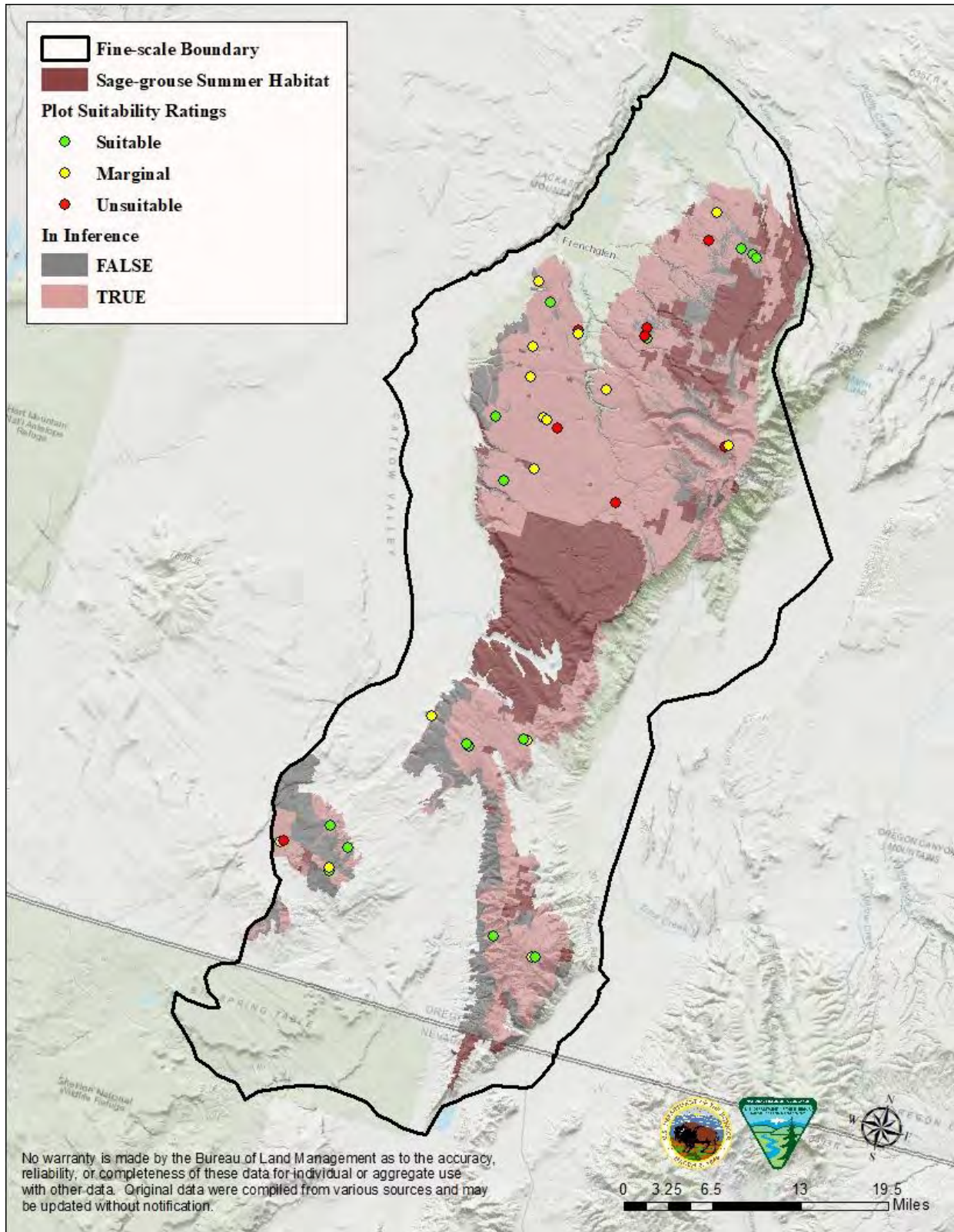


Figure 16-16: Site-Scale Suitability Ratings and Area of Inference in Upland Summer (Late-Brood Rearing) Habitat

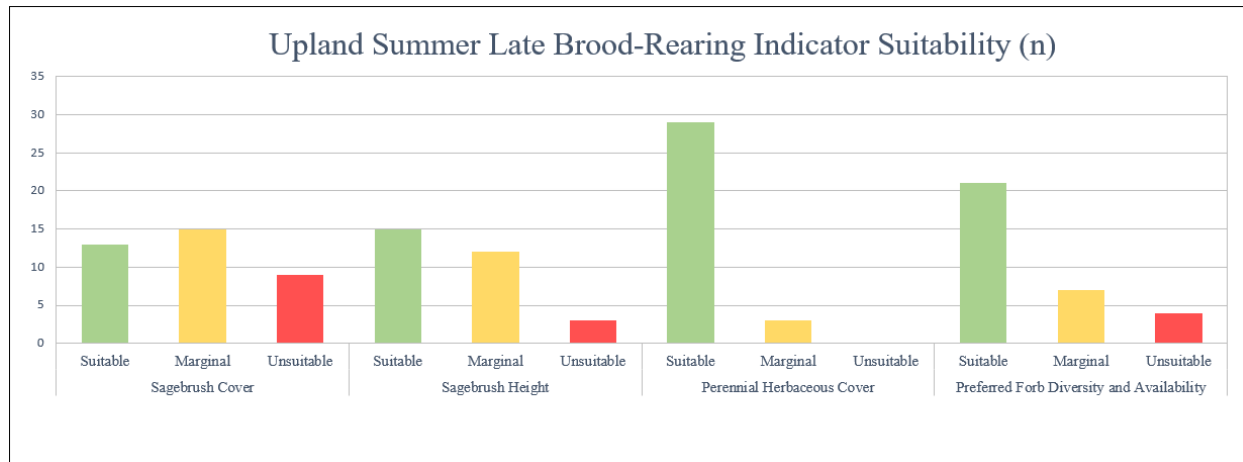


Figure 16-17: Site-Scale Vegetation Indicator Suitability for Upland Summer (Late Brood-Rearing) Habitat Plots

16.5.3.4 Riparian Summer and Late Brood-Rearing Habitat

Brood-rearing habitats for GRSG are typically mosaics of upland sagebrush and other habitats (for example, wet meadows, seasonal wetlands, and riparian areas) that together provide abundant insects and forbs for hens and chicks (Connelly et al. 2000; Connelly et al. 2004; Thompson et al. 2006; Atamian et al. 2010). There is limited information available to inform the suitability rating of riparian summer and late brood-rearing habitat. Riparian sites assessed for suitability relied heavily on proper functioning condition (PFC) ((Bureau of Land Management 2003b).

Of the 134 riparian sites, 86 (64%) were in proper functioning condition. 44 of the rated riparian sites (33%) were functioning at risk, and 4 sites (3%) were classified as not functioning (Table 16-5). Of the areas that were surveyed, a majority were rated marginal or unsuitable which is a strong indicator of potential long-term downward trend. While preferred forb availability is another important indicator of site suitability, proper functioning condition is a stronger indicator of long-term system health and riparian stability. Overall, assessed sites were well distributed within riparian summer habitat, and the number of sites (134) provided a general assessment of riparian condition. However, all riparian sites for this assessment were in lotic systems and little is known about lentic sites within the Steens Pueblo South Steens analysis area.

16.5.3.5 Winter Season Habitat

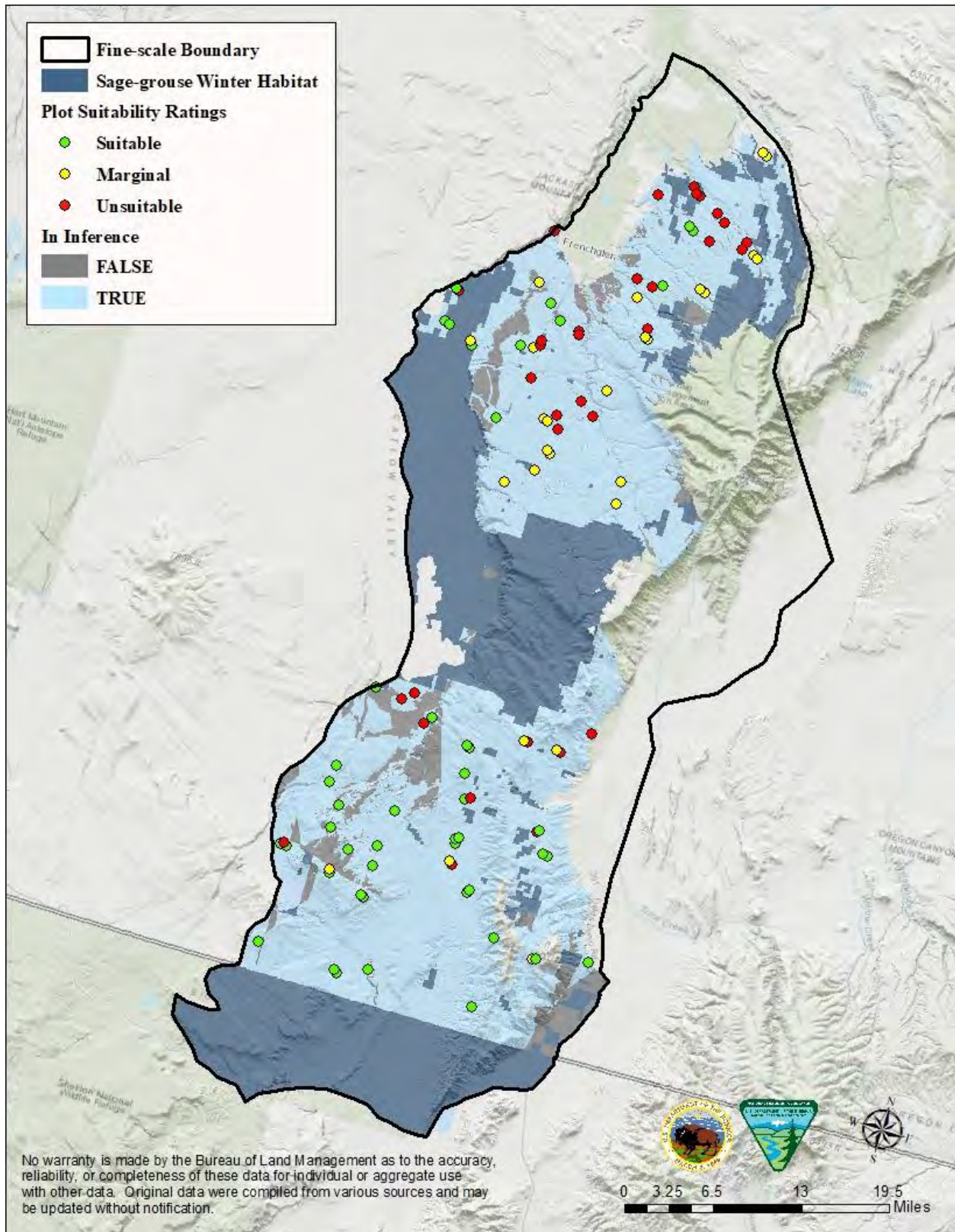
The wide range of elevations within the Steens-South Pueblos analysis area influence local annual habitat conditions for GRSG. Snow depth, rate of snow melt, spring and summer precipitation, and subsequent availability of water during summer and fall varies significantly with elevation from year to year. In years with low snow accumulation, GRSG may occupy high elevation sites during the winter that in other years would not be occupied because deep snow would likely cover sagebrush making it inaccessible for GRSG. If such a winter is followed by a spring and summer with little precipitation, GRSG may remain at high elevations throughout the

nesting and brood-rearing seasons as these areas would likely hold the most soil moisture, resulting in the most favorable summer habitat conditions. The inverse would likely be the case in years of high snow accumulations.

Of the 3,619 square kilometers of mapped winter season habitat, 2,391 square kilometers (66%) were BLM land, and approximately 2,299 square kilometers (64%) of the BLM lands in winter seasonal habitat were within the area of inference (Figure 16-18). 105 plots were rated that occur in mapped winter habitat and came from a sample design appropriate for weighted analysis. Within the area of inference, approximately 53% was rated suitable, 22% was rated marginal, and 25% was rated unsuitable (Table 16-5). Available suitable winter habitat did not meet the majority of desired conditions (arid sites 70% CI [55%, 85%], mesic sites 85% CI [68%, 100%]) as described in Table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015g). Landscape habitat objectives apply to BLM lands only.

Sagebrush canopy cover was unsuitable or marginal on 48 (46%) of 105 plots (Figure 16-19). Plots with less than suitable sagebrush height may still provide forage in years of relatively low snow fall and during early winter prior to snow accumulation that covers available sagebrush and after snow begins to melt and sagebrush is exposed. However, if sagebrush cover was >25% or <10% the plot was not suitable regardless of sagebrush height. Unsuitable plots lacked sagebrush cover, usually due to ecological site potential but also due to historic sagebrush removal projects.

Figure 16-18: Site-Scale Suitability Ratings and Area of Inference in Winter Habitat



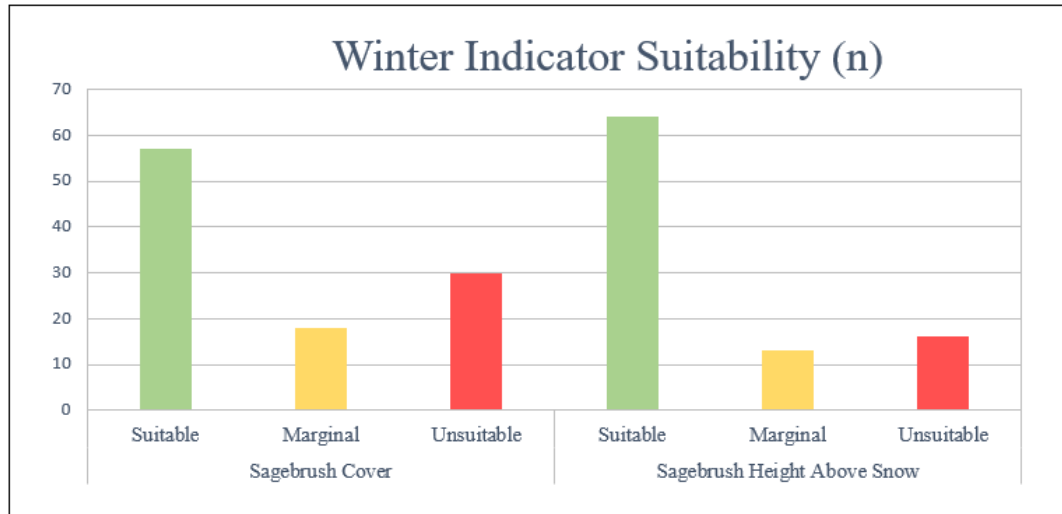


Figure 16-19: Site-Scale Vegetation Indicator Suitability for Winter Habitat Plots

16.6 Conclusion

16.6.1 Limiting Factors

Linkage between large habitat patches was limited by conifer cover in the western portion of the mid-scale and other areas where elevation exceeded 4500 feet. Connectivity between suitable habitat was also limited by sparse shrub vegetation in areas impacted by large fires, primarily in eastern portion of the mid-scale. Overall, large patches of available habitat were still relatively contiguous and not a limiting factor at the mid-scale.

Within the fine-scale assessment area, 65% of seasonal habitat was suitable with 58% occupancy. 17% of available habitat within the fine scale was classified as “potential” habitat. Remaining 18% of mapped seasonal habitat at the fine scale occurred within non-sagebrush and included riparian, historic conifer (juniper), and exotic herbaceous. Habitat availability was not a limiting factor at the fine scale.

Relatively low anthropogenic disturbance occurred at the mid, fine scales. Anthropogenic disturbance was generally associated with the presence of roads. Most roads within the large contiguous habitat patches were minor unpaved gravel or user-maintained dirt surface roads that were not likely to impact GRSB movements. Overall disturbance was calculated to be .47 kilometers per square kilometer which was well below the recommended .67 kilometers per square kilometer threshold. Therefore, anthropogenic disturbance was not a limiting factor.

Analysis of breeding habitat values suggested the primary factors resulting in marginal or unsuitable plot ratings were a lack sagebrush cover and perennial forb cover particularly at low elevation arid sites. Long-term moderate drought and encroachment by juniper and invasive annual grasses typically suppress perennial forb cover. However, herbaceous height and perennial grass cover were suitable in over 70% of the plots indicating adequate nesting and hiding cover was available at the majority of sites sampled. While ecological site potential can

vary across the landscape and may limit the ability of some plots to achieve habitat objectives and desired conditions, the overall plot suitability was generally rated suitable or marginal if critical habitat indicators such as sagebrush cover and perennial grass cover met the desired habitat objectives as described in Table 2-2 (Bureau of Land Management 2015a; Bureau of Land Management 2015g).

Site-scale winter habitat appeared to be limited with sagebrush canopy cover unsuitable or marginal on 48 (46%) of 105 plots. Overall, 53% of the available winter habitat was rated suitable, 22% rated marginal, and 25% rated unsuitable. Relatively low habitat suitability at the site-scale was primarily associated with poor recovery of post-fire shrub habitat from invasive annual grass infestations in burned areas and fragmentation of sagebrush habitat that resulted from historic conversion to crested wheatgrass seedings particularly in low elevation areas. Another factor that limited habitat suitability and connectivity was from persistent and expanding juniper encroachment. Overall, low occurrence of sagebrush cover >10%, lack of sagebrush >11 inches in height, were the most limiting factors within all seasonal habitats at the site-scale. As such, the site-scale evaluation area did not meet Table 2-2 Habitat Objectives requiring 70-85% suitability within all three seasonal habitats (Bureau of Land Management 2015a).

16.6.2 Historic Conversion from Sagebrush to Crested Wheat

At the site scale, the majority (60%) of plots sampled within breeding and winter habitat, which primarily occur at lower elevation were rated unsuitable due to a lack of sagebrush cover. While ecological site potential limitations and wildfire account for the loss of sagebrush at this scale, significant portions of the analysis area adjacent to eastern boundary of the Malheur Wildlife Refuge were converted from native sagebrush plant communities to crested wheatgrass (*Agropyron cristatum*) seedings from 1960-1980 and as well as subsequent post-fire revegetation efforts. Because crested wheatgrass outcompetes native vegetation (Nafus et al. 2015; Hamerlynck and Davies 2019), seeded areas are near monocultures and require significant active restoration efforts to successfully reestablish native plant communities. As such, a significant portion of winter and breeding habitat occurring at low elevations in this area are not currently available as suitable habitat for GRSG and are not likely to provide habitat in the foreseeable future.

16.6.3 Fire

The impacts of large fires on GRSG habitat are well documented in the scientific literature (e.g., (Miller et al. 2011; Coates, Ricca, et al. 2016)). Since 1990, wildfire in the Steens-South Pueblos fine-scale have burned approximately 231,316 acres with three of the largest fires (Grandad, Skull Creek, and Pueblo) burning approximately 133,857 acres. Major impacts due to fire include loss of sagebrush and facilitating the spread of invasive plants, with invasive annual grasses a particular concern. Sagebrush recovery to densities that provide usable GRSG habitat can take two or more decades in cool moist sites and five or more decades in warmer, drier sites. To reduce the risks of invasive annual grass dominance, BLM often plants crested wheatgrass in burned areas due to its ability to compete with annual grasses. However, areas where crested wheatgrass is dominant often lack forb diversity needed to support pre-laying hens and brood-

rearing. Coates et al. (2016) found that GRSG population growth remained suppressed following large wildfires that burned in proximity to leks even during years of adequate precipitation when population growth increase would be expected.

16.7 List of Preparers, Assessment Team Members and Roles:

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- Megan Oyarzun, Geospatial Ecologist- California BLM
- Andrew Johnson, Geographer- California BLM
- Jennifer Derley, Geospatial Ecologist- Nevada BLM
- Quinn Young, Natural Resource Specialist, Nevada BLM
- Glenn Fredrick, Wildlife Biologist- Oregon State Office BLM
- Arlene Kotic, Lead Biologist- California BLM
- Kate Yates, Wildlife Biologist- Lakeview District, Oregon BLM
- Holly Higgins, Wildlife Biologist- Burns District, Oregon BLM

16.8 Habitat Assessment Report Appendices

16.8.1 HAF Appendix A. Oregon ARMPA (Bureau of Land Management 2015a) Habitat Objectives Table 2-2

Table 2-2
Habitat Objectives for Greater Sage-grouse

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
Breeding Including Lekking, Pre-nesting, Nesting, and Early Brood Rearing (Seasonal Use Period March 1 – June 30)			
Lek Security	Proximity of trees or other tall structures	No conifers or tall structures within 1.0 mile of lek center, and conifer cover less than 5% within 4.0 miles of lek, excluding old trees, culturally significant, actively used by special status species, and old growth juniper stands.	Connelly et al. 2000; Fresse 2009; Baruch-Mordo et al. 2013; Knick et al. 2013
	Proximity of sagebrush to leks	Lek has adjacent sagebrush cover	Connelly et al. 2000
Cover	Sagebrush cover (%)	10 to 25	Doescher et al. 1986; Gregg et al. 1994; Hanf et al. 1994; Coggins 1998; Crawford and Carver 2000; Bates and Davies 2014; BLM 2015a
	Sagebrush height (inches) Arid sites (warm-dry) Mesic sites (cool-moist)	11 to 31 15 to 31	Gregg et al. 1994; Hanf et al. 1994; Coggins 1998; Crawford and Carver 2000; Fresse 2009.
	Predominant sagebrush shape	Spreading	Connelly et al. 2000
	Perennial grass cover (such as bunchgrass) (%) Arid sagebrush Warm-dry Shallow-dry Mesic sagebrush Cool-moist Warm-moist	10 to 30 10 to 25 20 to 45 20 to 50	Gregg et al. 1994; Coggins 1998; Crawford and Carver 2000; Fresse 2009; NRCS 2015; Bates and Davies 2014; Jon Bates, USDA ARS, pers.comm. 2/10/2015; BLM 2015a; BLM 2015b
	Perennial grass and forb height (inches, including residual grasses) – most important and appropriately measured in nest areas; excludes shallow-dry sites ¹ Arid sites (warm-dry) Mesic sites (cool-moist)	≥ 7 ≥ 9	Gregg et al. 1994; Hanf et al. 1994; Crawford and Carver 2000; Hagen et al. 2007; Jon Bates, USDA ARS, pers.comm. 2/10/2015

Table 2-2
Habitat Objectives for Greater Sage-grouse

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
	Perennial forb cover (%) ² Arid sagebrush Warm-dry Shallow-dry Mesic sagebrush Cool-moist Warm-moist	 2 to 10 2 to 10 6 to 12 5 to 15	Drut 1992; Drut et al. 1994; Crawford and Carver 2000; Freese 2009; NRCS 2015; Bates and Davies 2014; BLM 2015a; Jon Bates, USDA ARS, pers.comm. 2/10/2015; BLM 2015b
Food	Preferred forb diversity and availability	Preferred forbs are common with 5 to 10 species present ²	Hanf et al. 1994; Crawford and Carver 2000; Freese 2009; Bates and Davies 2014; BLM 2015a; Jon Bates, USDA ARS, pers.comm. 2/10/2015
Available Suitable Habitat (Landscape Context)	% of seasonal habitat within 4.0 miles of leks meeting a majority of the desired conditions Arid sagebrush Mesic sagebrush	 70 (55-85) 75 (60-90)	Connelly et al. 2000; Karl and Sadowski 2005; Evers 2010; Hagen 2011; NRCS 2015
Brood-rearing/Summer Including Late-brood Rearing, Summering, and Early Autumn (Seasonal Use Period July 1- October 31)			
Cover	Sagebrush cover (%)	10 to 25	Doescher et al. 1986; Drut et al. 1994; Connelly et al. 2000; Crawford and Carver 2000; Bates and Davies 2014; Jon Bates, USDA ARS, pers.comm. 2/10/2015
	Sagebrush height (inches)	15 to 31	Gregg et al. 1994; Hanf et al. 1994; Crawford and Carver 2000; Freese 2009
	Perennial herbaceous (grass and forbs) cover (%) Arid sagebrush Warm-dry Shallow-dry Mesic sagebrush Cool-moist Warm-moist Riparian ³	 15 to 30 10 to 25 20 to 45 30 to 55 ≥ 50	Drut et al. 1994; Bates and Davies 2014; NRCS 2015; BLM 2015b; Jon Bates, USDA ARS, pers.comm. 2/10/2015
	Riparian areas/mesic meadows	Majority of areas are in PFC	Stiver et al. 2010, or as updated
Food	Upland and riparian perennial forb availability	Preferred forbs are common with 5 to 10 species present ⁴	Hanf et al. 1994; Freese 2009; Bates and Davies 2014; BLM 2015b; Jon Bates, USDA ARS, pers.comm. 2/10/2015

Table 2-2
Habitat Objectives for Greater Sage-grouse

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
Available Suitable Habitat (Landscape Context)	% of seasonal habitat within 4.0 miles of leks meeting a majority of the desired conditions Arid sagebrush Mesic sagebrush	70 (55-85) 75 (60-90)	Connelly et al. 2000; Karl and Sadowski 2005; Evers 2010; Hagen 2011; NRCS 2015
Winter Including Late Autumn and Winter (Seasonal Use Period November 1 – February 28)			
Cover and Food	Sagebrush cover above snow (%)	≥ 10	Willis 1990 (in Hagen 2011); Bruce 2011
	Sagebrush height above snow (inches)	≥ 10	Willis 1990 (in Hagen 2011); Bruce 2011
Available Suitable Habitat (Landscape Context)	% of wintering habitat meeting a majority of the desired conditions Arid sagebrush Mesic sagebrush	70 (55-85) 85 (68-100)	Connelly et al. 2000; Karl and Sadowski 2005; Evers 2010; NRCS 2015

¹Perennial grass and forb minimum height may not be achievable in years with below normal precipitation. Other indicators of desired condition may still render the site suitable, however.

²In very dry years, forb cover and availability may not be at the desired condition, and in certain plant associations such as Wyoming big sagebrush/Needle and Thread, these indicators may rarely be achieved even in years with normal precipitation.

³Riparian includes swales, wet meadows, and intermittent/ephemeral streams.

⁴Sage-grouse preferred forbs are listed in Appendix I.

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Landfire V. 2.0 Existing Vegetation (EVT)	Habitat Availability	Linkage Area	Edge Effect
North Pacific Oak Woodland	Existing Nonhabitat	Unsuitable	Negative
Northwestern Great Plains Aspen Forest and Parkland	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Western Larch Savanna	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Aspen Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Bigtooth Maple Ravine Woodland	Existing Nonhabitat	Unsuitable	Negative
Western Great Plains Dry Bur Oak Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Central and Southern California Mixed Evergreen Woodland	Existing Nonhabitat	Unsuitable	Negative
Colorado Plateau Pinyon-Juniper Woodland	Existing Nonhabitat	Unsuitable	Negative
Columbia Plateau Western Juniper Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
East Cascades Mesic Montane Mixed-Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Great Basin Pinyon-Juniper Woodland	Existing Nonhabitat	Unsuitable	Negative
Inter-Mountain Basins Subalpine Limber-Bristlecone Pine Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Dry-Mesic Mixed Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Mesic Mixed Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Mixed Oak Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Lower Montane Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
California Montane Jeffrey Pine-(Ponderosa Pine) Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Red Fir Forest	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Subalpine Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Mesic Serpentine Woodland	Existing Nonhabitat	Unsuitable	Negative
North Pacific Dry Douglas-fir-(Madrone) Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
North Pacific Seasonal Sitka Spruce Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Dry-Mesic Douglas-fir-Western Hemlock Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Mesic Subalpine Parkland	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Mountain Hemlock Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Mesic Western Hemlock-Silver Fir Forest	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Mixed Evergreen Forest	Existing Nonhabitat	Unsuitable	Negative
Northern California Mesic Subalpine Woodland	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Subalpine Woodland and Parkland	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Mesic Montane Mixed Conifer Forest	Existing Nonhabitat	Unsuitable	Negative
Northwestern Great Plains Highland White Spruce Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Foothill Limber Pine-Juniper Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Lodgepole Pine Forest	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Ponderosa Pine Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland	Existing Nonhabitat	Unsuitable	Negative
Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Pinyon-Juniper Woodland	Existing Nonhabitat	Unsuitable	Negative
East Cascades Ponderosa Pine Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Inter-Mountain Basins Curl-Leaf Mountain Mahogany Woodland	Existing Sagebrush Associated	Suitable	Positive
North Pacific Broadleaf Landslide Forest	Existing Nonhabitat	Unsuitable	Negative
Colorado Plateau Mixed Low Sagebrush Shrubland	Existing Sagebrush	Suitable	Positive
Columbia Plateau Scabland Shrubland	Existing Sagebrush Associated	Suitable	Positive
Inter-Mountain Basins Mat Saltbush Shrubland	Existing Nonhabitat	Suitable	Neutral
Mediterranean California Alpine Fell-Field	Existing Nonhabitat	Marginal	Neutral
North Pacific Dry and Mesic Alpine Dwarf-Shrubland	Existing Nonhabitat	Marginal	Neutral
North Pacific Dry and Mesic Alpine Fell-field or Meadow	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Alpine Dwarf-Shrubland	Existing Nonhabitat	Marginal	Neutral
Sierra Nevada Alpine Dwarf-Shrubland	Existing Nonhabitat	Marginal	Neutral
Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	Existing Sagebrush	Suitable	Positive
Colorado Plateau Blackbrush-Mormon-tea Shrubland	Existing Nonhabitat	Suitable	Neutral
Great Basin Xeric Mixed Sagebrush Shrubland	Existing Sagebrush	Suitable	Positive
Inter-Mountain Basins Big Sagebrush Shrubland	Existing Sagebrush	Suitable	Positive
Inter-Mountain Basins Mixed Salt Desert Scrub	Existing Sagebrush Associated	Suitable	Positive
Mojave Mid-Elevation Mixed Desert Scrub	Existing Nonhabitat	Suitable	Neutral
North Pacific Avalanche Chute Shrubland	Existing Nonhabitat	Suitable	Neutral
North Pacific Montane Shrubland	Existing Nonhabitat	Suitable	Neutral
Northwestern Great Plains Shrubland	Existing Sagebrush Associated	Suitable	Positive
Rocky Mountain Lower Montane-Foothill Shrubland	Existing Sagebrush Associated	Suitable	Positive
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	Existing Nonhabitat	Suitable	Neutral
Sonora-Mojave Mixed Salt Desert Scrub	Existing Nonhabitat	Suitable	Neutral
Southern California Coastal Scrub	Existing Nonhabitat	Suitable	Neutral

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Southern Colorado Plateau Sand Shrubland	Existing Nonhabitat	Suitable	Neutral
Western Great Plains Sandhill Steppe	Existing Nonhabitat	Suitable	Neutral
California Mesic Chaparral	Existing Nonhabitat	Suitable	Neutral
California Montane Woodland and Chaparral	Existing Nonhabitat	Suitable	Neutral
California Xeric Serpentine Chaparral	Existing Nonhabitat	Suitable	Neutral
Colorado Plateau Pinyon-Juniper Shrubland	Existing Nonhabitat	Unsuitable	Negative
Great Basin Semi-Desert Chaparral	Existing Nonhabitat	Suitable	Neutral
Mogollon Chaparral	Existing Nonhabitat	Suitable	Neutral
Northern and Central California Dry-Mesic Chaparral	Existing Nonhabitat	Suitable	Neutral
Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	Existing Nonhabitat	Suitable	Neutral
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	Existing Sagebrush Associated	Suitable	Positive
Sonora-Mojave Semi-Desert Chaparral	Existing Nonhabitat	Suitable	Neutral
Western Great Plains Mesquite Shrubland	Existing Nonhabitat	Marginal	Neutral
California Central Valley Mixed Oak Savanna	Existing Nonhabitat	Unsuitable	Negative
California Coastal Live Oak Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
California Lower Montane Foothill Pine Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
Inter-Mountain Basins Juniper Savanna	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Ponderosa Pine Savanna	Existing Nonhabitat	Unsuitable	Negative
Southern Rocky Mountain Juniper Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
Willamette Valley Upland Prairie	Existing Nonhabitat	Unsuitable	Negative
Columbia Plateau Steppe and Grassland	Existing Sagebrush Associated	Suitable	Positive
Columbia Plateau Low Sagebrush Steppe	Existing Sagebrush	Suitable	Positive
Inter-Mountain Basins Big Sagebrush Steppe	Existing Sagebrush	Suitable	Positive
Inter-Mountain Basins Montane Sagebrush Steppe	Existing Sagebrush	Suitable	Positive
Inter-Mountain Basins Semi-Desert Shrub-Steppe	Existing Sagebrush Associated	Suitable	Positive
California Central Valley and Southern Coastal Grassland	Existing Nonhabitat	Marginal	Neutral
California Mesic Serpentine Grassland	Existing Nonhabitat	Marginal	Neutral
Central Mixedgrass Prairie Grassland	Existing Nonhabitat	Marginal	Neutral
Columbia Basin Foothill and Canyon Dry Grassland	Existing Nonhabitat	Marginal	Neutral
Inter-Mountain Basins Semi-Desert Grassland	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Alpine Dry Tundra	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Subalpine Meadow	Existing Nonhabitat	Marginal	Neutral
North Pacific Montane Grassland	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Subalpine-Upper Montane Grassland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Mixedgrass Prairie	Existing Sagebrush Associated	Suitable	Positive
Columbia Basin Palouse Prairie	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Alpine Fell-Field	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Alpine Turf	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Subalpine-Montane Mesic Meadow	Existing Nonhabitat	Marginal	Neutral
Southern Rocky Mountain Montane-Subalpine Grassland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Foothill and Piedmont Grassland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Sand Prairie	Existing Sagebrush Associated	Suitable	Positive
Western Great Plains Shortgrass Prairie	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Tallgrass Prairie	Existing Nonhabitat	Marginal	Neutral
California Central Valley Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
California Central Valley Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Inter-Mountain Basins Greasewood Flat	Existing Nonhabitat	Suitable	Neutral
North Pacific Lowland Riparian Forest	Existing Nonhabitat	Marginal	Neutral
North Pacific Lowland Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
North Pacific Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
North Pacific Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Conifer Swamp	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Foothill Conifer Wooded Steppe	Existing Nonhabitat	Unsuitable	Negative
Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Rocky Mountain Poor-Site Lodgepole Pine Forest	Existing Nonhabitat	Unsuitable	Negative
Northern Rocky Mountain Avalanche Chute Shrubland	Existing Nonhabitat	Suitable	Neutral
Northern Rocky Mountain Subalpine Deciduous Shrubland	Existing Nonhabitat	Suitable	Neutral
North Pacific Alpine and Subalpine Dry Grassland	Existing Nonhabitat	Marginal	Neutral
Sierra-Intermontane Desert Western White Pine-White Fir Woodland	Existing Nonhabitat	Unsuitable	Negative
North Pacific Wooded Volcanic Flowage	Existing Nonhabitat	Unsuitable	Negative
North Pacific Dry-Mesic Silver Fir-Western Hemlock-Douglas-fir Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Hypermaritime Western Red-cedar-Western Hemlock Forest	Existing Nonhabitat	Unsuitable	Negative
Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
Recently Logged-Herb and Grass Cover	Existing Nonhabitat	Marginal	Neutral
Recently Logged-Shrub Cover	Existing Nonhabitat	Marginal	Neutral
Recently Logged-Tree Cover	Existing Nonhabitat	Unsuitable	Negative
Recently Burned-Herb and Grass Cover	Existing Nonhabitat	Marginal	Neutral
Recently Burned-Shrub Cover	Existing Nonhabitat	Marginal	Neutral
Recently Burned-Tree Cover	Existing Nonhabitat	Unsuitable	Negative

Recently Disturbed Other-Herb and Grass Cover	Existing Nonhabitat	Marginal	Neutral
Recently Disturbed Other-Shrub Cover	Existing Nonhabitat	Marginal	Neutral
Recently Disturbed Other-Tree Cover	Existing Nonhabitat	Unsuitable	Negative
Central Mixedgrass Prairie Shrubland	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Mesic Serpentine Chaparral	Existing Nonhabitat	Unsuitable	Negative
Inter-Mountain Basins Curl-leaf Mountain Mahogany Shrubland	Existing Sagebrush Associated	Suitable	Positive
Mediterranean California Lower Montane Black Oak Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
Mediterranean California Lower Montane Black Oak-Conifer Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
East Cascades Oak Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
East Cascades Oak-Ponderosa Pine Forest and Woodland	Existing Nonhabitat	Unsuitable	Negative
California Lower Montane Blue Oak Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
California Lower Montane Blue Oak-Foothill Pine Woodland and Savanna	Existing Nonhabitat	Unsuitable	Negative
Open Water	Existing Nonhabitat	Unsuitable	Neutral
Quarries-Strip Mines-Gravel Pits-Well and Wind Pads	Existing Nonhabitat	Unsuitable	Negative
Developed-Low Intensity	Existing Nonhabitat	Unsuitable	Negative
Developed-Medium Intensity	Existing Nonhabitat	Unsuitable	Negative
Developed-High Intensity	Existing Nonhabitat	Unsuitable	Negative
Developed-Roads	Existing Nonhabitat	Unsuitable	Negative
Great Plains Wooded Draw and Ravine Woodland	Existing Nonhabitat	Marginal	Neutral
Great Plains Wooded Draw and Ravine Shrubland	Existing Nonhabitat	Marginal	Neutral
Great Plains Prairie Pothole	Existing Nonhabitat	Marginal	Neutral
Eastern Great Plains Wet Meadow-Prairie-Marsh	Existing Nonhabitat	Marginal	Neutral
Temperate Pacific Freshwater Emergent Marsh	Existing Nonhabitat	Marginal	Neutral
North Pacific Shrub Swamp	Existing Nonhabitat	Marginal	Neutral
Temperate Pacific Tidal Salt and Brackish Marsh	Existing Nonhabitat	Marginal	Neutral
North Pacific Montane Massive Bedrock-Cliff and Talus	Existing Nonhabitat	Unsuitable	Neutral
North Pacific Alpine and Subalpine Bedrock and Scree	Existing Nonhabitat	Unsuitable	Neutral
North American Glacier and Ice Field	Existing Nonhabitat	Unsuitable	Neutral
Western Cool Temperate Urban Deciduous Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Urban Evergreen Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Urban Mixed Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Urban Herbaceous	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Urban Shrubland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Urban Deciduous Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Urban Evergreen Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Urban Mixed Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Urban Herbaceous	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Urban Shrubland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Deciduous Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Evergreen Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Mixed Forest	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Shrubland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Grassland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Deciduous Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Evergreen Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Mixed Forest	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Shrubland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Grassland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Deciduous Forested Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Evergreen Forested Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Mixed Forested Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Shrub Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Developed Ruderal Herbaceous Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Deciduous Forested Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Mixed Forested Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Shrub Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Warm Temperate Developed Ruderal Herbaceous Wetland	Existing Nonhabitat	Unsuitable	Negative
Western Cool Temperate Orchard	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Vineyard	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Bush fruit and berries	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Row Crop - Close Grown Crop	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Row Crop	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Close Grown Crop	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Fallow/Idle Cropland	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Pasture and Hayland	Existing Nonhabitat	Marginal	Negative
Western Cool Temperate Wheat	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Orchard	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Vineyard	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Bush fruit and berries	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Row Crop - Close Grown Crop	Existing Nonhabitat	Marginal	Negative

Western Warm Temperate Row Crop	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Close Grown Crop	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Fallow/Idle Cropland	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Pasture and Hayland	Existing Nonhabitat	Marginal	Negative
Western Warm Temperate Wheat	Existing Nonhabitat	Marginal	Negative
Colorado Plateau Mixed Bedrock Canyon and Tableland	Existing Nonhabitat	Unsuitable	Neutral
Columbia Basin Foothill Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Great Basin Foothill and Lower Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Inter-Mountain Basins Active and Stabilized Dune	Existing Nonhabitat	Unsuitable	Neutral
Inter-Mountain Basins Alkaline Closed Depression	Existing Nonhabitat	Marginal	Neutral
Inter-Mountain Basins Cliff and Canyon	Existing Nonhabitat	Unsuitable	Neutral
Inter-Mountain Basins Playa	Existing Nonhabitat	Unsuitable	Neutral
Inter-Mountain Basins Shale Badland	Existing Nonhabitat	Unsuitable	Neutral
Inter-Mountain Basins Wash	Existing Nonhabitat	Unsuitable	Neutral
North American Arid West Emergent Marsh	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Lower Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Floodplain Forest and Woodland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Riparian Forest	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Alpine Bedrock and Scree	Existing Nonhabitat	Unsuitable	Neutral
Rocky Mountain Alpine-Montane Wet Meadow	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Cliff Canyon and Massive Bedrock	Existing Nonhabitat	Unsuitable	Neutral
Rocky Mountain Lower Montane-Foothill Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Subalpine-Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Subalpine-Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Badlands	Existing Nonhabitat	Unsuitable	Neutral
Western Great Plains Cliff and Outcrop	Existing Nonhabitat	Unsuitable	Neutral
Western Great Plains Closed Depression Wetland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Floodplain Forest and Woodland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Open Freshwater Depression Wetland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Saline Depression Wetland	Existing Nonhabitat	Marginal	Neutral
Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe	Existing Nonhabitat	Marginal	Neutral
Columbia Plateau Ash and Tuff Badland	Existing Nonhabitat	Unsuitable	Neutral
Inter-Mountain Basins Volcanic Rock and Cinder Land	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Lower Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Central California Coast Ranges Cliff and Canyon	Existing Nonhabitat	Unsuitable	Neutral
Klamath-Siskiyou Cliff and Outcrop	Existing Nonhabitat	Unsuitable	Neutral
Mediterranean California Alpine Bedrock and Scree	Existing Nonhabitat	Unsuitable	Neutral
Mediterranean California Foothill and Lower Montane Riparian Woodland	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Serpentine Foothill and Lower Montane Riparian Woodland and Seep	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Active and Stabilized Dune	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Badland	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Bedrock Cliff and Outcrop	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Cienega	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Pavement	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Playa	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Riparian Mesquite Bosque Woodland	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Volcanic Rockland	Existing Nonhabitat	Unsuitable	Neutral
North American Warm Desert Wash Woodland	Existing Nonhabitat	Marginal	Neutral
North Pacific Active Volcanic Rock and Cinder Land	Existing Nonhabitat	Unsuitable	Neutral
North Pacific Hardwood-Conifer Swamp	Existing Nonhabitat	Marginal	Neutral
North Pacific Herbaceous Bald and Bluff	Existing Nonhabitat	Marginal	Neutral
North Pacific Hypermaritime Herbaceous Headland	Existing Nonhabitat	Marginal	Neutral
North Pacific Lowland Mixed Hardwood-Conifer Forest	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Coastal Sand Dune and Strand	Existing Nonhabitat	Unsuitable	Neutral
North-Central Interior Floodplain Forest	Existing Nonhabitat	Marginal	Neutral
Sierra Nevada Cliff and Canyon	Existing Nonhabitat	Unsuitable	Neutral
Southwestern Great Plains Canyon	Existing Nonhabitat	Unsuitable	Neutral
Temperate Pacific Subalpine-Montane Wet Meadow	Existing Nonhabitat	Marginal	Neutral
California Ruderal Grassland and Meadow	Existing Nonhabitat	Marginal	Negative
Californian Ruderal Forest	Existing Nonhabitat	Unsuitable	Negative
Great Basin & Intermountain Introduced Annual and Biennial Forbland	Existing Nonhabitat	Marginal	Negative
Great Basin & Intermountain Introduced Annual Grassland	Existing Nonhabitat	Marginal	Negative
Great Basin & Intermountain Introduced Perennial Grassland and Forbland	Existing Nonhabitat	Marginal	Negative
North American Warm Desert Ruderal & Planted Scrub	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Coastal Sand Dune Ruderal Scrub	Existing Nonhabitat	Marginal	Negative
Northern & Central Plains Ruderal & Planted Shrubland	Existing Nonhabitat	Marginal	Negative
Northern & Central Ruderal Wet Meadow & Marsh	Existing Nonhabitat	Marginal	Neutral
Great Plains Comanchian Ruderal Shrubland	Existing Nonhabitat	Unsuitable	Negative

Southern Vancouverian Lowland Ruderal Shrubland	Existing Nonhabitat	Marginal	Negative
Interior West Ruderal Riparian Forest	Existing Nonhabitat	Unsuitable	Negative
Interior Western North American Temperate Ruderal Shrubland	Existing Nonhabitat	Unsuitable	Negative
Western North American Ruderal Wet Shrubland	Existing Nonhabitat	Unsuitable	Negative
Great Basin & Intermountain Ruderal Shrubland	Existing Nonhabitat	Unsuitable	Negative
California Ruderal Scrub	Existing Nonhabitat	Unsuitable	Negative
Columbia Basin Foothill Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Great Basin Foothill and Lower Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Columbia Basin Foothill Riparian Herbaceous	Existing Nonhabitat	Marginal	Neutral
Great Basin Foothill and Lower Montane Riparian Herbaceous	Existing Nonhabitat	Marginal	Neutral
Northern Rocky Mountain Lower Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Floodplain Shrubland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Floodplain Herbaceous	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Northwestern Great Plains Riparian Herbaceous	Existing Nonhabitat	Marginal	Neutral
Rocky Mountain Lower Montane-Foothill Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Floodplain Shrubland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Floodplain Herbaceous	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Western Great Plains Riparian Herbaceous	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Riparian Herbaceous	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Lower Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Foothill and Lower Montane Riparian Shrubland	Existing Nonhabitat	Marginal	Neutral
Mediterranean California Serpentine Foothill and Lower Montane Riparian Shrubland and Seep	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Riparian Mesquite Bosque Shrubland	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Wash Shrubland	Existing Nonhabitat	Marginal	Neutral
North-Central Interior Floodplain Shrubland	Existing Nonhabitat	Marginal	Neutral
North American Warm Desert Ruderal & Planted Grassland	Existing Nonhabitat	Unsuitable	Negative
North Pacific Maritime Coastal Sand Dune Ruderal Herb Vegetation	Existing Nonhabitat	Unsuitable	Negative
Northern & Central Plains Ruderal & Planted Grassland	Existing Nonhabitat	Unsuitable	Negative
Great Plains Comanchian Ruderal Grassland	Existing Nonhabitat	Unsuitable	Negative
Southern Vancouverian Lowland Ruderal Grassland	Existing Nonhabitat	Unsuitable	Negative
Interior West Ruderal Riparian Scrub	Existing Nonhabitat	Unsuitable	Negative
Interior Western North American Temperate Ruderal Grassland	Existing Nonhabitat	Unsuitable	Negative
Western North American Ruderal Wet Meadow & Marsh	Existing Nonhabitat	Unsuitable	Negative