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ALVORD
ALLOTMENT MANAGEMENT PLAN / ENVIRONMENTAL ASSESSMENT

DOI-BLM-ORWA-B060-2014-0019-EA

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LIST OF ACRONYMS

ACEC....Area of Critical Environmental Concern
AIM....Assessment, Inventory, Monitoring
AMP....Allotment Management Plan
AMU....Andrews Management Unit
ARMPA....Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment
ATV....All-Terrain Vehicle
AUM....Animal Unit Month
BLM....Bureau of Land Management
BMP....Best Management Practices
BO....Biological Opinion
BSC....Biological Soil Crusts
CCC....Consultation, Cooperation and Coordination
CEAA....Cumulative Effects Affected Area
CFR....Code of Federal Regulations
CMPA....Steens Mountain Cooperative Management and Protection Area
COA....Conservation Opportunity Areas
CRP....Comprehensive Recreation Plan
DEIS....Draft Environmental Impact Statement
EA....Environmental Assessment
EIS....Environmental Impact Statement
EPA....Environmental Protection Agency
ESA....Endangered Species Act
ESD....Ecological Site Description
ESR....Emergency Stabilization and Rehabilitation
FEIS....Final Environmental Impact Statement
FONSI....Finding of No Significant Impact
GHMA....General Habitat Management Area
GIS....Geospatial Information System
GRSG....Greater Sage-Grouse
GWP....Global Warming Potentials
HMA....Herd Management Area
ICBEMP....Interior Columbia Basin Ecosystem Management Project
IDT....Interdisciplinary Team
IPCC....Intergovernmental Panel on Climate Change
LCT....Lahontan cutthroat trout
LMF....Landscape Monitoring Framework
LWC....Lands with Wilderness Character
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
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
TMDL .... Total Maximum Daily Load
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 Areas

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1 INTRODUCTION: PURPOSE OF AND NEED FOR ACTION

1.1 Background

The Andrews Field Office, Bureau of Land Management (BLM) has prepared this environmental assessment (EA) to analyze renewal of one grazing permit for a 10-year period in the Alvord Allotment (#6012), address levels of active use, suspended use, and non-renewable (NR) use to be authorized, and address grazing management, range improvements, and development of the Alvord Allotment Management Plan (AMP). This EA analyzes the potential direct, indirect, and cumulative impacts that may result with the implementation of the alternatives.

The Alvord Allotment is located approximately 70 air miles southeast of Burns, Oregon (Appendix A: Map 1 – Vicinity Map) on the east side of Steen Mountain. The allotment contains approximately 223,662 acres of public land managed by the BLM and 5,682 acres of private land for a total of 229,344 acres.

Table 1: Land Designation by Pastures within the Alvord Allotment (Acres)

Land Management Designation[1]		Alvord Seeding #1	North Foothills #2	South Foothills #3	Table Mtn. #4	Desert #6	Pike Creek #9	Total Acres[2]
Steens Mountain Wilderness*		-	203	1,322	-	-	3,592	**5,117**
Wilderness Study Areas (WSA)	**Alvord Desert***	-	-	-	-	63,348	-	**63,348**
	East Alvord*	-	-	-	-	21,915	-	**22,128**
	High Steens*	-	3,483	1,098	-	-	1,306	**5,887**
	Sheepshead Mountains*	-	-	-	2,060	-	-	**2,060**
	Table Mountain*	-	-	-	12,221	17,545	-	**29,782**
	Wildcat Canyon*	-	-	-	6,432	1,806	-	**8,238**
	Winter Range*	-	-	-	-	15,485	-	**15,485**
Steens Mountain Cooperative Management and Protection Area (CMPA)[3]*		-	4,082	2,308	-	-	4,595	**10,986**
Area of Environmental Concern (ACEC)	**Alvord Desert**	-	-	-	-	20,391	-	**20,391**
	Mickey Hot Springs	-	-	-	-	42	-	**42**
Research Natural Area (RNA)	**Big Alvord Creek**	-	169	-	-	-	-	**169**
	Mickey Basin	-	-	-	-	374	-	**374**
No Special Designation BLM-Managed		2,923	2	6	30	68,843	44	**71,848**
Total BLM-Managed Acres		2,923	3,688	2,425	20,743	188,941	4,936	**223,902**
Total Private Ownership		14	2,209	1,627	-	1,493	339	**5,681**
Total Acres		**2,937**	**5,897**	**4,052**	**20,743**	**190,434**	**5,275**	**229,584**

The Alvord Allotment consists of six pastures and includes a variety of land management designations (Table 1) (Appendix A: Map 2 – Land Status). The last AMP for this allotment was completed in March 1985. An allotment evaluation was completed in 2014.

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

[1] All Land Management Designations followed by an "*" are also identified as part of the National Landscape Conservation System (NLCS) which provides additional direction to conserve, protect, and restore special areas and unique resources, with direction being provided in the Oregon/Washington National Landscape Conservation System 3-year Strategy: Fiscal Years 2013-2015 (September 14, 2012).
[2] The totals in this column may be larger than the sum shown in the table. This is due to the presence of special designation acres within areas that are part of the allotment but are exclosed from grazing. There are no proposed actions that would affect these exclosures, therefore, they are not discussed within this document.
[3] Some designations such as CMPA, ACEC, and RNA may overlap with other designations. Therefore, these acres are not additive and adding all acres for each pasture within this table may result in a total higher than the total pasture acreage.

Greater Sage-Grouse (GRSG) Approved Resource Management Plan Amendment (ARMPA) ROD, made forage allocations within the Alvord Allotment.

Table 2: Alvord Allotment Forage Allocations from the Andrews/Steens CMPA RMPs (Appendix J-17)

SPECIES	TYPE OF USE	ANIMAL UNIT MONTHS (AUMs)
Deer	Active	244
Antelope	Active	20
Elk	Active	0
Wild Horses	Active	1,200
Livestock	Active	7,355
	Suspended	1,892
	TOTAL	**10,711**

There is currently one permittee that holds all the grazing preference (7,355 AUMs) for this allotment. The grazing preference is associated with grazing authorization #3602552. The mandatory terms and conditions on that grazing permit, when none of the preference is leased, is shown in Table 3. This table provides the preference holder's grazing authorization including number of livestock, permitted season of use, and active animal unit months (AUM), but does not show the prescribed grazing management within the allotment, which is part of an AMP.

Table 3: Current Grazing Preference within the Alvord Allotment

Authorization	Pasture	Livestock Number	Begin Date	End Date	% Public Land (PL)[4]	Active AUMs
3602552	Desert	1,254	11/16	2/28	100%	4,328
	Desert	1,254	3/1	3/31	100%	1,278
	N. / S. Foothills / Table Mountain	698	4/15	6/14	100%	1,400
	Alvord Seeding	47	11/16	6/29	100%	349
					TOTAL	**7,355**

The permittee that currently holds all the grazing preference may lease out portions of the preference to additional operators. While these base property leases result in the lessee's being issued a grazing permit, the mandatory terms and conditions of these leased permits are required to fit within the mandatory terms and conditions of the preference holder's permit. Therefore, the sum of all current grazing permits within the Alvord Allotment would not exceed the authorized AUMs of grazing preference. As leasing preference is strictly an administrative act, is temporary, and all lessees have the same requirements as the preference holder, these leased grazing permits will not be addressed further in this document. All discussion of grazing terms and conditions will be for authorization #3602552, which is based on current grazing preference.

In 1965, the current day Alvord Allotment was established, AUMS were adjudicated, and livestock grazing authorized (this area was previously part of the Wildhorse Unit). A rest-rotation grazing system was implemented at the same time. During that transition, 1,892 AUMs were moved from active to suspended nonuse on the grazing permit. The intent of this decision was to work towards improving crucial winter mule deer range along the east face of the Steens Mountain. These AUMs were suspended in coordination with the previous permit holder, by District Manager decision (February 19, 1965), with the understanding that they could be reinstated within the Desert #6 Pasture following the development of range improvements. This decision predates congressional direction to the BLM to identify WSAs, which was implemented in 1976.

On March 12, 1985, the BLM received a grazing application by the permittee to reinstate the 1,892 suspended AUMs in the Desert #6 Pasture in response to the increase in accessible forage following the construction of range improvements, including water developments and new fence construction, which improved distribution within the pasture and made more areas of the pasture accessible to livestock. Shortly thereafter, on March 25, 1985, the BLM completed an EA (EA OR-

[4] %PL is calculated on a forage production basis, not on an acre basis.

020-6-29) to analyze the impacts of restoring the suspended AUMs. A “Finding of No Significant Impact” was issued on November 4, 1987, followed by the decision on January 19, 1988, which stated that grazing use in Desert #6 Pasture of Alvord Allotment could be temporarily increased by 946 AUMs beginning in 1988 and continuing for 3 years. After 3 years, the amount of grazing use could again be increased by another 946 AUMs if monitoring showed only a negligible impact to WSA, and that forage was available. After the initial 6-year trial, data was to be analyzed to determine if use of the suspended AUMs had a negligible effect to wilderness characteristics in established WSAs in the Desert #6 Pasture. This process was not completed, and suspended AUMs were not reinstated.

Although the suspended AUMs have not been formally reinstated as active use AUMs, when forage and water is available within the Desert #6 Pasture, the permittee has been allowed to request to use up to, and exceeding, the full amount as NR AUMs. Over the last 49 years, the permittee has been authorized NR 18 times, ranging from 379 AUMs to 2,278 AUMs.

The allotment management category process was initiated in 1982 and was used primarily to establish priorities for investing in range improvements. The Alvord Allotment was designated as an “improve” (I) management category allotment in the 2005 Steens CMPA RMP/ROD. An “I” categorization identifies the allotment as having management or resource issues or concerns and resource conflicts exist. Alvord Allotment was designated an “I” category allotment due to the potential for resource concerns regarding resources present including riparian resources, water quality, special status species (SSS), including GRSG and their habitat, and Lahontan cutthroat trout (LCT), threatened species under the Endangered Species Act. Resource concerns being identified during the categorization process does not mean there are issues with those resources but is meant to document the presence of those resources and potential for issues.

In 2017, Alvord Allotment was evaluated 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) (1997) by an interdisciplinary team (IDT). Standards are intended to address the health, productivity, and sustainability of public rangelands. They represent the minimum acceptable conditions for the public rangelands. Guidelines are intended to offer guidance in achieving goals and objectives using practices, methods, techniques, and considerations used to ensure that progress is achieved in a way, and at a rate, that meets goals and objectives.

The 2017 S&G Determination for Alvord Allotment found that Standards 1 (Watershed Function – Uplands), 2 (Watershed Function – Riparian), and 3 (Ecological Processes) are being achieved. The other two Standards, 4 (Water Quality) and 5 (Native, Threatened or Endangered, and Locally Important Species), were found to not be achieved in Willow Creek, Big Alvord Creek, and the lower elevation portion of Cottonwood Creek (below 4,800 feet) due to stream temperatures above the Oregon Department of Environmental Quality (ODEQ) water temperature standard for LCT. The causal factors for not achieving these standards were determined to be geomorphic constraints and past disturbance from wildfires. Current livestock grazing management was not considered a causal factor for non-attainment. Creeks containing known populations of LCT that are meeting the standards for stream temperature include Mosquito Creek, Little Alvord, Pike Creek, and the upper elevation of Cottonwood Creek (above 5,000 feet). See Table 4 for a summary of the 2017 Standards Determination[5]. Current grazing management is conforming to Guidelines throughout the allotment.

Table 4: 2017 Alvord Allotment Standards Determination

STANDARD	STATUS	CAUSAL FACTORS	COMMENTS
1. Watershed Function - Upland	Achieved	N/A	Proper soil and site stability is occurring in this allotment along with hydrologic function, and biotic integrity. Indicators suggest the sites are generally resistant and resilient to disturbance. Good species diversity is also occurring within each functional group, which is allowing for proper ecological functioning. The upland soils are exhibiting infiltration and appropriate permeability rates, storing available moisture, and showing little to no sign of erosion. Precipitation that

[5] This discussion is about the data found at the time of the 2017 S&G assessment. Some conditions have shown some positive changes since 2017. Current conditions are found in EA Section 3.

STANDARD	STATUS	CAUSAL FACTORS	COMMENTS
			each site is receiving appears to be captured and stored properly. There are no signs of rills, gullies, or water flow patterns. Litter, rock, biological crust (including moss), and vegetation are protecting the soil surface. The upland soils in this allotment are supporting native and desirable nonnative vegetation. The plants observed at each site appear to be generally healthy and vigorous with a suitable level of reproduction occurring as evident by the number of seedlings and young plants. In areas that show some disturbance, there is an increase in annual grasses. In small areas of the allotment annual grasses were found to be occurring in abundance due to past wildfires. Annual grasses are a threat to upland function in the future.
2. Watershed Function - Riparian	Achieved	N/A	Past monitoring has indicated that riparian areas are in Proper Functioning Condition (PFC) or better. Riparian trend photos and Multiple Indicator Monitoring (MIM) monitoring indicated that riparian and stream condition is trending upward with vegetation exhibiting all characteristics (except height) of late seral community types.
3. Ecological Processes	Achieved	N/A	The sites observed were fully capable of energy flow and nutrient cycling. Sites were supporting numerous desirable native plant species that are healthy and vigorous and plant litter was abundant and being accumulated and distributed into the soil. The community structure was healthy and plant composition was good.
4.Water Quality	Not Achieved: Willow Creek, Big Alvord Creek, Cottonwood Creek (below 5,000 feet) Achieved: Mosquito Creek, Cottonwood Creek (upper elevation), Little Alvord Creek, Pike Creek	Geomorphic constraints and limited long-term woody recovery from wildfires.	The seven-day-average maximum temperature of 68ºF in Willow Creek, Big Alvord Creek, or Cottonwood Creek, all identified as having Lahontan cutthroat trout or red band trout, are not currently met per ODEQ standards. Wildfires in 1992, 1994, and 1997 within these creeks are attributed for the lack of a mature age class of shading woody species, and the likely cause of temperature exceedance. Cattle use of riparian woody species has been shown to be minimal, and trend monitoring has indicated an upward trend in vegetation community structure. Data is still being collected.
5. Native, Threatened or Endangered (T&E), and Locally Important Species	Not Achieved: LCT (Willow Creek, Big Alvord Creek, Cottonwood Creek (below 5,000 feet)) Achieved: GRSG and other terrestrial wildlife; LCT (Mosquito Creek, Little Alvord, Pike Creek, Cottonwood Creek (above 5,000 feet))	Geomorphic constraints and limited long-term woody recovery from wildfires.	Water temperature standards are not met for Lahontan cutthroat trout in Willow Creek, Big Alvord Creek, or Cottonwood Creek. The likely cause of this is that wildfires in 1992, 1994, and 1997 have resulted in the loss of shade-providing mature woody riparian species and, therefore, increased water temperatures. Standard 5 for GRSG and other locally important terrestrial wildlife species is achieved within the allotment. However, wildlife habitat is threatened by invasive annual grasses, wildfire, and wild horse populations that have exceeded prescribed management objectives. In addition to habitat damage, wild horses have been observed chasing both big horn sheep and GRSG from water sources within the allotment. Wild horses have also been shown to disrupt breeding activity and reduce GRSG lek attendance when present at lek sites during the breeding season (Coates and Munoz 2019).

This AMP/EA analyzes possible management actions, developed through IDT recommendations, public comments, and in coordination with the livestock permittees, to aid in accomplishing allotment resource objectives and fully achieve all S&Gs. These management actions work to balance all resources, meeting multiple use requirements while conforming to required laws and policies.

1.2 Purpose of and Need for Action

The purpose of the action is to:

- Respond to an external request by the permittee for renewal of a 10-year grazing permit and to implement changes in current grazing practices and related activities;
- Respond to the permittee's request to analyze moving 1,892 suspended AUMs to active use AUMs within the Desert #6 Pasture as agreed upon in the 1967 AMP;
- Improve livestock distribution to spread grazing effects on vegetation more evenly throughout the allotment and reduce catastrophic wildfire risk; and
- Respond to the permittee's request to be allowed the use of the Indian Creek area at a later season of use with specifically allocated AUMs.

The need for the action is:

- The BLM has a responsibility to respond to external requests for renewal of the grazing permits and modification of grazing management related activities; and
- The need to continue to improve grazing management practices and related activities is consistent with the BLM's need to manage livestock grazing in the most ecologically sound manner in conformance with the S&Gs.

1.3 Decision to Be Made

The BLM will decide whether to accept, reject, or accept with modifications the permittee's request to renew the 10-year grazing authorization #3602552 with specific terms and conditions (under which preference may be leased to other permittees), whether to reinstate any or a portion of the suspended AUMs as active use, and whether to adopt and implement the proposed new AMP. In addition, the authorized officer will determine whether or not to construct range improvements within the Alvord Allotment.

1.4 Conformance with Land Use Plans

The proposed action and alternatives are in conformance with the AMU and Steens Mountain CMPA RMPs and RODs, dated August 2005, as amended by the 2015 Oregon GRSG ARMPA/ROD even though they are not specifically provided for, because they are consistent with the RMP/ROD resource objectives and the GRSG ARMPA goals, objectives, and management decisions (MD) identified in Appendix B: Resource Objectives.

1.5 Compliance with Other Laws, Regulations, and Policies

The proposed action has been designed to conform to the following documents that direct and provide the framework for management of BLM-managed lands within Burns District:

- Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), 1918
- Taylor Grazing Act (43 U.S.C. 315), 1934
- National Historic Preservation Act (16 U.S.C. 470 et seq.), 1966
- The National Environmental Policy Act (NEPA) (42 U.S.C. 4320–4347), 1970
- The Wild Free-Roaming Horses and Burros Act (Public Law 92-195), 1971
- Federal Land Policy Management Act (FLPMA) (43 U.S.C. 1701), 1976, as amended
- Public Rangelands Improvement Act (43 U.S.C. 1901), 1978
- ACEC, Manual 1613, 1988
- S&Gs for Public Lands Administered by the BLM in the States of Oregon and Washington, August 12, 1997

- Steens Mountain Cooperative Management and Protection Act of 2000
- Maintenance of Range, Wildlife, and Wild Horse Improvements in Wilderness Study Areas in the Burns District (EA OR-020-05-080), 2005
- Oregon/Washington National Landscape Conservation System 3-year Strategy: Fiscal Years 2013-2015 (September 14, 2012)
- Management of Wilderness Study Areas, Manual 6330, 2012
- Management of Designated Wilderness Areas, Manual 6340, 2012
- U.S. Geological Survey (USGS) Report Conservation Buffer Distance Estimates for GRSG – A Review (Open File Report 2014-1239)
- Integrated Invasive Plant Management for the Burns District Revised EA (DOI-BLM-OR-B000-2011-0041-EA), 2015
- Greater Sage-Grouse Land Use Plan Implementation Guide, 2016
- Washington Office Instruction Memoranda (IM) 2016, 139–145
- Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment, 2015
- Final OR/WA BLM Director's List of Special Status Species, 2019
- State, local, and tribal laws, regulations, and land use plans
- All other Federal laws that are relevant to this document, even if not specifically identified

1.6 Public Involvement

The actions and alternatives proposed in this document have been prepared in consultation with the permittee as described in 43 CFR 4120.2(a). The BLM has also consulted with interested American Indian Tribes, the U.S. Fish and Wildlife Service (USFWS), and the Steens Mountain Advisory Council prior to issuing a decision. In addition, this document was released for a 30-day public comment period, which ended August 25. The BLM received four comment letters from 5 different organizations. All substantive comments have been addressed in EA Appendix H: BLM Response to Comments.

1.7 Identification of Issues

BLM's NEPA Handbook (H-1790-1, 2008) explains that an EA must describe and provide the analysis of environmental effects of the proposed action and each alternative analyzed in detail (40 CFR 1508.9(b)). An issue identified through internal and external scoping must be analyzed if analysis is necessary to:

- Make a reasoned choice among alternatives (if any); or
- Determine the significance of effects.

The issues below were identified during coordination with the allotment permittee and through the Burns District BLM IDT meetings and public comments.

1.7.1 Issues for Analysis

Grazing Management/Rangelands/Vegetation

- How would the number of active use AUMs and/or NR livestock use under the alternatives affect the health and vigor of crested wheatgrass seedings and native vegetation?
- How would the proposed range improvement affect grazing management and vegetation?
- How would the alternatives affect the establishment and spread of annual invasive grasses?
- How would livestock grazing change the characteristics of fine fuels to reduce wildfire spread?

Riparian/Fisheries/Water Quality

- What would the effect of livestock grazing be on riparian areas and T&E fish?
- What would be the effect of range improvements on riparian areas and T&E fish?

Wildlife/GRSG/Migratory Birds

- How would the proposed alternative affect the various GRSG seasonal habitats?
- How would the level of livestock use under the alternatives impact grassland obligate ground-nesting migratory birds?
- How would the proposed alternatives affect big game species that occur in the area?

Socioeconomics

- What are the anticipated costs associated with the implementation of the alternatives?
- What are the economic effects of the alternatives on the local economy?

Visual Resource Management (VRM)

- How would proposed range improvements affect visual resources?

Wilderness/WSA/Lands with Wilderness Characteristics

- How would wilderness characteristics in the wilderness, WSAs, and lands with wilderness characteristics be affected by the proposed changes?

Transportation and Roads

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

1.7.2 Issues Considered but Not Fully Analyzed

The BLM considered several other issues during development of the EA but did not analyze them in detail. For rationale on why these issues were not analyzed in detail see Appendix C - Issues Considered but Not Fully Analyzed.

2 DESCRIPTION OF ALTERNATIVES

This chapter describes possible management actions developed through IDT recommendations, comments from other Federal and State agencies, organizations, and the public, and in coordination with the permittee to meet the purpose and need for action (Section 1) and aid in accomplishing resource objectives (Appendix B – Resource Objectives). Alternatives are developed to balance all resources, meet multiple use requirements, and comply with required laws and policies.

Alternatives A through D are described in this chapter and fully analyzed in Section 3.

- Alternative A: No Action
- Alternative B: Proposed Action - Permit Renewals, Management Changes, and Range Improvements
- Alternative C: Termination of Suspended AUMs
- Alternative D: No Grazing

Following the public review period for this document, a proposed decision may be issued to proceed with any one of the alternatives analyzed or with a combination of portions of multiple alternatives.

2.1 Actions Common to Grazing Alternatives A–C

2.1.1 Goals and Objectives for Alvord Allotment[6]

- *Goal:* Manage the rangelands of the Alvord Allotment for the next 10 years in a manner that promotes native forage species and rangeland health. *Objective:* Increase or maintain current abundance of native forage species such as bottlebrush squirreltail, bluebunch wheatgrass, and needle and thread grass, along with shadscale and

[6] These are goals and objectives that are in addition to goals and objectives already identified in the AMU and Steens Mountain CMPA RMPs and RODs, dated August 2005, as amended by the 2015 Oregon GRSG ARMPA/ROD.

winterfat. *Measure:* Utilization, Pace 180°, and photo monitoring.

- *Goal:* Manage desirable nonnative forage species in a way that promotes sustainability and a long-term forage base. *Objective:* Increase or maintain crested wheatgrass abundance and vigor in the Alvord Seeding. *Measure:* Utilization, Pace 180°, and photo monitoring.

- *Goal:* Maintain utilization levels at 50 percent for native forage species. *Objective:* Adjust the number of AUMs authorized annually in order to stay at or below the 50 percent utilization level. *Measure:* Utilization. During years of low precipitation available forage would be assessed on the Desert #6 Pasture by inspecting established utilization points, and areas in between, that livestock have access to. Available water would also be checked in order to determine where livestock can access forage.

- *Goal:* Maintain WSAs and wilderness characteristics within the Alvord Allotment. *Objective:* Maintain Alvord Desert, East Alvord, Table Mountain, Wildcat Canyon, Winter Range, and High Steens WSAs, as outlined through FLPMA and Manual 6330 Management of Wilderness Study Areas. *Measure:* Site visits, patrol logs, surveillance reports, photographs, and observation. Includes on-the-ground surveillance conducted at a minimum of once per month during months the area is accessible to the public, depending on workload and budget. Surveillance can be initiated more frequently if potential use activities or resource conflicts indicate a need.

- *Goal:* Maintain or improve LCT habitat within the Alvord Allotment. *Objectives*: 1) Utilize monitoring to document the condition and direction of change (trend) of stream habitat and riparian areas. 2) Utilize monitoring to determine whether management practices are effective in maintaining or improving the structure and function of riparian habitat. 3) Change grazing management as needed to achieve management goals on occupied LCT habitat. *Measure*: MIM, PFC, Aquatic AIM (Assessment, Inventory, Monitoring), temperature thermographs, photo monitoring, greenline, streambank alteration, and browse alteration.

2.1.2 Monitoring

Monitoring, by BLM staff[7] in coordination with the permittees, of the success in meeting resource objectives and goals would continue to occur in the allotment, no matter the outcome of the decision associated with this document. All monitoring within the AMU/Steens CMPA follows the direction provided in the AMU Monitoring Plan dated May 4, 2011 (or subsequent plan), and the 2005 AMU/Steens CMPA RMPs, as amended by the 2015 Oregon GRSG ARMPA/ROD.

Grazing management would be monitored following periods of grazing and would include utilization studies for each pasture grazed by livestock, along with use supervision reports and actual use reports. The modified Key Forage Plant Method would be used to measure utilization in each pasture (Utilization Studies and Residual Measurements (TR 1734-3), 1999). The target utilization levels for key forage plant species are no more than 50 percent utilization[8] on key native upland perennial species and 60 percent utilization on desirable nonnative species, such as crested wheatgrass (AMU/Steens CMPA RMPs 2005, p. 54). These utilization limits help to ensure that proper plant cover, litter, and distribution of bare ground are achieved in the uplands to maintain proper watershed function. Utilization limits also ensure that above-ground vegetation of plants is not removed to a detrimental level that would cause long-term ecological damage or decreased plant vigor, and that enough above-ground vegetation remains to meet wildlife habitat requirements. Utilization monitoring is typically performed along a route transect by vehicle, foot, and/or horseback, with utilization being calculated on a pasture average basis. When possible, utilization should be collected prior to livestock turnout to document wild horse use in the Desert Pasture. Upland trend would be monitored approximately every 5-10 years using Pace 180° methodology (Johnson and Sharp, 2012, TR 4400-4, 1985) and permanent photo points to measure the occurrence of key forbs, shrubs, and perennial grass species in order to assess trend in rangeland condition. Soil Surface

[7] 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.
[8] BLM Burns District measures utilization percentage using an ocular method, not a weight method.

Factor (SSF) methodology would be used to measure soil stability and Observed Apparent Trend (OAT) would be assessed at each upland trend plot. Currently, there are 18 upland trend monitoring plots within the Alvord Allotment.

Riparian trend and assessment will be monitored approximately every 5-10 years and methods may include using PFC (USDI 2015), MIM (BLM 2011), Aquatic AIM[9] (BLM 2017), photo monitoring, temperature thermographs (10-year intervals), and greenline monitoring. Water temperature monitoring will be conducted through deploying HOBO temperature probes for two to three years in LCT streams and will continue documenting that parameter for water quality purposes. This will occur on a rotational basis so all streams will be monitored at least once over a six-to-nine-year period, or as time and staffing allow. Additional annual monitoring by the BLM has been implemented in the riparian areas of Pike Creek (from the Pike Creek Trail) when cattle are present on the pasture. Monitoring of the Pike Creek drainage every 2-3 weeks will occur when livestock are in the Pike Creek and proposed Indian Creek pastures, when staff are available, to monitor use in that drainage at locations accessible to livestock and to let the permittee know to remove livestock when observed in the drainage per terms and conditions described in Section 2.3. In addition, the BLM will monitor LCT creeks for browse on willows and streambank alteration in areas accessible to livestock (where slope and vegetation don't limit access) after livestock are removed, dependent upon staff availability. Monitoring of livestock use of riparian vegetation (willows, sedges, and rushes) will be conducted as soon as possible after livestock removal from pastures with LCT streams. For all pastures, the end of season riparian objective is 35 percent riparian shrub (e.g. willow) use or less. Bank alteration transects will be established on LCT streams, in areas accessible to livestock, to document hoof action on streambanks after livestock have been removed, annually, or as staffing allows. For all pastures, the end of season riparian objective is 20 percent streambank alteration or less.

The BLM has completed a Biological Assessment for LCT within the Alvord Allotment (Dec. 1, 2021), working in coordination with the USFWS. The USFWS provided the BLM with a Biological Opinion on March 29, 2022, and the BLM incorporated additional grazing terms and conditions, thresholds, and/or monitoring the USFWS requires. The BLM will continue to conduct any additional compliance, implementation, and effectiveness monitoring that may be required as a condition of consultation with USFWS and identified in any future Biological Opinion or Letter of Concurrence on all three pastures containing streams with LCT (*Oncorhynchus clarki henshawi*). Implementation and effectiveness monitoring will be conducted annually in accordance with USFWS' Biological Opinion, in all LCT pastures where grazing occurs. The BLM will share the results of implementation and effectiveness monitoring with the USFWS annually, submitting monitoring reports (including implementation, effectiveness, and compliance information) for all pastures containing streams with LCT in Alvord Allotment by December 31 each year.

Other monitoring that includes the Alvord Allotment within a larger scale landscape will follow the GRSG Monitoring Framework (GRSG ARMPA, Appendix D, p. D-1). This includes an ongoing Terrestrial AIM project, which was initiated in 2016 within the Burns District in conformance with the monitoring framework. New AIM plots on the district continue to be added annually, and plots established in 2016 were re-monitored in 2021. AIM and Landscape Monitoring Framework (LMF) plots are used to support the findings of the Habitat Assessment Framework (BLM 2015c) reports, when available. AIM and LMF monitoring includes monitoring of many indicators including perennial grass height. There are 15 AIM[10] plots and 42 LMF plots located within the Alvord Allotment[11]. During each allotment visit, monitoring for noxious weed establishment would occur as well as observation of overall rangeland 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 natural resource systems is sometimes uncertain and, in this context, adaptive management affords an opportunity

[9] Aquatic AIM field measurements include pH, specific conductance, water temperature, total nitrogen and phosphorus, stream substrate, pool dimensions, bank stability/cover, stream width/depth, large woody debris, floodplain connectivity, canopy cover, riparian vegetation, and macroinvertebrates. Also included is the greenline component of MIM.
[10] AIM plots follow a random sample design and are not located within key areas. Therefore, an individual AIM plot cannot be extrapolated from in the same manner as a monitoring plot located within a key area.
[11] General habitat suitability determinations were made during the Standards and Guidelines Assessment using all data currently available.

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, 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;[12]
- The previous year's monitoring results, considering weather conditions (temperature and precipitation);
- The current year's forecasted weather conditions;
- Persistent drought causing reduced forage production and/or a lack of available water in areas originally scheduled to be used;
- Occurrence of wildfire; and
- To balance utilization levels.

Rangeland monitoring 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. 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 and occurs within the confines of the grazing permit. 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. General thresholds and responses related to grazing management in this allotment would include those described in Table 5 and would be applied as described in the monitoring section 2.1.2. These thresholds may adjust over time through adaptive management based on short- and long-term monitoring and assessment of objectives.

Table 5: Thresholds and Responses[13]

Activity	Threshold/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 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 was over 50%[14]. If 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 over 60% utilization. If under 60%, consider increasing AUMs (within total permitted AUMs) or authorizing non-renewable grazing.

[12] Currently (as with the previous S&G assessments) livestock is not a causal factor.
[13] 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.
[14] 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 place if for unseen reasons, this does not occur.

Activity	Threshold/Indicators	Response
Browse on Willows in Riparian Areas (LCT Pastures)	35% browse on willows.	For all pastures, the end of season riparian objective is 35 percent shrub use or less. If use is higher, an additional year of rest (two full years) will be required prior to resuming grazing in the pasture.
Streambank Alteration along LCT Creeks	20% streambank alteration.	Bank alteration transects in areas accessible to livestock will be used to document hoof action on streambanks after livestock have been removed, annually, or as staffing allows. If alteration is higher, an additional year of rest (two full years) will be required prior to resuming grazing in the pasture.

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, the unreliability of water sources, and a past record of paying bills on time. Annual grazing would be authorized with a letter of authorization prior to turnout. Accurate records would be kept, and an actual use grazing report would be submitted within 15 days after the authorized use was completed within the allotment, unless other arrangements are made with the BLM. Advanced billing would be allowed 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.

2.1.5 Grazing Preference

The permittee currently authorized under authorization #3602552 would continue to hold all 7,355 AUMs of grazing preference within the Alvord Allotment. The number of AUMs of preference would be adjusted as necessary based on any decision made following this analysis.

2.1.6 Maintenance

Existing reservoirs and waterholes within the Alvord Allotment would be cleaned, in accordance with their ability to currently hold water and to help distribute livestock (if grazing is continued) and wild horses. These would be cleaned and repaired in accordance with the AMU/Steens RMP, as amended, and the Maintenance of Range, Wildlife, and Wild Horse Improvements in Wilderness Study Areas in The Burns District EA (EA OR-05-020-080, 2005) and this document.

2.1.7 Gate Management for Wild Horses

A term and condition of the permit issued under any grazing alternative is gate management for wild horse movement. In the areas of the allotment that lie within a herd management area (HMA), permittees are required to open gates when livestock are not present on either side of the fence. Coordination with adjacent permittees will be required. This allows horses to move freely between water and forage within seasonal habitats.

2.1.8 Utilization Levels

Total utilization by grazing animals (e.g., domestic livestock, wild horses, and wildlife) in all native pastures should not exceed 50 percent of available current year forage in each pasture. In desirable non-native seedings, utilization should not exceed 60 percent of available current year forage.[15]

2.1.9 Desert #6 Pasture Wells

In the Desert #6 Pasture, Pipeline well and/or Ancient Lake well would be turned on to fill the associated troughs, in the absence of livestock, for use by wild horses and wildlife only during drought conditions when other water sources within

[15] Alternative B includes seeding maintenance through grazing, which would allow temporary and occasional use above this level when needed to address residual vegetation and wolf plants. If selected, this would be an authorized exception to utilization levels.

the HMA are limited. The selected well would be turned on periodically to fill the trough and the overflow pond. The water level in these would be maintained by the BLM, in coordination with the permittee, as needed throughout the drought; the well would not continuously pump water or provide water to wild horses when other water sources are available. This would work to encourage wild horses to move throughout their HMA and not rely upon these two wells.

2.2 Alternative A: No Action

The no action alternative would renew the existing livestock grazing permit #3602552 for the Alvord Allotment for 10 years.[16] This would continue the current grazing management and current mandatory terms and conditions as shown below.

Table 6: Alternative A - Proposed Grazing Authorization Mandatory Terms and Conditions

Authorization	Pasture	Livestock Number	Begin Date	End Date	% Public Land (PL)[17]	Active AUMs
3602552	Desert #6	1,254	11/16	2/28	100%	4,328
	Desert #6	1,254	3/01	3/31	100%	1,278
	Alvord Foothills and Table Mountain #4 Pastures	698	4/15	6/14	100%	1,400
	Alvord Seeding	47	11/16	6/29	100%	349
					TOTAL	**7,355**

The grazing permit would be issued with the same terms and conditions as the current permit. Livestock numbers can vary if authorized AUMs are not exceeded. Seasonal fluctuations of livestock numbers may be made to adjust AUM numbers to meet resource objectives. AUM numbers may be reduced in years of low forage availability and low available water resources to remain below the proper utilization level. If monitoring during grazing shows utilization is nearing the target utilization thresholds, the permittee would be required to respond by removing livestock before that threshold is crossed. The Alvord Allotment AMP and incorporated management changes would not be implemented. No range improvements would be constructed under this alternative. Existing range improvements would continue to be maintained following existing policy and existing NEPA. Appendix A: Map 3 – Existing Range Improvements shows current range improvements within the Alvord Allotment.

Currently grazing management varies by pasture as shown in Table 7. Grazing management as currently occurring is described below.

Table 7: Alternative A – No Action General Grazing Rotation Based on Grazing Treatment Descriptions[18]

Pasture	Year One	Year Two
Alvord Seeding #1	Winter-Early	Winter-Early
North Foothills #2	Rest	Early-Graze
South Foothills #3	Early-Graze	Rest
Pike Creek #9[19]	Early-Graze	Rest
Table Mountain #4	Early-Graze	Early-Graze
Desert #6	Winter-Early	Winter-Early

- *Alvord Seeding #1:* Generally, 349 active use AUMs are authorized within this pasture. However, AUMs can vary depending on forage availability and water in this and other pastures.

[16] This permit is attached to grazing preference. Any leased preference would continue to fall under the terms and conditions of this permit.
[17] %PL is calculated on a forage production basis, not on an acre basis.
[18] See Appendix D: Grazing Treatment Descriptions.
[19] Pike Creek #9 Pasture includes the Indian Creek area. Grazing use within this pasture also allows for use within the Indian Creek area and actual use for Pike Creek #9 Pasture may include use in this area.

- *North Foothills #2, South Foothills #3, and Pike Creek #9:* These pastures are currently on a rest rotation schedule. North Foothills #2 Pasture is used by itself every other year and South Foothills #3 Pasture and Pike Creek #9 Pasture are used together in the alternating years. These pastures (North Foothills #2 and South Foothills #3/Pike Creek #9) are generally authorized for 700 active use AUMs during each season of use. The Indian Creek portion of the Pike Creek #9 Pasture would continue to get sporadic use when snowpack is low and the area is accessible early in the year or when a temporary season of use is authorized periodically.

- *Table Mountain #4*: Generally, use within this pasture is limited to 700 active use AUMs. Water is often limiting in this pasture. In years where many waterholes do not hold water, full livestock numbers may be permitted with a shorter season of use or the permittee may haul water to approved locations to increase livestock distribution and ensure the use area around the available water does not exceed the utilization threshold.

- *Desert #6:* Generally, use within this pasture is limited to 5,606 active use AUMs, based on water availability. Years with increased forage production may result in the authorized use of NR forage. NR forage may be authorized if utilization levels after active use are found to be below the 50 percent utilization level, key species are showing vigor, and water is available. When there is more water available, the use area is also larger as livestock are able to spread out from more water sources in a two-mile radius (Ganskopp 2001, Holechek et al. 2011), increasing the areas of available forage and allowing more forage to be utilized without exceeding the utilization threshold.

2.3 Alternative B: Proposed Action – Permit Renewals, Management Changes, and Range Improvements

The proposed action was developed by the BLM IDT in coordination with external requests from the permittee. The proposed action conforms to all Guidelines including providing periodic growing season rest to all areas of the allotment. In addition to AMP components discussed under Section 2.1, management below would be incorporated as part of the new Alvord AMP. While the entire AMP would become a term and condition of the Alvord Allotment grazing permit, only the components that are within the permittee's management ability would be the permittee's responsibility.

2.3.1 Permit Renewal

The proposed action includes renewal of the existing preference based 10-year livestock grazing permit #3602552 in the Alvord Allotment,[20] the extension of permitted season of use, and the reinstatement of suspended AUMs, as well as proposed developments and AMP. Terms and conditions associated with this grazing permit are described below. Mandatory terms and conditions would include*:*

Table 8: Alternative B - Proposed Grazing Authorizations within the Alvord Allotment

Authorization	Pasture	Livestock Number	Begin Date	End Date	% PL	Active AUMs
3602552	Desert #6 – Non-WSA	141	3/1	2/28	99%	1,670[21]
	All	109	3/1	2/28	97%	7,577
					TOTAL	**9,247**

Other terms and conditions would include[22]:

1) The AMP is a term and condition of your permit as provided for in 43 CFR 4120(a)(1–4) (b).

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[20] Any leases of this preference would meet all terms and conditions of this grazing permit and the associated AMP.

[21] These AUMs would be reinstated suspended use and would be available only in the non-WSA portion of the Desert #6 Pasture. The remaining 222 AUMs of suspended use would be assigned to the proposed Indian Creek Pasture. The Indian Creek area is currently part of the Pike Creek #9 Pasture. This area was previously added to the allotment and authorized for grazing, but the associated AUMs were not added to the grazing permit at that time. Assigning those AUMs would correct this oversight. Those AUMs are included in the second row of the permit.

[22] These are verbatim 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.

2) This permit / lease is subject to modification if necessary to achieve compliance with the standards for rangeland health & guidelines for livestock grazing management (43 CFR 4180).

3) Actual livestock numbers may vary dependent on length of annually authorized grazing. AUMs are not allowed to be exceeded.

4) Annual period of use and AUMs (not to exceed the permitted amount) within each pasture can be adjusted for annual grazing, within the bounds of the grazing permit and AMP.

5) Actual use billing is authorized per the AMP. An actual use record will be submitted within 15 days after completion of annually authorized grazing per 4130.3-2(d), unless other arrangements are made with the BLM.

6) Percent public land (%PL) for billing will be dependent on best available estimates of forage production on BLM-managed land compared to that on land controlled by the permittee within each pasture. Pastures will be billed at these %PL under this authorization: Alvord Seeding North #1 – 100%, North Foothills #2 – 70%, South Foothills #3 – 60%, Table Mountain #4 – 100%, Desert #6 – 99%, Pike Creek #9 – 95%, Alvord Seeding South #11 – 99%, and Indian Creek #12 – 100%. If private property within these pastures increases or decreases, or more accurate estimates of forage production becomes available, these values would be recalculated as appropriate, and this term and condition updated.

7) There is a 50 percent utilization (as measured using the Ocular Landscape Appearance/Key Species Method) threshold on upland native key species and a 60 percent utilization threshold on upland desirable nonnative key species. The response of reaching this threshold would be the immediate removal of livestock, even if the number of annually authorized AUMs within the pasture has not been reached. The 60 percent threshold on desirable nonnative species may be exceeded once every five years to allow upland vegetation management through the grazing of wolfy plants to reduce residual dry matter and fuel loading. This use must be authorized by the BLM in advance and be for ecologically based reasons. If utilization thresholds in the uplands are exceeded rest may be required during the next grazing season.

8) No salt or supplements will be permitted within 0.25-mile of a water source or within 1.2 miles of the perimeter of an occupied or pending lek.

9) The permittee is required to maintain all improvements unless there is an agreement in place documenting an improvement as a BLM responsibility. Maintenance activities that involve ground-disturbing activities need to be approved by the BLM prior to beginning work.

10) Active trailing (actively moving with limited grazing) is allowed to occur through rested pastures. Trailing will be documented on actual use forms for each pasture and labelled as trailing.

11) The permittee will coordinate with the BLM to ensure required monitoring outlined in the AMP is completed in a timely manner.

12) Permittee may haul water to portable water troughs in predetermined locations within the pasture to distribute livestock when it is needed to meet management goals and distribute livestock.

13) Any supplements/salt placed in the Indian Creek Pasture will be on the opposite side of the pasture from the Pike Creek Pasture boundary to reduce livestock pressure on the pasture boundary.

14) When grazing the Indian Creek Pasture, livestock must be turned into the southern part of the pasture to minimize livestock pressure on the Pike Creek Pasture boundary.

15) Any livestock authorized in Indian Creek, that cross the pasture boundary into the Pike Creek Pasture and associated riparian area, must be pushed back into Indian Creek Pasture. If livestock are found within the Pike Creek Pasture a second time, livestock within the Indian Creek Pasture will be required to be fully removed within 7 days of notification. Any livestock found in Pike Creek after this would be considered to be in trespass.

16) When livestock start to congregate in any Lahontan Cutthroat Creek (LCT) streams, and observations and/or monitoring suggest use in the riparian area is moderate, the permittee will be notified that livestock must be removed from the pasture. If cattle are not fully removed within 7 days of notice, livestock will be in trespass. If livestock continue to use the riparian area, and utilization exceeds 50 percent in upland areas, the permittee will be required to rest the identified pasture containing the specific LCT stream for an additional year (for a total of two years) before the pasture is grazed again.

17) BLM will follow all USFWS guidance in any Biological Opinion (BO) or Letter of Concurrence, including reductions in season of use, AUMs, and/or complete removal of livestock.

2.3.2 Reinstatement of Suspended Use AUMs to Active Use[23]

Under this alternative, the remaining 1,670 AUMs of suspended use would be reinstated onto the grazing authorization as active use. These AUMs have regularly been used by the permittee in the Desert #6 pasture as NR AUMs. This use would not be available until at least one proposed well (see Section 2.3.3.4 Wells) is in place in T. 33 S., R. 37 E. of the non-WSA portion of the Desert #6 Pasture (see Appendix A Map 2: Land Status and Special Management Areas and Map 5: Alternative B), which would focus these active use AUMs in the interior of the non-WSA portion of the pasture. The BLM and the permittee would work together utilizing other tools such as supplementation or herding to encourage livestock to stay within the non-WSA portion of the allotment. Water developments are a known tool for controlling livestock distribution. Research has found that “[t]he location and number of watering points on grazing lands are important in controlling the movement, distribution and concentration of grazing animals” (Vallentine 2001).

If at least one proposed well is successful in establishing water within the interior of the non-WSA portion[24] of the Desert #6 Pasture, these AUMs would be authorized using a phased in approach, beginning with 500 AUMs in the first year, 1,000 AUMs in the second year, 1,335 AUMs in the third year, and the full 1,670 AUMs in the fourth year. Increases would only occur if monitoring shows the next increase can occur without livestock use in the adjacent WSA increasing above historic levels.

For each increase in AUMs, the BLM would monitor livestock distribution and numbers, through use supervision and/or livestock counts, along with utilization along the WSA boundary, to ensure the number of livestock that are turned out in the non-WSA area are remaining within the non-WSA area. During monitoring, if the number of livestock in the non-WSA portion of the pasture is found to be the same or higher than what was authorized, this would suggest that developments are holding authorized livestock in the non-WSA portion of the pasture and/or pulling more livestock from the WSA portion of the pasture into the non-WSA portion, improving distribution pasture wide. This would ensure no more AUMs are being removed from the WSA portion of the pasture than what historically occurred. If fewer livestock are determined to be in the non-WSA portion of the pasture than what was turned out (i.e. more animals moved into the WSA than out of it), the BLM would require the permittee to remove the number of animals that was assigned to the non-WSA portion of the pasture within two weeks of notification[25]. This monitoring would occur following turnout and at least once mid-grazing season, as staffing allows, until monitoring shows that use within the WSA is not greater than what historically occurred.

[23] Currently, use of suspended AUMs is occurring due to a January 19, 1988, BLM decision authorizing temporary use of suspended AUMs. This would formalize the use and establish terms and conditions.
[24] This would be one of three wells that are found more than 1.5 miles away from WSA in the largest portion of non-WSA managed land.
[25] It is expected that livestock would move both into and out of the WSA portion of the pasture, especially with the developments proposed on the WSA boundary, throughout the grazing season. Livestock moving across the WSA boundary does not automatically mean additional AUMs are being removed from within the WSA, compared to what previously occurred. See EA Section 3.6.

Additional annual utilization in the adjacent WSA area, and along the WSA boundaries, would also occur. If the BLM determines, through monitoring and observation, that utilization levels within the adjacent WSA are higher than what has historically occurred (on average over both wet and drought years), the BLM would not increase AUMs the next year, but would authorize the same number of AUMs in order to continue utilization monitoring of adjacent WSAs. This would occur for at least three consecutive years to account for annual variations. If monitoring is inconclusive, additional years of monitoring would be added prior to making a determination in order to ensure there is no permanent increase in livestock grazing within the WSA. If utilization monitoring continues to suggest that utilization in adjacent WSAs is higher than the historic utilization levels, or it remains inconclusive, AUMs at that rate would not be authorized again. A reduced number of AUMs based on previous monitoring could be allowed. However, full reinstatement of suspended AUMs would not be able to occur unless fencing along the non-WSA boundary is analyzed under separate NEPA, selected in a decision, and built around a portion of the non-WSA. Once that fencing is completed, the BLM could establish a new pasture (Suspended Pasture #13), and the BLM would authorize all of the suspended AUMs within that area. If completion of the fence is delayed due to cost, or if it is cost prohibitive, or not built for other reasons, the AUMs above what the non-WSA portion of the pasture can support, without use in the WSA increasing, would be formally removed from the grazing permit. These removed AUMs may be authorized within the pasture under NR annual authorization (see NR Authorization section).

Utilization within the use areas resulting from available water would continue to be limited to 50 percent even if not all AUMs are utilized.

2.3.3 <u>Livestock Grazing Management</u>

2.3.3.1 New Pasture Establishment

To implement the proposed grazing system in Table 9, Alvord Seeding #1 would be divided into two pastures. The northern portion of the seeding would retain the name *Alvord Seeding #1* and the southern portion of the seeding would be named *Alvord South Seeding #11*. These pastures would be created with the construction of a new fence and the relocation of an existing fence (see Proposed Range Improvements Section).

Currently, the Pike Creek Pasture includes two use areas, the area around Pike Creek itself, including the lower elevations along the East Steens Road and the lower elevations of Indian Creek to the south, and the higher elevation Indian Creek Area which is largely separated from the rest of the pasture due to topography and existing gap fences. In some years, the higher elevation Indian Creek use area of the Pike Creek Pasture is not accessible in spring or early summer due to snow or saturated soil conditions. This action would officially designate the Indian Creek Use Area as the Indian Creek #12 Pasture (2,735 acres), and reducing the Pike Creek Pasture to 2,545 acres. By separating this use area into a designated pasture, it would allow for management that would protect the Pike Creek riparian area by grazing early when upland vegetation is green and palatable in the Pike Creek Pasture, while utilizing the higher elevation proposed Indian Creek Pasture later in the year when it is accessible. Due to the increase in elevation in the proposed Indian Creek Pasture, vegetation in this pasture would be green and palatable later in the year (summer and fall). Existing gap fences and steep topography would continue to create the pasture boundary between the Indian Creek and Pike Creek pastures. In addition, the proposed Indian Creek Pasture has off-creek water available for livestock, which would help keep livestock permitted in the Indian Creek Pasture from trespassing into Pike Creek Pasture (and the associated LCT area). The Indian Creek Pasture would not contain any streams with LCT.

Since no AUMs were added to the grazing permit when the Indian Creek area was incorporated into the allotment, 222 AUMs[26] of suspended use would be reinstated within this area to cover the available AUMs within this pasture and correct the administrative error. The AUMs allocated to the Indian Creek pasture would be reactivated suspended non-use AUMs and not from the 700 AUMs typically used in the Pike Creek and South Foothills pastures.

[26] This number was determined by looking at historic actual use and utilization levels for the identified area.

2.3.3.2 Proposed Grazing System

Livestock grazing management is designed to provide periodic growing season rest for plant species within each pasture. Use periods may vary annually, with the proposed general grazing systems shown in Table 9. Livestock numbers may also vary annually as outlined under "Adaptive Management" (Chapter 2.1. Actions Common to All Grazing Alternatives); however, total permitted AUMs would not exceed those permitted on the allotment. Annual livestock grazing management is based on grazing treatments (i.e., early, graze, and defer; see Appendix D: Grazing Treatment Descriptions) that correspond with general dates. The general grazing treatments in this table are just guidelines as there can be a large variability of climatic conditions from year to year and in different parts of the allotment. This variation results in key forage species entering vegetative states on differing dates, annually. Using grazing treatments instead of specific dates allows for flexibility and adaptive management. Specific annual livestock use dates for the allotment would be determined on an annual basis during permittee meetings and annually authorized in a letter of authorization. Adaptive management may result in the grazing systems being modified, within the terms and conditions of the grazing permits, if periodic growing season rest occurs. Prior to authorizing grazing, monitoring data and current climatic conditions, such as drought, would be taken into consideration. This may result in changes to stocking levels and timing of grazing to best meet 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.

Table 9: **Alternative B – Proposed General Grazing System**

PASTURE	YEAR 1	YEAR 2	YEAR 3
Alvord Seeding #1	Winter-Early-Graze	Winter-Early-Graze	Winter-Early
North Foothills #2	Rest	Early-Graze	N/A (2-Year Rotation)
South Foothills #3	Early-Graze	Rest	N/A (2-Year Rotation)
Table Mountain #4	Early-Graze	Early-Graze	Defer-Winter
Desert #6	Winter-Early-Graze	Winter-Early	Winter-Early-Graze
Pike Creek #9	Early-Graze	Rest	N/A (2-Year Rotation)
Proposed Alvord South Seeding #11	Winter-Early-Graze	Winter-Early	Winter-Early-Graze
Proposed Indian Creek #12	Graze-Defer	Rest	N/A (2-Year Rotation)

The Pike Creek Pasture is at a lower elevation than the proposed Indian Creek Pasture; therefore, proposed grazing rotation in this pasture would be early-graze treatments followed by a complete year of rest. Proposed grazing management would encourage livestock use of the uplands, with green vegetation pulling them away from the riparian areas. The proposed Indian Creek Pasture (upper elevations of the existing Pike Creek Pasture) would be grazed separately from the lower elevations (as was done in 2013, 2016 and 2020) in the same year as the rest of the Pike Creek Pasture. This proposed use in the Indian Creek Pasture would be later in the grazing season due to snow or wet conditions at the higher elevations during the Pike Creek Pasture proposed grazing treatment. Within Indian Creek Pasture 222 AUMs of suspended use would be reinstated within this area to cover the available AUMs within this pasture and correct the administrative error that failed to add these AUMs onto the Alvord Allotment grazing permit when the area was added into the allotment.

The South Foothills Pasture and the Pike Creek Pasture would be used concurrently with approximately 700 AUMs. In alternating years, these AUMs would be used within the North Foothills Pasture, as these pastures would follow a 2-year rest rotation (see Table 9). Use in these pastures would be prior to and during the growing season, when upland vegetation is green and highly palatable, air temperatures are low/moderate, and upland grasses have a high-water content. This would facilitate livestock distribution in the uplands and minimize use in riparian areas.

Grazing within the LCT pastures would be dependent upon livestock utilizing the uplands for the majority of their forage needs and accessing riparian areas for water. The BLM would monitor riparian areas, as staffing allows, to determine if use is occurring in riparian areas accessible to cattle and check use on willows and streambank alteration. Due to the presence of a trail along Pike Creek (not present along the other creeks), increased monitoring (approximately once every two to three weeks) would occur by the BLM, staff availability dependent, within the Pike Creek drainage when livestock are present in the Pike Creek Pasture, and to a lesser extent when in the Indian Creek Pasture[27], to observe livestock use in the Pike Creek drainage. If BLM monitoring begins to see livestock use within the Pike Creek area resulting in increased use on willows and streambank alteration nearing 20% prior to full AUMs being utilized, the permittee would be given an opportunity to actively herd livestock out of the Pike Creek area. If monitoring suggest herding is being effective in limiting livestock use within the Pike Creek drainage, the permittee would be allowed to continue grazing until all permitted AUMs are removed or utilization levels reached, whichever comes first. If herding is found not to be effective, livestock would be removed. Specific grazing terms and conditions would be implemented to manage livestock use in pastures with LCT streams (see Other Terms and Conditions above).

Within the Alvord Seeding #1 and Alvord South Seeding #11, when the BLM determines the desirable non-native plants are becoming wolfy with buildup of residual vegetation accumulating in the crown of the plant, the BLM may authorize additional grazing, during a period when grasses are dormant, to reduce this build up, thus reducing the fuel loading and shading, resulting in healthier and more vigorous plants.

2.3.3.3 Non-Renewable (NR) Authorization

NR AUMs may be authorized on an annual basis if utilization level after active use is found to be below the 50 percent utilization level, key species are showing vigor, and water is available. NR grazing is allowed under 43 CFR 4110.3-1(a) and 4130.6-2. NR grazing would only be available after the permittee utilized all permitted AUMs[28] and would have the following terms and conditions:

- NR grazing would not be authorized in pastures that contain wilderness or LCT, specifically it would not be authorized in the North Foothills #2, South Foothills #3, Pike Creek #9, or proposed Indian Creek #12 pastures. NR grazing could be authorized in any other pastures in the allotment, including WSA areas, as it is a temporary use.

- NR grazing would be allowed when native grasses are dormant, typically from November 15 to March 15 (defer/winter grazing treatment).

- NR grazing would only be authorized following use of all permitted AUMs authorized within that pasture.

- NR grazing would only be authorized up to the appropriate utilization threshold, including permitted use, wild horse use, and wildlife use. Overall use would be limited to 50 percent on natives and 60 percent on desirable non-natives.

- When NR grazing reaches the appropriate utilization threshold, the response would be that livestock would be required to be removed immediately.

- Water hauling and supplementations could be utilized to better distribute livestock to meet management goals. Water can be hauled, and salt placed, to any site that shows disturbance, such as existing water developments, salting locations, and roads as described in the Water Hauling Section 2.3.3.4.

2.3.3.4 Water Hauling

Water hauling would be authorized within the allotment if needed to promote proper livestock distribution and ensure permitted AUMs are available when water in that area is limited. Water could be hauled to existing disturbed areas such as troughs or reservoirs or historic salting locations along roads. Existing water developments are identified in Appendix

[27] While the proposed Indian Creek Pasture is topographically separate from Pike Creek, without the presence of fences, there is potential livestock could find a way down into the Pike Creek Pasture, and therefore, Pike Creek. Increased monitoring would continue when livestock are present in proposed Indian Creek Pasture to ensure trespass livestock have not entered the Pike Creek Pasture and associated riparian area.
[28] A NR grazing authorization is separate from the regular grazing permit as it would allow for use of AUMs that exceed what is permitted.

A: Map 3 – Existing Range Improvements. If any proposed developments are completed, they would also be considered water hauling locations if needed. At these sites, temporary troughs would be placed in the disturbed area to reduce water loss through absorption. Portable water troughs must be temporary in nature and removed at the end of the grazing season. Water hauling would only be authorized in years when drought is limiting water availability and would be used as a tool to improve management of livestock. Any water hauling would be approved before occurring by the BLM, with specific hauling locations identified.

2.3.4 Proposed Range Improvements

2.3.4.1 Fence Construction

Alvord Seeding #1 would be divided using a 1.7-mile-long division fence (Appendix A: Map 5 – Alternative B). The fence would likely be constructed within T. 33 S., R. 34 E., Section 13 and T. 33 S., R. 35 E., Section 8. However, the placement and design would be based off the most suitable location to allow a better distribution of livestock in the northern part of the pasture and the specific location may vary. The proposed fence would not be located in WSA or wilderness and would be located in an area predominantly seeded with crested wheatgrass.

The pasture boundary fence between the proposed Alvord Seeding South #11 and the Desert #6 Pasture would be relocated further south, to follow the Mickey-Alvord Wells Road from private property to the east (T. 33 S., R. 35 E., Section 20, NWNW to T. 33 S., R. 35 E., Section 15, SESW). The fence would then turn to the north, leaving the road for approximately 0.25 miles, then following Sulfur Spring – Mickey Road to the allotment boundary fence (T. 33 S., R. 35 E., Section 15, SESW to T. 33 S, R. 35 E., Section 16, NENE). This new fence would be approximately 7.2 miles long. The 1.05 miles of existing pasture boundary fence would be removed. An additional approximately 1,154 acres of the Desert #6 Pasture would be added to the Alvord Seeding. This fence would not be located within WSA.

2.3.4.2 Seeding Maintenance

Alvord Seeding #1 (including the proposed Alvord South Seeding #11) would be brush beat to remove sagebrush encroaching into the seeding. Brush beating would occur in strips or mosaics, no larger than 25 acres each. Brush beating would occur using heavy equipment, such as a backhoe with rubber tires or a bulldozer with metal tracks pulling a mower. In areas that have become dominated by annual grasses, they would be sprayed with an herbicide. The seeding would be reseeded as necessary utilizing desirable non-native species to compete with annual grasses, meeting site-specific resource objectives of the crested wheatgrass seeding. Seeding would be completed using heavy equipment, such as a backhoe with rubber tires or a bulldozer with metal tracks pulling a rangeland drill. Seeded areas would be rested from grazing for two growing seasons.

Periodically, the 60 percent utilization threshold may be exceeded, no more than once every five years, to allow vegetation management through the grazing of wolfy plants to reduce residual dry matter and fuel loading. Supplementation would be strategically placed in areas with the most wolfy plants to encourage livestock utilization in those areas. By maintaining this seeding and creating a site with abundant forage, livestock would be able to use it in case of a wildfire, if a vegetation treatment takes place somewhere else in the allotment, or to help address resource concerns in other locations. In these situations, this seeding may be used at a higher stocking level to offset the loss of AUMs from those pastures that were affected. This would only be a temporary use and would cease once those affected areas were rehabilitated. This use must be authorized by the BLM in advance and be for ecologically based reasons. Periodic growing season rest would still occur.

2.3.4.3 Development Maintenance

Within the Alvord Seeding #1 and proposed Alvord South Seeding #11 pastures, 1.7 miles of existing, non-functional pipeline would be reconstructed. New pipe would be laid in the same location as the existing pipelines in T. 33 S., R. 35 E., Section 8, SW¼SW¼ to T. 33 S., R. 35 E., Section 18, NE¼SE¼ and in T. 33 S., R. 35 E., Section 8, SW¼SW¼ to

Section 6, SE¼SW¼. This pipe would be laid using heavy equipment such as a backhoe with rubber tires or a bulldozer with metal tracks. Pipelines would be buried 18 inches below ground level, when rocks do not limit trench depth. Soil disturbed during pipe placement would be hand or utility terrain vehicle (UTV) seeded with a desirable non-native species as site potential is low and success with native species would be expected to be minimal.

A 3.1-mile currently non-functioning pipeline in the Desert #6 Pasture would be repaired. This pipeline begins in T. 34 S., R. 36., Section 9, NE¼SE¼ at Pipeline Well and travels south parallel to the Mickey-Alvord Well Loop Road where it ends in T. 34 S., R. 36 E., Section 28 NE¼SW¼, draining into the existing reservoir just inside the WSA boundary (approximately 100 feet located in T. 34 S., R. 36 E., section 28, SWNE), as it did after initial construction. Repairs and restoration would be conducted in the same manner as described above.

In addition to pipelines, all other water developments would be maintained to ensure continued functionality. Machinery, such as dozers or excavators, would be used to clean water developments. These are transported with a truck and lowboy as close to the worksite as they can be then driven cross-country to the actual location to do the work. Maintenance activities would result in surface disturbance at the site; however, this would be no greater than the disturbance caused during the initial construction of the development.

2.3.4.4 Wells

Seven new wells are proposed in the Desert #6 Pasture (Map 5: Alternative B). These wells are located on non-WSA designated land. Two wells are proposed in the northwestern part of the pasture in T. 31 S., R. 35 E., Section 25, SW¼ and T. 31 S., R. 36 E., Section 32, NW¼. Two other wells would be located in non-WSA near the WSA boundary. One of them would be located in T. 33 S., R. 36 E., Section 10, NE¼, just east of the Nowhere Mickey Road. The seventh well would be located in T. 34 S., R. 36 E., Section 5, NW¼. The main purpose of these four wells is to improve overall livestock distribution within the Desert #6 Pasture. These wells, if drilling them results in water[29], would help increase the available use area for all livestock, and would not increase the number of AUMs taken from WSA-managed lands, but would spread where those AUMs are being taken from into currently inaccessible areas with the goal of decreasing use in currently used areas and increasing use in areas currently receiving little to no use. Three of the wells are proposed off the Mickey-Alvord Wells Road in T. 33 S., R. 37 E., Sections 9 (NW¼), 14 (NW¼), and 17 (SE¼). A road would be constructed to the well in section 14 (see Roads Section) to allow access for a drilling rig and maintenance of the development. At least one of these three wells would be required to be functional prior to reinstating any suspended AUMs on the ground. The main purpose of these wells would be to “hold” livestock in the non-WSA portion of the pasture.

Access for well-drilling equipment would use the following roads: Mickey-Alvord Wells Loop Road, Nowhere Mickey Road, Sulfur Springs-Mickey Road, and the Table Mountain Well Road, as well as the proposed road. The only off-road travel would be at the actual well site and would be no more than 500 feet from an existing road. Any materials needed for well drilling would be hauled in with a dump truck and/or trailer.

The well site would consist of an area disturbed during construction of approximately 0.2 acre, within approximately 500 feet of a route. Following seeding/rehabilitation of the disturbed site, the permanent footprint would be no more than 0.01 acre (see rehabilitation seeding project design element (PDE)). Only native species would be seeded at these disturbed sites.

[29] The Alvord Basin is part of the larger tectonic geomorphic Basin and Range province, a region of alternating narrow faulted mountains and flat arid valleys with abrupt elevation changes. This structure, along with lithology, are the principal control on the occurrence and movement of groundwater in Basin and Range aquifers (Robson and Banta, 1995). Faults can act as aquitards, with the fault core creating less permeable zones incapable of transmitting useful quantities of water (Turndage, et.al., 2018), this further isolates the sequences and distinct volcanic strata that undelay the Alvord Basin. In the Alvord Basin this occurs beneath 100 to 275 meters of unconsolidated Pliocene alluvium (Cleary, 1976). This makes predicting groundwater patterns and flows difficult as it is a challenge to find the isolated aquifers beneath the Alvord Basin area.

In general, an 8- to 12-inch-diameter hole would be drilled at the well site to accommodate 6-inch casing (pipe). Casing would be used for the entire depth of the hole unless solid rock was encountered. Pump size would be dependent upon depth of well and location of storage tank (if needed).

Wells would be powered by a generator, or by solar power with the ability to connect a fuel generator as a secondary power source, if needed. A generator would be hauled to the well site on a trailer. Panels for solar energy would be installed using a tractor with an auger. Poles would be concreted in the ground with solar panels mounted upon the poles. Pole height would be as low as possible, while still allowing panels to clear vegetation. Solar panels vary in size from 16 to 40 inches in length by 40 to 70 inches in width. The number of panels needed would depend on the characteristics of each well. Vegetative and topographic screening would be utilized as much as possible to minimize visual disturbance.

The well and power source would be fenced, enclosing the minimum area needed to protect the well and energy source, with a maximum perimeter of 0.1 mile, following the fencing PDE. If a barbed wire fence is not effective at keeping livestock and wild horses from causing damage, metal fence panels may be used.

If well production is low enough that a storage tank is required to store water, it would be at most 8 feet in height by 28 feet in length and hold 10,000 gallons of water. Tank size would be based on water production of the well (a higher producing well would require a smaller storage tank than described above and may eliminate the need completely). The storage tank would be placed aboveground, with perch deterrents, and painted to blend in with the surrounding landscape. The color would be chosen from the BLM Standard Environmental Color Chart and would be approved by BLM prior to painting. Equipment for installation may include an excavator or backhoe and a low-boy truck and trailer to haul the tank.

Proposed wells would primarily be used to distribute livestock and would not regularly be turned on for wild horses.

2.3.4.5 Troughs

Within the Alvord Seeding #1 and proposed Alvord South Seeding #11 two troughs would be installed on the maintained pipeline to replace two existing metal 4x10 troughs at T. 33 S., R. 35 E., Section 18, NE¼SE¼ and T. 33 S., R. 35 E., Section 6, SE¼SW¼. These troughs would be placed outside of the WSA.

Within the Desert #6 Pasture, two new troughs are proposed to be placed on the maintained pipeline. One would be in T 34 S., R. 36 E., Section 15, SWSW. The other proposed trough may be placed at the end of the same pipeline, just outside of WSA in T. 34 S., R. 36 E., Section 28, SWNE. The second trough could be placed at this location to minimize disturbance in the adjacent WSA by ending the pipeline prior to crossing into the WSA and reaching the reservoir, which it historically drained into, in T. 34 S., R. 36 E., Section 28, SWNE. In addition to these troughs, a new trough would be installed at each proposed well location. Troughs would be up to a 30-foot round bottomless trough, though a smaller bottomless trough, a tire trough, or a smaller rectangular galvanized trough may be used. The disturbance for these smaller troughs would always be less than for the 30-foot bottomless trough. Bottomless troughs are circular, with a 4- to 6-inch concrete bottom and a 2- to 4-foot concrete apron to aid in erosion control. The sides of the trough would be 2-feet high and constructed of galvanized metal. A tractor would be used to scrape dirt to level the area for a trough within approximately 30 feet of an existing route. A concrete truck would haul concrete to the site to construct the apron and concrete bottom. The area disturbed during installation of the trough would be approximately 0.2 acre. This trough would also act to store water, and may eliminate the need for a storage tank, though that determination would be dependent on the rate of water produced by the well. The trough would have floats installed to prevent water from overflowing, as well as an overflow pipe to protect the site in the event the float valve is damaged, and water continuously flows into the trough. Bird escape ramps would be installed in all troughs. Water troughs would have coarse rock placed around them to reduce soil compaction by livestock and assist in blending the site with the surrounding area.

2.3.4.6 Roads

A new road would be constructed to the proposed well in T. 33 S., R. 37 E., Section 14 (see Map 5: Alternative B). This road would be approximately 2 miles long and would primarily be constructed by the passage of vehicles. If a portion of this road is too rough to be constructed by vehicle passage, a tractor with a blade would be used to clear rough areas to ensure a well drilling rig could access the site.

The road would have a minimum 12-foot-wide driving surface. There would also be an up to 4-foot-wide berm on either side of the road in areas where a tractor is needed to construct the road, from the material cleared off the road surface. In steep areas, ditches approximately 4 feet wide would need to be built to address any anticipated drainage issues. The maintenance level of this road would be assigned as level 1. According to BLM Manual 9113 Roads (2015b), a maintenance level 1 road is defined as a route where minimum (low intensity) maintenance is required to protect adjacent lands and resource values. Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless route bed drainage is being adversely affected, causing erosion, and route surface and other physical features are not maintained for regular traffic. Maintenance of the road would occur as needed to ensure the road remains passible for vehicles needed to maintenance and operation.

To ensure a net decrease in the total miles of roads within the Alvord Allotment, approximately 5.9 miles of existing roads would be abandoned (see Map 5: Alternative B), and reclamation would occur where needed to allow the roads to ecologically recover, following Instruction Memorandum OR-2011-074, Incorporating Road and Sediment Delivery Best Management Practices into Resource Management Plans. Road closed signs would be placed at the road entrances.

2.3.4.7 General Project Design Elements (PDEs)

PDEs were developed to aid in meeting project goals and objectives. These features are nonexclusive and are subject to modification based on site-specific terrain characteristics (topography and vegetation). All range improvements would follow the PDEs outlined below. The locations of all proposed range improvements are estimated locations. Exact, on-the-ground locations of any proposed range improvements would be determined by those responsible for constructing the proposed developments and may be modified based on clearances. Generally, all range improvements would occur within 0.25 mile of the current proposed location. Changes to proposed locations would be made through coordination between appropriate BLM specialists and the grazing permittee, and approved by the field manager.

- Maintenance on all range improvements and roads would be done to ensure the continued functioning of the improvements. Maintenance activities would be the minimum necessary to ensure continued functionality of the improvement and would not exceed the original disturbance footprint of the improvement.

- Upon affirmative final decision to implement proposed range improvements, and prior to development, Cooperative Range Improvement Agreements (Form 4120-6) between the Alvord Allotment permittee and BLM Burns District would be completed to address each partner's responsibilities for labor, construction, maintenance, and/or supplies.

- The Industrial Fire Precaution Levels would be followed during construction.

- Proposed rangeland improvement sites, including sites of temporary range improvements, would be surveyed for cultural values prior to implementation. Where cultural sites are found, developments would be relocated, and site condition and National Register of Historic Places (NRHP) eligibility would be evaluated. If sites are determined to be NRHP eligible and under threat of damage, mitigation measures to protect cultural materials would be determined. Mitigation plans would be developed in consultation with the Oregon State Historic Preservation Office and the appropriate 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).

- Proposed rangeland improvement sites, including temporary sites, would be surveyed for plant SSS prior to implementation. Plant SSS sites would be avoided.

- Proposed range improvement sites, including temporary sites, would be surveyed for noxious weed populations 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 Integrated Invasive Plant Management for the Burns District Revised EA (DOI-BLM-OR-B000-2011-0041-EA) (2015d), which this document is tiered to, or subsequent decision.

- Proposed range improvement sites, including temporary sites, would be surveyed by a BLM wildlife biologist, as needed, to identify occupied nest sites within the work area prior to construction in order to avoid harm to nests, eggs, and nestlings. Should nests be located on the site, construction would either be delayed until nesting is complete or nest sites would be identified and avoided.

- 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. Wire spacing would be 16 inches, 22 inches, 30 inches, and 42 inches up from the ground, with a smooth bottom wire. As many as two metal stays would be used in each section of fence. Posts would be standard metal posts and solid green in color. Green, brown, or gray steel braces and stretch panels would 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 UTVs would be used in fence construction; off-road travel would occur to haul materials. Anti-strike markers would be used as described under “Required Design Features” from the GRSG ARMPA section. The grazing permittee would be responsible for all fence maintenance.

- To minimize impacts to visual resources, chemical treatment or vinegar would be used to reduce sheen on troughs if needed; non-reflective material would be used for solar panels if available.

- Disturbed areas would be seeded with native, or desirable nonnative species outside of WSAs, where the site is at immediate risk of annual grass invasion to increase the rate of recovery. Seeding would be completed using a UTV to broadcast seed, pulling chains to cover the seed, or by hand with a whirlybird seeder, depending on the size of the disturbed area. Reseeding would occur if monitoring suggested it was not successful. Seeding would occur in the fall or winter.

2.3.4.8 Required Design Features (RDF) from the GRSG ARMPA[30]

- Restrict the construction of fences and tall structures to the minimum number and amount needed (GRSG ARMPA, Appendix 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 (GRSG ARMPA, MD LG 9, p. 2-20). Refer to the model by Bryan 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) (GRSG ARMPA, Appendix 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 (GRSG ARMPA, 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 (GRSG ARMPA, Common to All RDF 12, p. C-2).

[30] These are the most relevant RDFs and BMPs from the GRSG ARMPA, however, all RDF and BMPs that are applicable would be applied, even if not specifically listed here.

- Ensure proposed sagebrush treatments are planned with interdisciplinary input from the BLM or state wildlife agency biologist and promote use by GRSG (GRSG ARMPA, Common to All RDF 13, 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 (GRSG ARMPA, Common to All RDF 19, p. C-3).

- Restore disturbed areas at final reclamation and duplicate roads to the pre-disturbance landforms and desired plant community (GRSG ARMPA, Reclamation RDF 2, p. C-3).

- Use native plant species, locally sourced where available, recognizing that use of nonnative species may be necessary to achieve site-specific management objectives (GRSG ARMPA, Vegetation and Fuels Management RDF 4, p. C-4).

- Do not place salt or mineral supplements within 1.2 miles of the perimeter of an occupied lek (GRSG ARMPA, 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 (GRSG ARMPA, Livestock Grazing RDF 2, p. C-6).

- Locate new or relocate existing livestock water developments within GRSG habitat to maintain or enhance habitat quality (GRSG ARMPA, Livestock Grazing RDF 3, p. C-6).

- Ensure wildlife accessibility to water and install escape ramps in all new and existing water troughs (GRSG ARMPA, Livestock Grazing RDF 6, p. C-7). Ramps would be installed in each trough, including temporary troughs. Escape ramps would be fabricated of metal or may be a pile of rocks in one part of the trough.

- 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 (GRSG ARMPA, Livestock Grazing RDF 7, p. C-7).

2.3.4.9 Best Management Practices (BMP) from the GRSG ARMPA

- Use ecological site descriptions 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 (GRSG ARMPA, 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 (GRSG ARMPA, Post-Fire and Restoration Seeding BMP 3, p. C-9).

- Prefer minimum-till and standard drill seeding to aerial or broadcast seeding, particularly to control invasive annual grasses. Where possible, prefer minimum-till drill seeding to standard drill seeding (GRSG ARMPA, Post-Fire and Restoration Seeding BMP 4, p. C-10).

- Rest seeded and planted areas from grazing by livestock for at least two growing seasons. When possible, exclude seeded or planted areas from wild horses and burros as well. Grazing should not resume until vegetation objectives have been met. Plans must clearly describe the vegetation objectives and how attainment will be measured and determined. (GRSG ARMPA, Post-Fire and Restoration Seeding BMP 12, p. C-10).

2.4 Alternative C: Termination of Suspended AUMs

This alternative proposes to terminate 1,822 AUMs of suspended use in the Alvord Allotment. This suspended use and associated preference would be removed from the grazing permit and would not be reinstated or available for grazing under any circumstances. Total permitted active use AUMs for the allotment would remain at 7,355 AUMs. NR AUMs would not be authorized under this alternative.

Table 10: Alternative C - Proposed Grazing Authorizations within the Alvord Allotment

Authorization	Pasture	Livestock Number	Begin Date	End Date	% Public Land (PL)	Active AUMs
3602552	All	109	3/1	2/28	97%	7,355
					TOTAL	**7,355**

All other terms and conditions, livestock grazing management, and range improvements would be authorized as described under Alternative B: Proposed Action.

2.5 Alternative D: No Grazing

This alternative would result in the 10-year grazing permit not being renewed for this allotment, completely removing all permitted livestock grazing from the Alvord Allotment. The Alvord Allotment and associated 7,355 AUMs of active grazing AUMs and 1,822 suspended use AUMs would be removed from the current livestock grazing permit. Under this alternative, no new range improvements would be constructed unless needed for another resource and analyzed as appropriate to meet NEPA requirements. Existing range improvements within the allotment would only be maintained as needed for other resources, including wild horses, following appropriate NEPA analysis.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

2.6.1 Enclosing the Non-WSA Portion of the Desert #6 Pasture and Reinstating All Suspended AUMs

This alternative includes the construction of a 53-mile fence around the non-WSA section in the middle of the Desert #6 Pasture to ensure the reinstated suspended AUMs are not used within the WSA portion of the pasture. The new fence would be constructed following the southern WSA/non-WSA boundary along the Grassy Ridge Road (on the non-WSA side of the road), starting at where the Dry Basin Road connects into it. The fence would loop around to the Mickey-Alvord Well Road, then it would cut south, starting at the Horse Basin Road, before turning southwest onto the Nowhere-Mickey Road and continue south until this road turns into Desert Well–Mickey Reservoir Road, finally turning west onto Dry Basin Road and following it back to the Mickey-Alvord Well Loop Road. This would result in 61,078 acres of non-WSA land being enclosed to create a new pasture where the reinstated suspended AUMs would be utilized, up to 50 percent utilization. Double gates would be constructed to help facilitate wild horse movement each time the fence crosses a road and every 1.0 mile.

The BLM is not fully analyzing this alternative at this time as they believe the proposed alternative provides other ways to meet the needs without utilizing such a large amount of fencing. However, this alternative may be analyzed in the future if it is determined that a physical barrier would be needed for the reinstatement of suspended use.

2.6.2 Reinstatement of All Suspended AUMs Within both WSA Designated and Non-WSA Designated BLM-managed Lands

The BLM originally believed that the suspended AUMs could be reinstated in the allotment with no limitations, specifically within the Desert #6 Pasture, if sufficient water sources were developed and new fences were built to better utilize available forage.

Under the Federal Land Policy and Management Act of 1976 (FLPMA), the BLM is required to manage WSA so as not to impair the suitability of such areas for preservation as wilderness (Sec. 603. [43 U.S.C. 1782] (c)). Through FLPMA, grazing was allowed to continue in WSAs if the use was in place prior to FLPMA being enacted (1976). At the time FLPMA was enacted, use of 1,822 AUMs had been suspended and was not available as active use. In 2012, BLM Manual 6330 Management of BLM Wilderness Study Areas provided updated policy guidance within WSAs. This manual states "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 preexisting 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…." Therefore, under current law and policy, none of these suspended use AUMs can be reinstated within WSAs.

Due to the presence of WSA designated lands within many of the Alvord Allotment pastures, the BLM cannot reinstate the suspended AUMs in any of these pastures without putting in additional measures to ensure (to the extent possible) that these additional AUMs are only being removed from non-WSA designated lands.[31]

For these reasons, this alternative was removed from further consideration.

2.6.3 Reducing utilization thresholds to promote GRSG Habitat

Reducing livestock utilization thresholds would not meet the purpose and need of this document and would not automatically result in improved GRSG habitat. In the Oregon Greater Sage-grouse Strategy (Hagen 2011, p. 44), Hagen compares GRSG populations in grazed and ungrazed (Hart Mountain National Antelope Refuge) from 1981 to 2010. Hart Mountain Refuge was grazed until 1995, then livestock were removed. The populations have highs and lows at the same time periods throughout the 30-year period, reflecting that something other than grazing is affecting population dynamics. Grazing timing, intensity and duration may have more to do with impacts to GRSG habitat than utilization levels, which are used as an annual indicator for timing of movements between allotments and pastures. In the USFWS 2010 determination that listing of GRSG was warranted but precluded, USFWS determined improperly managed livestock grazing is a threat. However, they noted: "There are data to support both beneficial and detrimental aspects of grazing (Klebenow 1981, p. 122; Beck and Mitchell 2000, p. 993), suggesting that the risk of livestock grazing to GRSG is dependent on-site specific management" (75 FR 13998). The USFWS 2010 finding also stated: "For grazing, the regulatory mechanisms available to the BLM and U.S. Forest Service are adequate to protect sage-grouse habitats..."

Therefore, the BLM does not believe that a reduction in utilization thresholds would provide better maintenance or improvement of GRSG habitat above what one or more of the current alternatives would already provide.

3 AFFECTED ENVIROMENT AND ENVIRONMENTAL EFFECTS

This section 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 Section 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 section is to give enough information for the reader to compare the present with the predicted future conditions resulting from enactment of the activities proposed in each alternative, and for

[31] See Alternative B, which analyzes reinstatement of these AUMs and management and monitoring tools to increase livestock use outside of WSAs and to focus use of these AUMs on non-WSA designated land within the Desert #6 Pasture.

the decision maker to make an informed decision.

This section also details the environmental effects analysis, which identifies the known and predicted effects of the actions proposed in each alternative that are related to the issues identified in Section 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 Alvord Allotment, and adjacent areas, are continued livestock grazing, weed treatments, road maintenance, recreation activities, and wild horse use.

This document is tiered to the Andrews Management Unit/Steens Mountain CMPA Proposed RMP/Final Environmental Impact Statement (FEIS) (Andrews/Steens PRMP/FEIS) (August 2004). The environmental consequences and cumulative effects sections in the Andrews/Steens PRMP/FEIS describe potential environmental consequences to the greater environment of Andrews Management Unit and Steens Mountain and are incorporated into this document by reference.

3.1 Grazing Management/Rangelands/Vegetation/Invasive Annual Grasses

3.1.1 Affected Environment

Grazing management, rangelands, and vegetation, including invasive annual grasses, are very intertwined, with changes in one affecting the others. Due to that, all these resources are being analyzed together.

Disturbances are events that change the vegetation and can be considered natural or human caused. Disturbances can include, but are not limited to, fire, planting desirable non-native species, grazing by wildlife and domesticated animals, drought, outbreaks of pests or disease, and other 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 area, 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 drivers to vegetation change within the allotment historically and more recently (especially on the foothills of the Steens Mountain). Wildfire has occurred within and across allotment and pasture boundaries. Generally, most wildfires have been suppressed by humans since around the homesteading and stockman era (starting in the 1870s) and more seriously since the early 1900s as a way to protect property and forage.

Historical grazing has also been a disturbance in this area and can be linked indirectly to the fire history. A government surveyor named Meldrum surveyed the area on the western base of the Steens Mountain in 1880 and commented on the abundance of good bunchgrass in most of the township (Beckham 1995). 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. At that time grazing management was largely uncontrolled and was used 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 Alvord Allotment. 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. Portions of the current day Alvord Allotment were included in his route as part of the “Steins Mountains” investigation. In his report he describes the current day Steens Mountain as the most “closely pastured” area of the entire trip, meaning the most heavily grazed. This is a summary of his impressions of the uplands: “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.”

Since the 1902 assessment of the area by Griffith when livestock grazing was essentially “first come, first served,” the grazing management on western rangelands, and this allotment, 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 improvements. This system, generically

Photo 1: 1901 Photo of the Steens Mountain, West of the Wilderness Portion of the Alvord Allotment[32]

Fig. 1.—A moderately grazed Native Pasture in Steins Mountains, Oregon.
Stubble of sheep fescue constitutes nearly the entire vegetation in foreground.

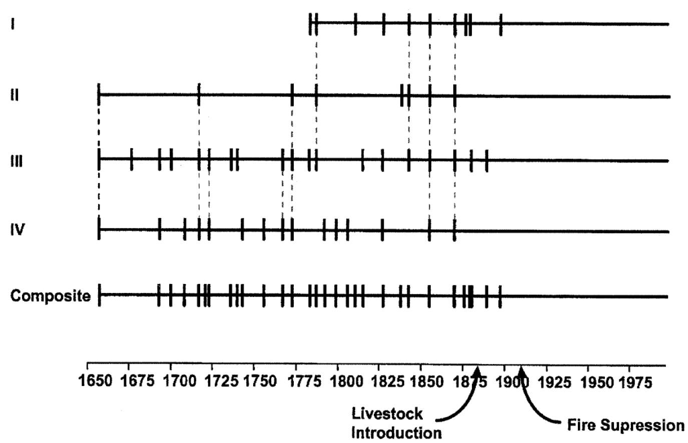
referred to as adjudication, was largely completed in the Burns District by 1965. The Federal Land Policy and Management Act of 1976 and Public Rangelands Improvement Act of 1978 mandated management of public land for multiple-use and sustained yield. Specifically, regulations implementing these acts call for rangeland management strategies that provide for forage for economic use as well as for maintenance or restoration of watershed function, nutrient cycling, water quality, and habitat quality for special status species and native plants and animals. These acts led to the Andrews Grazing Management Program Plan approved April 13, 1984, which defined management objectives and was the first-time modern livestock grazing for proper use[33] of vegetation was formally analyzed and implemented for the Alvord Allotment. The next major development was the implementation of the Standards for Rangeland Health and Guidelines for Grazing Management (Standards and Guidelines or S&Gs), which became part of the BLM livestock grazing regulations. The Standards and Guidelines specific to Oregon/Washington were adopted in 1997. In 2005, the Burns BLM went through the planning process to develop the Andrews/Steens CMPA RMP, which provided direction to include the S&Gs and continued the direction to manage for maintenance or improvement of rangelands.

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 allotments 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 that fueled fires, keeping the western juniper encroachment at a minimum. This period nearly coincided with 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 can also increase sagebrush cover, which creates safe sites in which western juniper saplings are protected and can thrive. At the same time, settlers and stockman suppressed wildfires that would have limited the very fire intolerant young western juniper to rocky outcroppings that would have not burned during a wildfire (see Figure 1) (Miller and Rose 1999). The figure below 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. This pattern was also true for the portions of the Alvord Allotment containing juniper. The main point of including this figure is that the wildfires that would have kept juniper in check all but ceased after 1900. The combined result was the accelerated opportunity for western juniper to

[32] Moderately grazed in 1902 was defined differently than it is in current day.
[33] 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 (August 12, 1997) 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.”

encroach into deeper soiled sites from the "scattering" of western juniper Griffith observed in 1902 to a more continuous stand. Since fire suppression is still commonplace for a number of reasons, western juniper encroachment continues to be a land management issue for overall land health and wildlife. To summarize a complex ecological relationship, 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 disappear, leaving an overstory of western juniper and the soil surface exposed to soil erosion.

Figure 1: Comparison of Livestock Introduction and Fire Suppression as they Relate to Western Juniper Expansion (Miller and Rose 1999). ***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 4 sites. Each vertical line designates a fire occurrence. Dashed lines connect collection sites where fires occurred across 2 or more sites in the same year.***



The other major factor affecting western rangelands, not unique to the Alvord Allotment, is the introduction and presence of non-native annual grasses (herein referred to as invasive annual grasses). The introduction of cheatgrass into the Great Basin and Upper Columbia River Basin has upset the ecological balance. Ecological processes such as energy flow, nutrient and hydrologic cycles, and structure and dynamics, result in fauna and flora having been adversely affected. In addition to the ecological implications associated with cheatgrass invasion, the impact to land uses in the area are also substantial (Pellant 1996). Cheatgrass was found by Knapp (1996) to dominate approximately one-fifth of the potential sagebrush-bunchgrass habitat. Since cheatgrass is present within the plant community, it is at risk for these associated effects of cheatgrass.

Not only is cheatgrass adapting to new environments, it is now being invaded by other noxious weeds (Pellant 1996). In the western United States, big sagebrush steppe communities dominate and comprise the largest vegetation type. However, due to the invasion of exotic plants, fire has become a driving force in the ecology and management of sagebrush steppe communities. The high variability in cover and density of shrubs indicates the complexity of factors influencing recruitment and establishment of sagebrush from both natural populations and from artificial seeding (Lysne and Pellant 2004).

Invasive annual grasses have been present in the allotment 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 *Bromus tectorum*, more commonly known as cheatgrass. 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. The biotic communities most at risk to the impacts of the "cheatgrass-wildfire cycle" are the Wyoming big sagebrush and more mesic salt desert shrub plant communities (Peters and Bunting 1994; Pellant 1990). These communities exist within the Alvord Allotment.

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. 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 discussion).

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 fires, especially on the foothills of the Steens in the western portion of the allotment. Medusahead rye (*Taeniatherum caput-medusae*) is a more recent invader to the Alvord Allotment. Medusahead is another invasive annual grass and noxious weed and is one of the more troublesome species plaguing the Burns District. In areas with heavy clay soils, medusahead can and will outcompete mid- and late seral species, as well as competitive introduced species such as crested wheatgrass. The area near Pike Creek where the medusahead infestation is found in this allotment has the potential to expand rapidly and infest many more acres of both private and BLM lands. Aerial treatments were conducted in 2017 to treat this area and monitoring of the treatment site is ongoing. Management actions that encourage mid- to late seral vegetation, good to excellent condition rangeland, and vigor and productivity in those species would be helpful in occupying niches and slowing down potential movement of medusahead into those areas. Exactly how and when the medusahead rye started in the Alvord Allotment is unknown. It has been well established that medusahead rye 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," 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 that animals (including wildlife and livestock) transport seeds. The main roads in the allotment are native surface (soil) roads and are frequented by recreationalists during multiple seasons including wet periods where soil and medusahead rye seed mix and stick to vehicles, then drop off the vehicle in other locations. In a 2013 study that included a study location near Diamond, Oregon, Davies and others 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. Furthermore, the Alvord Allotment area has frequent whirlwinds that travel up and down 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).

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 to manage to retain or increase large deep-rooted perennial bunchgrasses and reduce fuels that could spread fire 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 tall tussock perennial grass (deep-rooted perennial grasses) was the best barrier to medusahead rye 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 rye appears to invade areas that were dominated by annuals (such as cheatgrass). Crested wheatgrass is one of the few species that can outcompete undesirable annuals such as cheatgrass (Arredondo et al. 1998) and, as a tall tussock 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 invasion (Davies and Bates 2010b, Davies et al. 2015, Davies et al. 2016). Therefore, managing for the health and vigor of existing crested wheatgrass and to maintain or improve a vigorous native, deep-rooted perennial bunchgrass population (Johnson and Davies 2012) outside of seedings, within the Alvord Allotment, would be the most effective way to manage against cheatgrass establishment and spread.

Moderate spring utilization on crested wheatgrass by livestock has been shown to maintain or increase its productivity. Moderate winter livestock use on crested wheatgrass found no difference in annual grass biomass between grazed and ungrazed areas (Davies et al. 2017). 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 and Johnson 2015). Studies have shown that while grazing does affect vegetation, the removal of grazing may not result in an increase in total herbaceous standing crop. West et al. (1984) found there was no increase in standing herbaceous crop after 13 years of rest from livestock grazing, and that there was actually a decrease for many perennial grass species. He also found that cheatgrass increased in the area (West et al. 1984). Davies et al. (2011) also determined removal of livestock grazing would not conserve the sagebrush ecosystem and that to protect the sagebrush ecosystem other factors such as fire and conifer encroachment need to be addressed as well. Manier and Hobbs (2006) found grazing exclusion resulted in a reduction on both cover and frequency of forbs, with no substantial effects on cover or frequency of grasses, biological crusts, or bare ground. They also found that areas excluded from grazing had more shrub cover (Manier and Hobbs 2006). Forty years of grazing exclusion also seemed to have little effect on plant diversity (Manier and Hobbs 2006). Daddy et al. (1988) found areas protected from grazing had vigorous sagebrush while heavily grazed sites had a large amount of decadent sagebrush with numerous seedlings in the interspaces suggesting that livestock exclusion may accelerate woody plant growth. In Davies et al. (2020), they found that “cattle use did not negatively impact planted sagebrush seedlings and favored their growth and reproductive effort” over 5 years, and they expect the larger seedlings used in their study played a role in the dissimilar results with other studies that did find impacts. However, they found total herbaceous cover and the amount of above-ground biomass were greater on a moderately grazed site than on heavily grazed sites and areas with no grazing for 21 years (Daddy et al. 1988). Courtois et al. (2004) found greater plant densities outside of grazing exclosures and suggested this might be the result of increased seed dispersal and seed-soil contact resulting from grazing. In addition, they found exclusion of grazing did not conclusively increase species richness, and species richness was generally greater under grazing treatments (Courtois et al. 2004). The limited changes in vegetation characteristics between moderately grazed sites and those excluded from grazing for 65 years suggest recovery rates [from heavy utilization] have been similar under both treatments (Courtois et al. 2004). Daddy et al. (1988) found evapotranspiration loss was greatest at the heavily grazed and not grazed sites, and there was a lack of soil water recharge at the heavily grazed site, which was likely due to poorer infiltration and increased surface evaporation at the heavily grazed site compared to the moderately grazed and not grazed sites. Research suggests if the site has not crossed an ecological threshold, into a different steady state, the site can be returned to good ecological condition under both grazing exclusion and light to moderate grazing (Miller et al. 1994). Research also suggests that once a community has entered a new steady state, the removal of livestock is not expected to return the system to the good ecological condition it was previously in (Miller et al. 1994). Svejcar and Tausch (1991) found substantial disturbance does not need to occur in order for annual grasses to establish and dominate an area, and therefore, the absence of the same disturbance would not necessarily favor a return of the system to its previous, native species dominated condition. Another study found cheatgrass was higher in two areas excluded from livestock grazing than in the grazed areas and 65 years of grazing exclusion did not prevent cheatgrass invasion on the sites (Courtois et al. 2004). Research shows managers should not assume reduction or removal of grazing would result in the successional pathway being reversed and that the site would return to a pre-disturbance community (Archer and Smeins 1991). The effects of grazing on vegetation composition and productivity can be minor when compared to changes resulting from variation in precipitation patterns, and it can be difficult to separate if it is grazing or precipitation that is the main driving force of community changes in the short-term (Archer and Smeins 1991). 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). In 2021(b), Davies et al. found additional “strong evidence that moderate livestock grazing before fire can determine postfire plant community dynamics in fire-prone Artemisia communities at risk of exotic annual grass invasion.” Schmelzer et al. (2014) also found that “prescribed fall grazing can reduce cheatgrass fuel loads in the Great Basin.” Diamond et al. 2009 found that while fire spread in areas grazed, islands of unburned vegetation remained; these islands are important for the recovery of systems after fire. In moderately grazed areas, shrub density was found to be four times greater than in the ungrazed areas in the first growing season following fire, “providing strong evidence that fire-induced mortality was substantially greater in ungrazed areas” (Davies et al. 2021b). They found that “dormant-season moderate pre-fire grazing helped maintain perennial vegetation dominance in sagebrush communities at risk of conversion to exotic annual grasslands. In contrast, in ungrazed areas, exotic annual grasses increased substantially post fire” because “greater reductions in dominant perennial vegetation after fire in ungrazed areas likely increased resources for B. tectorum; hence, its biomass was approximately twice as great in ungrazed compared with grazed areas” (Davies et al. 2021b).

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). Hempy-Mayer (2008) also found that "clipping to 7.6 cm (3 inches) in a cheatgrass-dominated area is not always adequate" for reducing a cheatgrass seedbank in preparation for restoration seeding, but that their "results are consistent with observational studies examining cheatgrass phenology and the use of prescribed grazing that generally recommend defoliating cheatgrass before its seed enters the soft ''dough'' stage to avoid viable seed production (Mosley 1996). Therefore, grazing treatments that defoliate cheatgrass multiple times before seed maturity begins at the P[urple] stage have the greatest potential for reducing cheatgrass populations." 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 the 2020 Perryman and others work that shows that fall grazing treatments may reduce the cheatgrass seed bank. Davies et al. (2021a) found that "fall-winter grazing by cattle in exotic annual grass invaded rangelands altered the plant community. Most notably, grazing decreased annual vegetation, primarily exotic species, and increased Sandberg bluegrass. In contrast, other native vegetation did not increase with fall-winter grazing. Fall-winter grazing provided some desired changes in exotic annual grass‒invaded rangeland. 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." Perennial species tend to be slow growing and recruit sporadically (Davies et al. 2021a). Davies et al. 2016 concluded that "vegetation characteristics were similar between the winter-grazed and ungrazed treatments. The few differences detected were not indicative of a negative impact or an artifact of a pretreatment difference. This suggests that Wyoming big sagebrush plant communities with minimal cheatgrass and an understory dominated by perennial bunchgrasses are resilient to repeated winter grazing applied at levels similar to those employed in this study" which were between 40 and 60 percent utilization. Future grazing treatment timing may be leveraged to reduce the cheatgrass seedbank further, though it is not likely to eliminate them from the community. The exact impact of repeated fall grazing in cheatgrass dominated sites is still being researched.

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 in good years produced more herbage production than native or introduced bunchgrasses (Hull and Pechanec 1947, Young and Allen 1997). In 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 communities 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 rye (George 1992). Medusahead rye litter has a slow decomposition rate, allowing it to accumulate over time and suppress desirable plants (Bovey et al. 1961, Harris 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).

Regardless of the decision on the Alvord AMP, 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 EA and Decision Record.

The forage base for livestock in the Alvord Allotment is predominantly cool season perennial bunchgrasses. Livestock also utilize desert salt shrub such as shadscale and winterfat in a few locations throughout the Desert #6 Pasture. 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.

Table Mountain #4 Pasture is in a late seral stage with a healthy to slightly decadent plant community of predominately *Pseudoroegneria spicatum* (bluebunch wheatgrass, former scientific name *Agropyron spicatum*) and *Artemisia tridentata* ssp. *Wyomingensis* (Wyoming big sagebrush). There is an abundant amount of fine fuel located across this pasture due to the late seral stage that it is presently in and because of the absence of natural disturbance and the inability for livestock to remove decadent grass material through grazing (which can reduce fine fuel load and stimulate new plant growth).

The Desert #6 Pasture is at the northern end of the salt desert shrub range. It has many of the plant communities that are representative of this type of rangeland. Several different varieties of *Artemisia* (sagebrush) make up the dominate shrub component followed by *Atriplex confertifolia* (shadscale saltbush). The dominate grass type is *Elymus elymoides* (bottlebrush squirreltail); *Achnatherum hymenoides* (Indian ricegrass) and *Hesperostipa comata* (needle-and-thread grass) are the sub-dominate grass species. This pasture has many other types of native shrubs and grass varieties making it a unique and different landscape.

The pastures on the foothills of the Steens consist of native bunchgrasses such as *Elymus elymoides* (bottlebrush squirreltail), *Poa pratensis* (Kentucky bluegrass), *Festuca idahoensis* (Idaho fescue) and, to a lesser degree, *Stipa thurberiana* (Thurber's needlegrass, former scientific name *Achnatherum thurberianum)* in the ridges and slopes of the uplands. The lowlands, which are predominately private with BLM-managed rangeland mixed in, consist of a heavy shrub component containing multiple varieties of *Artemisia tridentata* (big sagebrush) with an understory of *Bromus tectorum* (cheatgrass, also known as downy brome) an annual invasive grass, and to a lesser degree *Elymus elymoides*. There are also documented areas of *Taeniatherum caput-medusae* (medusahead) scattered across the foothills.

Alvord Seeding #1 is an existing crested wheatgrass seeding that was established in October 1956; it is one of the oldest crested wheatgrass seeding projects on the district. When it was first developed, all vegetation was removed and it was taken down to bare soil with a rangeland plow. It was then reseeded with crested wheatgrass. For many decades it was a solid stand of *Agropyron cristatum* (crested wheatgrass), but *Artemisia tridentata* (big sagebrush species) has slowly grown back and taken over the pasture. It has had seeding maintenance completed on it three times to reduce the amount of big sagebrush, the last time being in 2011. *Agropyron cristatum* (crested wheatgrass) is the predominant grass in this pasture.

In addition to the perennial grass fine fuels within the allotment, cheatgrass and medusahead rye are adding to the fine fuel loading. Large wildfires (100,000 acres and larger) in the past decade in Harney County and Southeast Oregon (Miller Homestead 2012, Holloway 2012, and Buzzard 2014) have been where this situation has played out in native range and crested wheatgrass seedings. These large wildfires have created an awareness amongst the local community to encourage BLM to manage for fine fuels. These large wildfires burned similar vegetation to that in the Alvord Allotment and ultimately consumed over 1,000,000 acres of southeast Oregon rangelands and GRSG habitat as of 2019. Because of the interest by the public and other management considerations, such as the threat to GRSG habitat by wildfires, studies have been conducted that look at the way livestock influence fuel characteristics in the Great Basin (Davies et al. 2015; Davies et al. 2016, Davies et al. 2017). Two studies looked at the season of use of livestock grazing and its influence on fuel characteristics; one study focused on spring and fall use, the other winter use. 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. The winter study looked at using livestock as a fuel treatment to reduce the likelihood of fire spread and fire severity. Wildfire season is variable from year to year but, in general, for this area it is from mid-June through the end of August. The main finding of the grazing studies was that grazing in any season[34] 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

[34] The studies defined grazing seasons as: Spring (May–June), Fall (September), and Winter (November–early April).

does; 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 new and old material when it is mixed in 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 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 project area with similar livestock utilization levels as proposed; 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 11. 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 Alvord Allotment as in the grazing studies.

Table 11: Comparison of Fuel Characteristics by Grazing Season (Davies et al. 2015 and 2017)

HERBACEOUS (GRASS) FUEL CHARACTERISTICS	SPRING (MAY-JUNE)	FALL (SEPTEMBER)	WINTER (NOVEMBER-APRIL)
	CATTLE UTILIZATION 40–50%		CATTLE 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

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. 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 litter accumulation of perennial bunchgrasses, resulting 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). 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.

Bradley et al. (2018), in a look at the Intermountain West including the Alvord Allotment area, 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.

Uniform utilization and distribution across a pasture is an unreasonable expectation since that would require grazing animals to have access to all forage and to be forced to utilize both palatable[35] and unpalatable species, with no consideration for topography (including slope), cover, or water factors that would limit use (Coughenour 1991). Livestock tend to search for and use areas that have positive attributes, including abundant high-quality forage and water, and avoid areas with negative elements such as poisonous plants, pests, or limited resources (Launchbaugh and Howery 2005, Vavra 2005, Bailey et al. 1996). Roughness, steep topography, down timber, dense vegetation, weather, pests, and vegetation are a few of the other factors that can influence the distance livestock will travel for forage from water sources (George et al. 2007, Holechek et al. 2004, Stuth 1991, Cook 1966). All these factors are interrelated and play a role in feeding site selection, distribution, and utilization, which result in some degree of patchiness even when resources such as water are not limiting (Vavra 2005). Bailey (1999) found cows that had calves were less likely to graze steeper slopes and tended to stay closer to water. The amount of slope has influence on past and present land management within the allotment. 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 this allotment, the elevation is highest (7,500 feet) in the southwestern corner of the allotment and on the western edge of the allotment where it is on the slopes of the Steens Mountain. From there, elevation decreases to approximately 4,000 feet before it increases in the eastern side of the allotment, up to 6,100 feet in the northeastern corner of the allotment. Slopes in the allotment range from over 60 percent in the portion of the allotment on the Steens Mountain, especially in the current Pike Creek #9 Pasture. The entire western portion of the allotment located on the foothills of the Steens Mountain is dominated by slopes over 20 percent, with more gradual slopes of 4-12 percent occurring on the private property. The eastern portion of the allotment is dominated by slopes between 0-12 percent in the Desert #6 Pasture, the exception being a ridge that runs north-south with slopes up to 60 percent. In the Table Mountain #4 Pasture, slopes range from 4 percent (in the western portion) up to 60 percent (in the eastern portion). 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 (Ganskopp and Vavra 1987, Mueggler 1965). These results were similar to those obtained by Pinehak and others (1991) who discovered cattle preferred slopes of less than 4 percent and found over 90 percent of total use occurred on slopes of less than 7 percent. Forage on steeper slopes, over 60 percent, has been shown to receive little to no use by cattle (Holecheck 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” (Ganskopp and Vavra 1987, Mueggler 1965, Holecheck 1988). 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.

Water is an important tool in managing livestock. Holechek and others (2004) 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 across pastures. Heitschmidt and 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.

Currently within the Alvord Allotment there are 14 wells: 1 in the Alvord Seeding #1 that functions, 2 on Table Mountain #4 Pasture that are nonfunctioning, and 11 on the Desert #6 Pasture (5 are currently functioning, 3 of which have been upgraded by the BLM to solar powered, and other wells which are no longer used due to proximity to the ACEC) and 1

[35] Palatability is the preference an animal has for a particular plant when offered a choice.

natural artesian well. There are also four developed natural springs on the allotment: one in the proposed Indian Creek Pasture and two in the Desert #6 Pasture; one spring development is located in Table Mountain Pasture but is currently not functioning. Table Mountain #4 has approximately 26 reservoirs located throughout it and the Desert #6 Pasture has 65 reservoirs along with a dozen or so dugouts. Reservoirs range from non-functional to seasonal, with few reservoirs providing water late into the season and during the winter.

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. 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.[36] The effects of livestock grazing on western rangelands can differ substantially by variation in these factors (Davies et al. 2014, Rice and Westoby 1978, West et al. 1984, Eckert and Spencer 1986, Eckert and Spencer 1987, Courtois et al. 2004, Manier and Hobbs 2006). 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.

Livestock grazing timing, or season of use (see Appendix D: Grazing Treatment Descriptions), affects vegetation because of the removal of biomass by cattle at different growth stages of the plant. 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. For this discussion short-term effects are limited to one growing season and perennial bunchgrasses are considered to be native. Introduced bunchgrasses, in this case crested wheatgrass, are discussed later in this section. 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 the following concepts in more detail. There are five general grazing treatments: early, graze, defer, winter, and rest. In many cases, defer and winter grazing are used interchangeably.

An early treatment 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. A graze treatment is during the critical growth period of perennial bunchgrasses. 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 1984, Caldwell et al. 1987, Harnett 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 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 and (Vavra et al. 2014) is easier (soft) 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

[36] 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 management.

fall precipitation, invasive annual grasses soften and are effectively available again for grazing (Hull and Pehanac 1947). Therefore, livestock grazing prescriptions on invasive annual grasses are discussed and often targeted for early, early within graze, later within fall, and winter seasons of use. A defer treatment is generally after the perennial bunchgrasses have matured and set seed. Deferment allows plants to complete their lifecycle without stress from livestock grazing (defoliation) and allows plants to maintain leaf and basal area and production potential and to periodically reproduce (Hyder and Sawyer 1951, Ratliff et al. 1972, Holechek et al. 1998). 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), often there is 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 would more readily consume the current and past year's dried biomass. As nutrition in all grasses decreases, livestock are also more inclined to get more nutrients from available shrubs such as bitterbrush (*Purshia tridentata*), shadscale saltbush (*Atriplex confertifolia),* and Four wing saltbush (*Atriplex canescens*), among others. Winter treatments are similar to deferred use, however, during this treatment all the plants have fully senesced and are in fully dormant phase, so grazing has an even smaller effect on the vegetation across the landscape. The dormant period is the least critical period for forage removal (Holechek et al. 1998) 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 2014). However, heavy to severe grazing (over BLM utilization thresholds), even during dormancy, can have detrimental effects on plants and future forage production (Holechek et al. 1998). 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 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" 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. To summarize, when the 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). As a result, it is expected that appropriate moderate grazing levels should maintain perennial vegetation production and future livestock forage. How moderate grazing affects invasive annual grass and fuel characteristics also relates to maintenance of desirable perennial vegetation.

Livestock grazing intensity, or utilization level (presented in percentages), affects how much of the vegetation foliage is removed. Burns District utilization protocol is currently classified as the following: no use (0-5 percent) slight (6-20 percent), light (21-40 percent), moderate (41-60 percent), heavy (61-80 percent), and severe (81-100 percent) (Landscape Appearance Protocol from Interagency Technical Reference 1734-3, revised 1999, p. 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. France et al. (2008) found with utilization up to 40 percent, perennial grass plants in the interspaces between sagebrush plants were utilized and grass plants beneath the drip line of sagebrush were not utilized. After 40 percent utilization, use increased on plants under the drip line of sagebrush but was less than expected as utilization increased into the heavy to extreme category. Visual obstruction observations decreased by 5 percent with utilization increasing from 40 to 75 percent in the interspaces. Spreading canopy sagebrush such as Wyoming big sagebrush, which GRSG would be more likely to nest under, with branches closer to the ground decreases livestock grazing of under canopy grasses. Timing of grazing, grazing system and utilization levels make a difference in rangeland production. Winter and spring grazing when native plants are dormant, allows livestock to remove dead material which if left ungrazed, may increase the probability that if fire occurs, plants would suffer mortality from increased heat from accumulated dead matter in the crown (Davies et al. 2018). By early spring grazing when invasive annual grasses are greening up before perennial bunchgrasses start growth, livestock would target greener annual grasses which helps reduce growth and seed production of invasive annuals and allows perennial bunchgrasses to access available soil moisture that annuals may have used during their earlier growth. Long-term moderate grazing (30-45 percent) has minimal effects to the structure of native bunchgrasses (Davies et al. 2018). Davies et al. (2016) also found that moderate pre-fire winter grazing reduced maximum temperatures and duration of elevated temperatures (heat loading) at the meristematic crown of perennial bunchgrasses during a fire due to decreased accumulated fuel load.

Within the Alvord Allotment crested wheatgrass is only dominant in the Alvord Seeding #1. As an introduced nonnative species, crested wheatgrass (*Agropyron cristatum* (or in the past 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 in 1967 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, 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 vigor[37] 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. Another measure of health and vigor is evidence of reproduction; crested wheatgrass reproduces vegetatively (tillering) and by seed.

The response of the crested wheatgrass seedings 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 (Laycock and Conrad 1981, Frischknect and Harris 1968). Fall use of cool season grasses (such as crested wheatgrass) 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 and Bohnert 2004). Wolf plants are those that have multi-year accumulation of standing dead biomass within the "bunches." 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

[37] 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. (Society for Range Management. 1998. Glossary of terms used in range management, fourth edition.)

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 taking over the area.

Landscape position including elevation, aspect, and slope paired with underlying geology (what materials exist that break down to create mineral soil) and expected precipitation drive 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. Here is a hybrid approach that combines a discussion of threat-based management[38] to supply the broad overview at the allotment (management) scale, and a discussion of ecological sites as they apply. 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 complementary rather than competing. The Alvord Allotment consists of 18 different ecological sites, which are shown in Table 12.

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 ecological sites 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, threat-based management being more general in nature and disturbance response groups 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 assessment and management priorities. The process involves six main steps, which are detailed in the Manager's Guide and are considered through the allotment management plan process. Functional groups of vegetation within the Alvord Allotment are large perennial bunchgrass (examples are Idaho fescue, bluebunch wheatgrass, Thurber's needlegrass, squirreltail, and crested wheatgrass), small perennial bunchgrass (Sandberg's bluegrass), invasive annual grass (cheatgrass, medusahead rye), annual forbs, perennial forbs, sagebrush and other shrubs, and, conifers (western juniper).

Table 12: Ecological Site Descriptions for Alvord Allotment

Ecological Site Reference	Site Name	Vegetation Community
R023XY212OR	LOAMY 10–12 PZ	*Artemisia tridentata* ssp. *wyomingensis/Achnatherum thurberianum-Pseudoroegneria spicata* ssp. *spicata*
R023XY214OR	CLAYPAN 10–12 PZ	*Artemisia arbuscula/Pseudoroegneria spicata*
R023XY216OR	CLAYPAN 12–16 PZ	*Artemisia arbuscula* ssp. *arbuscula/Festuca idahoensis-Pseudoroegneria spicata* ssp. *spicata*
R023XY218OR	THIN SURFACE CLAYPAN 10–16 PZ	*Artemisia arbuscula/ Poa secunda/Achnatherum thurberianum /Elymus elymoides*
R023XY220OR	CLAYEY 10–12 PZ	*Artemisia tridentata* ssp. *wyomingensis/Pseudoroegneria spicata*
R023XY300OR	SOUTH SLOPES 10–12 PZ	*Artemisia tridentata* ssp. *wyomingensis/Pseudoroegneria spicata* ssp. *spicata-Achnatherum thurberianum*
R023XY501OR	SHALLOW LOAM 16–25 PZ	*Artemisia tridentata* ssp. *Vaseyana/ Festuca idahoensis/ Festuca idahoensis*
R024XY001OR	SODIC FLAT	*Sarcobatus vermiculatus/Distichlis spicata*
R024XY002OR	SODIC MEADOW 6–10 PZ	*Sporobolus airoides-Distichlis spicata*

[38] For more detailed discussion of Threat Based Management, a review of Threat Based Management in the Northern Great Basin: A Manager's Guide PNW 722 September 2019 (Johnson et al. 2019) is recommended.

Ecological Site Reference	Site Name	Vegetation Community
R024XY005OR	SODIC DUNES	*Artemisia tridentata* ssp. *tridentata-Sarcobatus vermiculatus/Leymus cinereus-Achnatherum hymenoides*
R024XY012OR	SANDY 6–10 PZ	*Atriplex canescens-Artemisia tridentata* ssp. *tridentata/Hesperostipa comata-Achnatherum hymenoides*
R024XY015OR	LOAM 6–10 PZ	*Atriplex confertifolia-Picrothamnus desertorum/Elymus elymoides*
R024XY016OR	LOAMY 8–10 PZ	*Artemisia tridentata* var. *wyomingensis/Achnatherum thurberianum-Pseudoroegneria spicata* ssp. *spicata*
R024XY017OR	SHALLOW LOAM 8–10 PZ	*Artemisia tridentata* ssp. *wyomingensis/Achnatherum thurberianum-Achnatherum hymenoides*
R024XY018OR	SANDY LOAM 8–10 PZ	*Artemisia tridentata ssp. wyomingensis/Hesperostipa comata-Achnatherum hymenoides*
R024XY021OR	THIN SURFACE 8–14 PZ	*Artemisia nova/Elymus elymoides-Poa secunda*
R024XY030OR	LOAMY SLOPES 6–10 PZ	*Artemisia tridentata* ssp. *wyomingensis-Grayia spinosa/Achnatherum hymenoides-Achnatherum thurberianum*
R024XY031OR	DROUGHTY SHALLOW SLOPES 6–10 PZ	*Atriplex confertifolia-Picrothamnus desertorum/Achnatherum hymenoides-Elymus elymoides*

Because of the combination of abiotic factors (landscape position, elevation range, soils, precipitation timing/distribution) and biotic factors (vegetation) the Alvord Allotment has all three primary ecosystem threats to consider. To quantify the states, and show the pattern spatially across the allotments, a Geospatial Information System (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.[39] The Manager's Guide has several useful figures to aid in visualizing concepts. The Andrews/Steens RMP directs managers to administer livestock grazing management that meets Standards and Guidelines, meaning implement practices or use that maintains or improves rangeland condition. Threat-based management generally equates to managing the rangeland to maintain or improve to Threat-based State A or B.

Table 13: Threat Based State-and-Transition Model Alvord Allotment (Acres)

PASTURE	A State	B State	C State Shrub/ Annual	D State Annual	Farm/ Developed	Juniper	Salt Desert Shrub	Sparse Vegetation	Water
Alvord Seeding #1	884	192	1,333	492	0	0	20	9	0
North Foothills #2	2,093	62	1,075	1,562	<1	850	40	115	<1
South Foothills #3	2,032	70	447	763	4	435	56	170	0
Table Mountain #4	13,860	487	4,020	2,211	0	4	69	89	<1
Desert #6	109,420	772	19,807	2,523	28	147	24,821	32,848	36
Getty Spring Exclosure #7	<1	0	<1	<1	0	0	<1	<1	0
Mickey Hotsprings Exclosure #8	<1	0	<1	<1	0	0	<1	<1	0
Pike creek #9	1,761	193	289	762	0	1,681	49	385	0
Mickey Basin RNA #10	<1	<1	<1	<1	0	0	2	<1	0
TOTALS	**130,050**	**1,775**	**26,972**	**8,313**	**32**	**3,116**	**25,057**	**33,618**	**37**

[39] Staff from Eastern Oregon Agricultural Research Center (USDA Agricultural Research Service and Oregon State University Extension Service), and United States Fish and Wildlife Service.

In the summer of 2017, the Burns District used continuous vegetation modelling to assess current carrying capacity for the 6 pastures in the Alvord Allotment. 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 for average, low, and high precipitation years. ORC's process is based on how rangeland carrying capacity has historically been adjudicated on most BLM allotments, but enriched spatially using GIS data and aerial imagery, as well as on-the-ground photos. 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. 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. Using the Piosphere tool, each individual pasture within the Alvord Allotment was assessed under favorable, normal, and unfavorable growing conditions, which correspond to the changes in pounds/acre due yearly differences in precipitation as defined by the long-term frequency distributions of precipitation (USDA, SCS 1973). Favorable refers to above average precipitation or the wettest 10 percent of the years in the record, normal refers to average precipitation, and unfavorable refers to below average precipitation or the driest 10 percent of the years. Assumptions for this modeling include only slopes less than 25 percent would get utilized, and utilization would be no more than 50 percent; therefore, the AUMs provided for livestock carrying capacity are only 50 percent of total production. While livestock will graze annual grasses, as they are not considered a key species within this allotment, production from annual grasses that may be available to livestock was not accounted for in this calculation. In addition, only areas within 3 miles of water were considered accessible to livestock. Therefore, any future water developments outside of the current use area would be expected to increase carrying capacity within that pasture by increasing the accessible use area. Table 14 shows the estimated carrying capacity AUMs for the allotment based on ORC's findings.

Table 14: Alvord Allotment Carrying Capacity AUMs on BLM-Managed Land by Pasture

Annual Precipitation	Alvord Seeding #1	North Foothills #2	South Foothills #3	Table Mountain #4	Desert #6	Pike Creek #9	Proposed Indian Creek Pasture	Allotment Total
Unfavorable	327	266	126	1,822	3,820	398	280	**7,039**
Normal	514	389	185	2,344	5,986	527	366	**10,311**
Favorable	685	553	257	5,872	13,001	676	460	**21,504**

The range condition within the Alvord Allotment from the 1992 ecological site inventory is shown in Table 15.

Table 15: Range Condition Data in Acres

Pasture	Excellent	Fair	Fair-Good	Fair-Poor	Good	Good-Fair	N/A	N/A Fair	Poor	Poor-Fair	Poor-Good	Grand Total
Alvord Seeding #1	-	-	-	-	332	-	-	-	1,814	-	1	2,147
Desert #6	-	94,684	10,995	1,299	18,719	33,523	16,428	-	4,689	6,192	2,423	188,953
North Foothills #2	2,137	374	-	-	-	-	-	466	712	-	-	3,688
Pike Creek #9	-	1,663	1,969	-	793	-	-	465	46	-	-	4,936
South Foothills #3	-	1,927	-	-	-	-	-	229	270	-	-	2,425
Table Mountain #4	-	115	-	-	19,567	843	-	-	217	-	-	20,743
TOTAL	2,137	98,763	12,963	1,299	39,411	34,367	16,428	1,159	7,748	6,192	2,424	222,892

In 2017, Alvord Allotment was evaluated for conformance to Standards and Guides. Standards 1 and 3 are highly correlated to upland vegetation; both were achieved in all pastures of the Alvord Allotment (see Table 4: 2017 Alvord Allotment Standards Determination).

The trend of upland vegetation was measured in the allotment using two methods, Pace 180° (Johnson and Sharp 2012, TR 4400-4 1985) and nested frequency, as well as photos. Pace 180° 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 SSF form to assess soil stability and an OAT form to assess trend in condition were completed. The nested frequency method is useful for sampling communities in which many species are being monitored. Frequency is the percentage of possible plots within a sampled area occupied by a target species. It is insensitive to the size or number of individual plants. The vegetation attributes monitored with frequency methods include frequency, basal cover and general cover categories (including litter), and reproduction of key species. Frequency does not express species composition, only species presence. It describes the abundance and distribution of species and is useful to detect changes in a plant community over time (BLM TR 1734-4, 1999; Elzinga et al. 2001).

Within the Alvord Allotment there are a total of 29 Pace 180° plots and 13 nested frequency plots. The nested frequency plots were established in 1986 and read in 1986, 1994, 2002, and 2011/2012. The Pace 180° plots were read in 1994, 2000/2001, 2002, and 2011/2012, two years after a multi-year drought. Both the nested frequency data and Pace 180° data were compared with all the previous readings to make a determination. For complete analysis of upland trend see the 2014 Alvord Allotment Evaluation and for a summary of plot data see Appendix E: Summary of Trend Analysis by Pasture.

The Alvord Seeding #1 Pasture contains two Pace 180º plots. Crested wheatgrass is the predominate grass species in this pasture, the seeding that was established in October 1956. It has been re-seeded at least 3 times over the last 50 years. The two plots in this pasture showed an upward trend in both vegetative cover and plant composition. Management changes were made in the early 2000s. Grazing management was changed from springtime use to wintertime use. This put less stress on the crested wheatgrass by not grazing it during the active growth period. As a result of the change in the season of use crested wheatgrass composition and occurrence has remained stable with an upward trend.

There are no currently established trend plots in the North Foothills #2, South Foothills #3, and Pike Creek #9 pastures. Trend comparisons for these pastures were analyzed using a computer model called the Rangeland Analysis Platform (RAP) that covers the western continental U.S. The RAP is an interactive web application (www.Rangelands.app) designed to assist in managing and monitoring rangelands. It was developed jointly by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service, BLM, and the University of Montana to be used alongside local knowledge and on-the-ground data to plan management actions that improve rangelands and wildlife habitat. The RAP provides the ability to monitor rangelands across time and space by combining the latest remote-sensing technology with satellite imagery archives. The RAP allows users to monitor trends and changes at the pasture, landscape, or regional scales from 1984 to present. Table 16 summarizes the results using RAP version 2 for years 1984 to 2020, and Figures 2-4 show graphical data.

Table 16: Rangeland Analysis Platform

	North Foothills #2			South Foothills #3			Pike Creek #9		
Vegetation Component	**% Cover 1984**	**% Cover 2020**	**Trend**[40]	**% Cover 1984**	**% Cover 2020**	**Trend**	**% Cover 1984**	**% Cover 2020**	**Trend**
Annual Forb / Grass	5	21	Down	6	18	Down	6	15	Down
Perennial Forb / Grass	28	26	Stable	28	20	Down	24	21	Stable
Shrub	26	8	Down	25	23	Stable	24	27	Stable
Bare Ground	14	9	Up	14	9	Up	15	8	Up

[40] This trend column identifies if the change is positive (upward), negative (downward), or stable (relatively consistent) ecologically. Computer models have a certain degree of error; the RAP version 2 error for cover data is explained in the peer-reviewed article, Allred 2021, and summarized here: https://rangelands.app/products/#cover.

Figure 2: North Foothills #2 RAP Chart

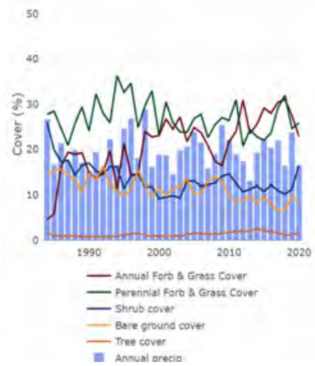


Figure 3: South Foothills #3 RAP Chart

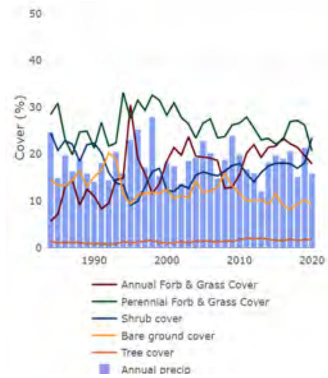
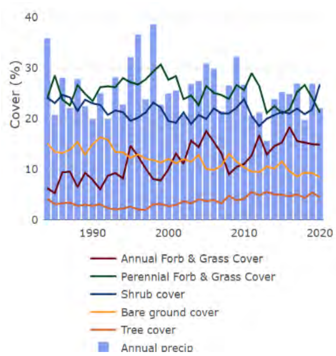


Figure 4: Pike Creek #9 RAP Chart



The results of the RAP show a change in the structure of the vegetation community, which can be attributed to multiple wildfires in the North Foothills #2, South Foothills #3, and Pike Creek #9 pastures. These fires altered the vegetation communities by removing the perennial grasses, forbs, and the shrub components in certain areas, allowing annual grasses to move in. These fires have resulted in invasive annual grasses establishing and replacing many of the perennial plants that were previously present in this area.

Table Mountain #4 Pasture has four Pace 180º plots. Data from all four of the plots show an upward trend. Three of the four location photos also showed an upward, while the fourth photo showed a static trend.

Desert #6 Pasture has a total of 18 trend plots located in it, 14 of the plots have a combination of nested frequency, Pace 180º, and photo plots[41]. Data has been collected from each plot on at least three separate occasions. This data, when averaged, showed 18 of the monitoring readings had plots that were static, 20 monitoring readings had an upward trend and 2 readings had a static/upward trend. There are also 4 plots in the Desert #6 Pasture that have a Pace 180º trend and photo trend. Individual monitoring collection at these plots found 5 upward trends, 1 static/upward trend and 2 readings with a static trend. Alvord Seeding #1 Pasture has 2 Pace 180º plots with photos; data was also collected during the same time periods as the Desert #6 Pasture. When analyzed this data showed 3 with an upward trend and one static trend. Table Mountain #4 Pasture has four Pace 180º and photo trend plots. Data collected and analyzed during the same time periods as the data was gathered for the other two pastures showed seven with upward trend and one static trend.

Monitoring data gathered for the Desert #6 Pasture, after being analyzed, showed that species composition on many of the plots changed over time. In some instances, grasses and shrubs that were present when the plots were established are starting to be replaced by either new species of grasses or by shrubs. The changes in species composition can be contributed to by several variables: a change from one seral stage to another, changes in weather patterns over time, or natural disturbance. Monitoring shows that changes in seral stage of the sites have caused a change in plant composition. Seral stages are the different stages that a plant community site can go through over time. As plant communities age, more dominant plant species replace less dominant plant species. For example, a site dominated by perennial grass species may eventually become dominated by a shrub component with a grass understory in a late seral stage (as seen occurring within the allotment). Changes in a site's plant composition may also be affected by a site's potential. Not all sites are capable of supporting later seral stages of plant communities and, with absence of disturbance, little change occurs over time. Disturbance such as fire can cause a change from a late seral stage with a plant community dominated by shrubs with a grass understory to a site completely dominated by early seral grasses species or invasive annuals. This has been seen on the foothills of the Steens Mountain within this allotment. Changing weather patterns may also contribute to plant communities changing over time. Some species of grasses require a higher precipitation amount in order to remain vigorous and healthy. When the original trend plots were established in the mid-1980s it was a time of higher precipitation across the district. Periods of drought temporarily affect the vigor of different species.

[41] Since multiple monitoring methods are conducted at each plot location, there are more monitoring readings and trend determinations than there are plots.

Utilization monitoring is done using the Key Species Method on a landscape (pasture) scale for pasture utilization (Utilization Studies and Residual Measurements, TR 1734-3, 1999b). The target utilization levels for key forage plant species are no more than 50 percent utilization[42] on key native upland perennial species and 60 percent utilization on desirable nonnative species, such as crested wheatgrass (AMU and Steens CMPA RMPs 2005, p. 54). 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 monitoring is done annually, on each grazed pasture, after livestock are gathered.[43] A summary of the utilization averages for each pasture is in Table 17.

Table 17: Alvord Allotment Utilization Levels by Pasture from 2011 to 2020

Year	Alvord Seeding #1	North Foothills #2	South Foothills #3	Table Mountain #4	Desert #6	Pike Creek #9
2011	15%	32%	52%	Rest	20%	Rest
2012	No Use	44%	55%	No Use	18%	57%
2013	No Use	Rest	Rest	No Use	24%	Rest
2014	23%	60%	46%	Rest	No Use	53%
2015	12%	Rest	Rest	No Use	No Use	Rest
2016	15%	56%	57%	Rest	No Use	46%
2017	No Use	Rest	Rest	12%	27%	Rest
2018	21%	Rest	53%	29%	29%	56%
2019	12%	41%	Rest	22%	21%	Rest
2020	33%	Rest	63%	15%	27%	60%

Current utilization levels in the Alvord Seeding #1 are uneven due to livestock distribution from the current water sources. Livestock tend to concentrate in the middle and south part of the pasture more than they do in the north. The available water sources currently are in the middle of the pasture where the well is located and in the southern part of the pasture where the permittee has a water gap for them to access on private ground. Livestock also tend to migrate to the southern end of the pasture because it borders private land, where they pasture prior to use in the seeding.

An actual use report for the Alvord Allotment is turned in by the permittee at the end of the grazing season, following the removal of all livestock. Actual use is the total use in AUMs over a grazing season, in a pasture, as calculated from the actual use report form submitted after livestock are removed from the allotment. The actual use report provides specific numbers and dates for each pasture. A summary of each year's actual use, by pasture, is provided in Table 18. Actual use is a calculation of what actually happened in a given year. This is different from the annually authorized grazing that is authorized through the payment of a bill (advanced billing) or through an annual letter of authorization, which specify authorized annual use within the bounds of the grazing permit and existing AMP or other identified grazing management plan.

Currently, one grazing authorization (permit), #3602552, exists for this allotment. Under this permit, the current season of use is from November 16 through June 29 for a total of 7,355 AUMs of active grazing preference for livestock. Current grazing management varies by pasture and is described below.

[42] Burns District BLM measures utilization percentage using an ocular method, not a weight method.
[43] While the goal is to complete utilization annually, its completion is dependent on available labor as well as potential access limitations, such as muddy conditions that may preclude utilization monitoring.

Table 18: Alvord Allotment Actual Use by Pasture

Year	Alvord Seeding #1	North Foothills #2	South Foothills #3	Table Mountain #4	Desert #6	Pike Creek #9
2011	209	2,110	2,110	Rest	5,478	2,110
2012	55	1,664	1,664	No Use	6,608	1,664
2013	No Use	Rest	Rest	No Use	6,487	Rest
2014	678	1,667	1,667	Rest	No Use	1,667
2015	247	Rest	Rest	No Use	No Use	Rest
2016	345	1,299	1,299	Rest	No Use	1,299
2017	No Use	Rest	Rest	701	4,171	Rest
2018	493	Rest	354	479	5,168	354
2019	169	648	Rest	620	2,704	Rest
2020	341	Rest	376	675	4,778	376

Desert #6 Pasture is a winter use pasture; permitted grazing starts in mid-November and ends April 1. The majority of the AUMs authorized for the Alvord Allotment are grazed in this pasture; it has approximately 5,606 active AUMs and 1,892 suspended AUMs. Table Mountain #4 is a spring use pasture; it is grazed from mid-April to mid-June. There is a total of approximately 699 AUMs in this pasture. South Foothills #3, Pike Creek #9, and North Foothills #2 are spring use pastures as well. The South Foothills #3 and Pike Creek #9 pastures are used in the same year together, while the North Foothills #2 Pasture is rested and used the following year. There is a total of approximately 700 AUMs available for grazing for these pastures from mid-April to mid-June. Alvord Seeding #1 is used mainly in the winter months from the middle of November to the end of February. There is approximately 349 AUMs available for grazing to this pasture.

3.1.2 Environmental Consequences

3.1.2.1 Issue Questions

- How would the number of active use AUMs and/or NR livestock use under the alternatives affect the health and vigor of crested wheatgrass seedings and native vegetation?
- How would the proposed range improvements affect grazing management and vegetation?
- How would the alternatives affect the establishment and spread of annual invasive grasses?
- How would livestock grazing change the characteristics of fine fuels to reduce wildfire spread?

3.1.2.2 Effects Common to All Alternatives: Grazing Management and Rangelands

For the purposes of this analysis, the cumulative effects affected area (CEAA) for livestock grazing management, rangelands, and vegetation consists of the Alvord Allotment. Past and present actions have influenced the existing environment within the CEAA. RFFAs in the CEAA that may contribute to cumulative effects to livestock grazing, include periodic gather of wild horses to maintain the balance between livestock and wild horses. An excessive number of wild horses (above appropriate management levels (AML)) contributes to a reduction in available forage for livestock use. This can affect both the Table Mountain #4 and Desert #6 pastures, which are both part of the same HMA. Another RFFA would be the continued treatment of noxious weeds using the most appropriate methods, in accordance with the Integrated Invasive Plant Management for the Burns District Revised EA (DOI-BLM-OR-B000-2011-0041-EA), 2015. This is needed to prevent the spread of noxious weeds into areas that are currently occupied by native plant species, if left unchecked noxious weeds would eventually replace the native species. There is one proposed project in the South Foothills #3 Pasture, called the Pike Creek Parking Area and Right-of-Way (ROW) improvement. It is expected to be completed in 2022. There is an existing parking area on the adjacent private land across the creek from this proposed project site that has been used for several decades. The proposed parking lot would only accommodate 7 vehicles, which would be about .028 acres or 1,260 square feet in size. Other RFFAs include wildfire, wildlife use, hunting, and other recreational pursuits.

3.1.2.3 Alternative A: No Action

For comparison purposes, Alternative A provides the general baseline for grazing management and livestock distribution against the other grazing alternatives. Under this alternative, effects to grazing management would remain the same as under the current grazing term permit and no new range improvements would be developed. The forage plant utilization and distribution for the allotment would be expected to be consistent with the past, and continuing grazing under Alternative A would not have a measurable effect on livestock distribution. Between years, differences between forage production may influence livestock distribution. The existing fences 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 range improvements are proposed under this alternative, there would be no change in livestock distribution or different concentrated areas of use related to water or fences.

Vegetation outside of the current use areas would only be grazed by wildlife, with occasional wild horse and livestock utilization. It is expected that this would continue to increase the fine fuel load in these areas, increasing the risk of severe wildfire. Since previous years' growth would be expected to remain on the plant, over many years this may increase the decadence of the plant as the old growth prevents some new growth from developing (Oesterheld and McNaughton 1991), especially where no event has occurred to remove the accumulations of dead material. As plant decadence increases, the ecological condition of the site would be expected to decrease, resulting in fewer AUMs available for grazing animals. The direct effect of livestock management and distribution under Alternative A is anticipated to produce similar results for utilization and forage trends as past management. The indirect effect of management under Alternative A is that opportunities to increase or change distribution for livestock nutrition and ecological health would not be realized. The season of use within the allotment would continue to be narrow in scope and prevent full use of adaptive management and flexibility to best address ecological concerns. Under this alternative the season of use in the allotment is limited to a date range and grazing rotations would be driven more by a calendar than plant phenology. However, all pastures would continue to receive periodic grazing season rest. Growing season rest provides an opportunity for bunchgrasses (both native and introduced) to complete their lifecycles without grazing stress and is an important factor in grazing rotations in which pastures are grazed during the graze or critical growth period. Moderate grazing levels paired with periodic growing season rest have been shown to maintain or improve bunchgrass communities. In low precipitation years AUM numbers would likely need to be reduced for seasonal fluctuation in water to prevent overuse of available forage in the use area around the existing wells. Available forage species surrounding the year-round, existing reliable water sources would continue to receive the majority of the grazing pressure; this would not negatively affect upland vegetation because AUM numbers would still be adjusted accordingly to make sure that no more than a 50 percent utilization on native key species and 60 percent utilization on crested wheatgrass were achieved in available use areas, on average across a pasture. Once utilization levels have been met in the pastures existing use area, on average, the livestock would transition to another pasture or allotment, or exit the allotment, regardless of the number of animals. Considering plot data and modern grazing history in the Alvord Allotment, the S&G determination, threat-based models, and local scientific work, moderate grazing in use areas would either maintain (be neutral) or improve the health of crested wheatgrass and native vegetation in the allotments. While grazing use would have a direct effect to the plants through defoliation, under the proposed utilization levels the plants would have an adequate amount of resources remaining to continue their lifecycles without a decrease in production. Indirectly, the level of use would reduce fine fuels within current use areas 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 level when compared to native vegetation. However, since no maintenance grazing of wolf plants would occur under this alternative, wolfy plants would result in self-shading in the bunches to be increased, thereby a reduction in the health and vigor of the crested wheatgrass over the long term (5-10 years or more) would be expected.

The permittee would continue to be required to spread livestock out between the existing wells or move them around as the season progresses to ensure that grazing pressure is not concentrated around a few select areas and distribution is spread across all available use areas. The hauling of water to some locations, especially in Table Mountain #4 Pasture, would continue to improve distribution and increase the use area in below average precipitation years. If water was not available or the permittee was unable to haul water, annual grazing may not be authorized depending on the severity of the drought. Alvord Seeding #1 Pasture would continue to receive more use in the southern portion of the pasture where there is a water gap and around the well site in the middle of the pasture. The northern half of the pasture would continue to receive less use. The Indian Creek Pasture would not be split off from the Pike Creek #9 Pasture, and no AUMs would be added to the permit to correct the administrative mistake from when this portion of land was added into the allotment. The Pike Creek #9 Pasture (Indian Creek use area) would remain inaccessible most years for livestock during the currently permitted season of use due to the high elevation, increased moisture, later growth season of vegetation, and access into the area, resulting in sporadic use of this area. AUMs currently authorized would have to continue to cover this portion of the allotment**.** Within the Desert #6 Pasture, the suspended AUMs would remain suspended and would only be authorized as NR forage during years of favorable moisture. Water availability within existing waterholes would continue to limit the use of the suspended AUMs as NR forage, as water defines the available use area. The use of NR AUMs (when available) would continue to help reduce the fine fuel load in the allotment within available use areas based on existing water.

Considering plot data and modern grazing history in the Alvord Allotment, the S&G determination, threat-based models, 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 allotment, 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, be frost heaved out of the soil, or be eaten by rodents. 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).

As discussed above regarding the 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 any grazing stress. Grazing in pastures during the early, defer, or winter seasons would have much less direct effect to bunchgrasses because they are in varying stages of dormancy, meaning they have fulfilled their lifecycle requirements after or prior to grazing. Indirectly, moderate grazing use (50 percent on native bunchgrass and 60 percent on crested wheatgrass) during any grazing season would reduce fine fuel accumulation in the bunchgrasses, reduce the continuity of the fuel in available use areas, and increase fuel moisture, thereby reducing the severity of a fire and resulting in less bunchgrass mortality. These benefits would not be seen outside of existing use areas where moderate grazing is unable to occur due to water limiting distribution of livestock. 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 in the fall after precipitation. In areas outside the current use areas, fine fuel would accumulate in the individual perennial bunchgrass and crested wheatgrass plants and be more susceptible to fire and burn 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. In areas where invasive annual grasses become dominant, the amount of sustainable forage production would be reduced. 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. Davies (et al. 2021a) observed cattle grazing invasive annual grasses in the fall and winter when native bunchgrasses had limited green leaves, decreasing annual grass competitive advantage. 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, Harris 1965).

3.1.2.4 Alternative B: Proposed Action - Management Changes, New Range Improvements

Under this alternative, the level of allowable livestock grazing use would be consistent with Alternative A with a moderate grazing level of 50 percent use on native bunchgrasses and 60 percent on crested wheatgrass. The effects of this would also be the similar to Alternative A; however, since water developments are proposed, the effects of moderate grazing would be spread out more and greater under this alternative as a much larger use area would be available to livestock due to better distribution. Unlike Alternative A, under Alternative B, the effects of moderate grazing would be combined with a livestock grazing rotation that focuses on plant growth stages allowing for more adaptive management and flexibility to occur. The grazing rotation provided under this alternative would continue to provide periodic growing season rest that would allow for all grasses regularly grazed by livestock during the growing season to complete a full reproductive cycle. Appropriate grazing management can help maintain or improve species composition, diversity, and production (Archer and Smeins 1991). Under Alternative B the length of time the livestock are in an individual pasture would be similar year to year based on forage and water availability, however the permitted season of use would be wider, allowing the grazing rotations to include more of the available grazing treatments, improved adaptive management, and flexibility. This would mean that grazing rotations could be used to better respond to areas of high production and annual grasses than under Alternative A. Changes in the permitted season of use would allow improved grazing management to occur, allowing for more flexibility in annual grazing to adjust for weather, vegetative stage, and other relevant conditions. Water may still limit late season use in some pastures; however, the ability of the permittee to haul water would help improve livestock distribution and maintain utilization levels. Utilization would still be limited, and livestock may be required to be removed prior to utilizing all AUMs when the utilization limit is reached within the use areas around available water. The late season of use in the fall would allow for a defer grazing treatment and would ensure periodic growing season, without full rest, which would still allow forage species a chance to complete a reproduction cycle. The longer permitted season of use would allow for improved grazing management of the proposed Indian Creek Pastures by allowing grazing to occur later in the year after snow drifts and frequent spring storms, which currently limits livestock access and grazing high up on the mountain, especially during years of high snowpack.

Crested wheatgrass maintenance through grazing would also be able to occur, reducing the number of wolf plants and increasing overall vigor of the bunchgrasses in the Alvord Seeding. Limits on utilization of native and introduced 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. Winter use to reduce fine fuels going into the next season would be possible. Moderate deferred and winter season grazing could further reduce fine fuels characteristics (increasing following year live:dead ratio and decreasing fine fuel continuity) to reduce potential for wildfire. While the sites dominated by grass would burn under varying degrees of severity depending on pre-fire conditions, grazing fine fuels may reduce the chance of spread into sagebrush and juniper sites, which would reduce the severity of wildfire and reduce the likelihood that cheatgrass could invade across the allotment. In addition, it is expected that fire would burn in a more mosaic pattern.

Under the proposed action, 222 AUMs would be assigned to the Indian Creek Pasture to correct the administrative mistake when that area was added into the allotment, but no AUMs were added. The Indian Creek Pasture would be established by separating it from the Pike Creek #9 Pasture. An additional 1,670 AUMs would be used in the non-WSA portion of the Desert #6 Pasture. The final carrying capacity report by ORC stated that a total of 5,986 AUMs are available on years of normal precipitation in this pasture, with current range developments. The maintenance of range developments and construction of new range developments would increase the use area within this pasture, resulting in additional AUMs becoming available. Using ORC's assumptions that the use area around a water source for cattle has a radius of three miles the use area within the pasture would increase with each well. Since the average carrying capacity within the Desert #6 Pasture was calculated by ORC at 32 acres per AUM, a minimum of 280 additional AUMs would be made available per new well, and up to 1,960 AUMs in total. Developments would also help promote improved distribution within the pasture, reducing the average use at any given water source. Additional AUMs would be made available within the allotment through reservoir and pipeline maintenance, as well as the fence construction and relocation in the Alvord Seeding. As ORC has calculated carrying capacity within the allotment at 10,311 AUMs in a normal precipitation year, the allotment is expected to be able to support the increase in AUMs, even if no new water developments were constructed. Monitoring and the phased in approach to increasing AUMs would ensure that utilization thresholds within the Desert #6 Pasture are not exceeded. In order to improve livestock distribution and be able to use reinstated suspended use in the non-WSA portion of the Desert #6 Pasture, new water sources would be developed, and existing pipelines would be maintained (see Section 3.6 for full analysis of use areas and WSA). These proposed wells and maintenance of existing pipelines would allow livestock to disperse through the allotment, reducing the impacts of livestock grazing at any one existing well. By constructing new water developments and increasing the reliability of existing water sources through maintenance, the use area in the Desert #6 Pasture would increase, opening these areas up to better distributed livestock grazing.

Livestock and wild horses would have improved distribution and utilization patterns due to the increased number of water sources available and the presence of water sources within the non-WSA areas, which currently do not receive much use by livestock due to lack of reliable water. In order for livestock to graze in the late summer, fall, or winter, reliable water has to be available. Within the allotment, new feeding locations would become available as additional water sources become available. The more reliable water sources, the better livestock distribution would be across the allotment since "[t]he location and number of watering points on grazing lands are important in controlling the movement, distribution and concentration of grazing animals" (Valentine 1947). Most large ungulates focus their feeding strategies around available freestanding water, making the water their "home place" (Stuth 1991). Heavy to severe vegetative disturbance caused by livestock concentration would be approximately two acres for each trough due to the increased level of use in the area. Stuth (1991) found the optimum grazing area is located in a 0.5-mile radius around the water. Miller (1983) found cattle generally stayed within three miles of water sources during the summer. Holechek and others (2001) found cattle will regularly utilize rangelands within one mile of water, but utilization will decline by about 50 percent between one and two miles from water. Holechek and others (2004) 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. Bailey (2004) found by developing water in areas more than 0.62 mile (one kilometer) away from existing water, overall uniformity of grazing increases. While the actual level of use depends on other factors such as stocking rate and other water source availability, the pattern described above is the normal pattern around water sources. Numerous studies support the conclusion that as livestock get father away from water, utilization levels will decrease and need to be accounted for (Cook 1966).

The direct effect of maintaining and developing water sources would be physical disturbance to the vegetation in the short term (1-5 years) from installing the wells, pipes, and troughs along with an access road. Well installation would damage vegetation on less than one acre during construction. Pipeline installation would damage vegetation in an area equating to approximately one acre per linear mile. Vegetation removal or severe disturbance associated with trough construction (3) would be no more than 0.05 acre for each trough. It is anticipated the native vegetation would return in one to three years; however, the extent of livestock congregation at the site may prevent vegetation from completely reestablishing. 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. Long-term maintenance would ensure distribution continues to be maximized within each pasture.

In addition, by constructing more wells, water would be able to be used to manage livestock distribution. Ganskopp (2001) found moving water in arid pastures was the most effective tool for changing the distribution of cattle. Therefore, location of new wells in the non-WSA portion of the Desert #6 Pasture would be integral to ensure the reinstated AUMs are used in the non-WSA use area.

In areas where resources (i.e., water) have been limiting, but then become available, the use of these areas may not be as high as expected due to the occurrence of cured stems in the area. Studies have found livestock prefer green vegetation to cured vegetation since it is more nutrient rich; cured stems have lower crude protein and digestibility levels (Ganskopp and Bohnert 2005). This behavior has been observed in both livestock and wild herbivores (Ganskopp et al. 1992). Herbel and Nelson (1966) found cattle would often graze plants with both green and dry portions, but they would try to select for the green portions and the dry portions would often drop out of their mouth. Ganskopp and Bohnert (2005) noted research shows cattle are aware of one cured stem within a green bunchgrass and that they are 40 percent more likely to reject grazing plants that have cured stems (considered wolfy) than those plants with no cured stems. They also found cattle were 2.3 times more likely to select areas of vegetation with mostly green stems (old growth had been previously removed) than areas with wolfy plants that had mixtures of green and cured stems (Ganskopp and Bohnert 2005). In a study done by Ganskopp and others (1992), cattle showed avoidance to plants that had as few as three cured stems that contributed to as low as 4 percent of the total plant biomass. However, Ganskopp and Bohnert (2005) suggest after grasses complete their lifecycle and cure (i.e., during defer 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). During these times, cattle would often graze sites that have more abundant forage, regardless of greenness or plant species (Stuth 1991). Therefore, grazing treatments that include defer and winter treatments would help minimize the effect of the cured stems.

Residual plant growth that has accumulated in the areas not currently available to livestock would be reduced once these water sources are developed and the livestock use area increases. This would remove fine fuels and decrease fire risk in these areas while maintaining or improving ecological conditions. Properly managed livestock grazing can be an effective tool used for maintaining healthy plant communities while reducing vegetative impacts resulting from wildfires (Davis et al. 2010, Patton et al. 2007, McNaughton 1993).

This pasture currently has no year-round water developments. There are a significant number of reservoirs located in it, but these do not fill up every year. Because of this, livestock in the past were often not part of the annual grazing rotation; this combined with the absence of natural disturbance has created an abundance of fine fuel and a late seral stage plant community of bluebunch wheatgrass, bottlebrush squirreltail, Kentucky bluegrass, Idaho fescue and Wyoming big sagebrush. Having the additional ability to haul water and place troughs in key locations would allow the use of livestock to reduce fine fuel build up. Upland vegetation would also start to show more vigor and stimulation, producing new growth once old decadent plant material has been removed. Oesterheld and McNaughton (1991) found that defoliation released plants from the limitations imposed by the accumulation of old and dead tissue and this release overrode the negative effect of biomass loss.

The proposed grazing season would allow livestock to graze in the spring when there is moisture and new green growth available for use. The option of winter use would allow wolfy plants to be grazed prior to green up when livestock start being more selective towards green stems. This periodic change in the season of use would allow livestock to remove the old decadent plant growth when it is more desirable in the spring while it still retains moisture, and it is not dried out. Plant vigor would be stimulated because of the old plant material being removed; new plant growth would grow back the following spring during the off season. The crested wheatgrass plants would become more vigorous, instead of decadent from old plant material not being removed. Lack of stimulus periodically by disturbance can lead to plant mortality. “Bunchgrass vigor may decline in lightly-grazed or non-grazed areas, due to plant decadence that may limit growth by accumulation of old and dead tissue” (Oesterheld and McNaughton 1991). The effects to upland vegetation by the proposed action would be a more even utilization pattern between the north and the south ends of the pasture through better control of livestock. By fencing the pasture in half, along with fixing the existing pipelines, livestock would be controlled so that they could not migrate to the south end of the pasture only but instead would be confined to the north end when put there. When livestock do use the south half of the seeding, the existing water gap would be closed off and the repaired water line would be used to keep livestock in the center of the south pasture where the trough from the water line is located. The new 7.2-mile proposed fence in the southeast corner of pasture would allow livestock access to 1,154 additional acres that previously had little to no use from livestock in the Desert #6 Pasture due to the distance from water. Little to no use in the southeast corner of Alvord Seeding #1 Pasture is expected to continue unless the permittee hauls water to designated areas along the road while the pasture is use. Standards 1 and 3 would still be achieved if water was hauled to designated areas because livestock would still be required to be spread out in the pasture and graze to a utilization level of no more than 60 percent on crested wheatgrass. Seeding maintenance would occur only in the existing crested wheatgrass seeing area and would ensure this area remains functioning properly with deep rooted perennial bunchgrasses, and that additional wolfy plants are grazed, improving plant health in the long-term.

Fence removal would require temporary crushing of vegetation while collecting the material for removal and 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 vigor of vegetation, and disturbance would be undetectable after one or two growing seasons. Range improvements proposed under Alternative B may create isolated areas of disturbed soil near fencing and water development projects in which cheatgrass and medusahead could establish. Best management practices and PDEs such as cleaning equipment, post-activity competitive seeding, and Early Detection Rapid Response inventories to detect invasive annual grasses for treatment would limit this effect. Proposed boundary changes are not expected to increase the spread or dominance of invasive annual grasses.

3.1.2.5 Alternative C: Termination of Suspended AUMs

Under this alternative, the effects to grazing management and vegetation would be between the effects of Alternative A and Alternative B. The difference would be that under this alternative the suspended AUMs would be permanently removed from the permit. Grazing management would only be affected in years of favorable moisture. In those years, actual utilization levels would fall well below 50 percent for livestock use especially in the Desert #6 Pasture as no NR would be authorized. In normal moisture years, there would continue to be pockets of fine fuel accumulation, though these would be smaller and less than in years of favorable moisture. Over time, fine fuel accumulation would result in a buildup of flammable fuels, increasing the risk of a catastrophic wildfire. Recent research suggests “properly managed livestock grazing is an effective tool that can be used to maintain healthy plant communities while reducing vegetative impacts resulting from wildfires” (Davies et al. 2010, Patton et al. 2007, McNaughton 1993). In addition, individual plants that have vegetation accumulation would be expected to see decreased vigor in the long-term. As authorized AUMs and the forage are not balanced (more forage available for livestock than AUMs authorized) use supervision during the time that suspended AUMs would have been turned out would happen less frequently. The permittee would not have to make sure that livestock are spread out as often to limit the effects of them over concentrating around watering sources and to ensure that one part of the pasture is not receiving heavier impacts then other parts. Range improvement projects, as described under the proposed action, would still be built in the Desert #6 Pasture to help spread livestock concentration out from the existing ones already in place. The suspended AUMs would not be available as NR forage. Therefore, during years of favorable moisture when utilization from permitted use remains below 50 percent, no additional grazing would be authorized and there would be a long-term buildup of fine fuels. The effects from this fine fuel buildup might be the total removal of all standing biomass by wildfire and increased bunchgrass mortality. Some of this residual vegetation may be utilized in years of drought when plant growth is reduced. However, as new water developments are constructed the livestock distribution would spread more evenly throughout the allotment. The increase in livestock distribution would also change the use pattern on residual vegetation and in some areas the fine fuel reduction by livestock would be less since an overall larger area would be useable by livestock. Additional use supervision would not have to be conducted to determine if the available forage is staying below the 50 percent utilization level or to ensure new developments are holding livestock in the non-WSA area, as there would be no increase in AUMs. Since fewer AUMs would be authorized compared to Alternatives A and B, there would be a decrease in the impacts to the landscape from livestock. However, this would not be a measurable change on the landscape scale, and differences would be more visible at the water site level and through overall pasture utilization in favorable years. Differences would be less obvious in low moisture years.

The other effects of grazing management and range improvements would be the same as under Alternative B.

3.1.2.6 Alternative D: No Grazing

Under this alternative, the suspended AUMs along with the permitted AUMs would be removed from the Alvord Allotment; there would be no permitted grazing by livestock any time of the year. The effects would be yearlong rest from livestock use. No forage plant species would be grazed except those used by wild horses and other wildlife species. The direct effect would be that the plants could complete their lifecycles with no livestock grazing related stress. The indirect effect is magnified from Alternative C, in that fine fuels (from perennial and annual grasses) would not be removed by livestock at all and instead would accumulate in and between the vegetation, reducing fuel moisture and increasing ignition potential. This would likely contribute to higher mortality of bunchgrasses in the case of a wildfire. Livestock would not be used as a tool to reduce fine fuels. Unless reduced by some other disturbance, large amounts of fine fuels would begin to accumulate and cure across the entirety of the allotment creating incremental decreases in the live:dead ratio within the bunch. Over time standing dead material would break off the plant and become litter over the soil, increasing fine fuel continuity. Bunchgrass communities would be primed to burn and spread fire should an ignition source occur regardless of if it is a natural or human caused start. Due to the accumulation of fine fuels, severity would be increased and mortality of the bunchgrasses would be more likely. Increased mortality of bunchgrass leaves open sites for invasive annual grasses to spread and/or increase in cover, which proliferates the annual grass fire cycle. Grazing exclusion has been shown to present a high risk for a community altering wildfire (Davies et al. 2010). Davies and others (2009) found that the absence of grazing decreases the ability of the native herbaceous community to tolerate fire due to the accumulation of fine fuels, which can cause an increase in the mortality of desirable vegetation during wildfire events. Davies (2010) found wildfires that occur in areas where grazing has been absent would have a higher increase in the "probability of postfire exotic plant invasion by the increased risk of fire-induced mortality of perennial bunchgrasses." Wildfires have become more frequent and larger in the Great Basin; one of the contributing factors that helps these fires become so large and spread so quickly is the abundance of fine fuels from both native perennial grasses and non-native annual grasses that can build up in the inner spaces between the shrub components if they are allowed to do so. (Davis et al. 2010). Because this allotment has such a large, intact sage steppe community, the effects of removing livestock would be increasing the chances for a catastrophic wildfire to occur and the disappearance of this intact sage steppe community. Existing forage species would become even more decadent from the lack of a controlled disturbance that grazing livestock provide; a lack of disturbance may also eventually lead to these species being replaced by less desirable shrubs or grasses. "The effects on plant vigor from grazing is more subtle and involves interplay between a plant's ability to reestablish photosynthetic activity and its ability to retain a competitive position in the plant community" (Oesterheld and McNaughton 1991). This alternative presents the greatest risk to perennial bunchgrasses, because of all the alternatives only this one calls for the complete removal of grazing by livestock on the allotment.

Ecological damage around developed water sources and salting areas from livestock congregation would begin to recover and heal. Wild horses may slow this recovery process down or prevent it from occurring completely in some areas, especially if numbers are not managed within AML. Overpopulations of wild horses result in increased pressure around the available water sources. BLM TR 1737-20 (2006) states: "reducing stocking rates may reduce the percentage of area in unsatisfactory condition but impacts around the foci of highly used areas (e.g., riparian areas or other water) will remain the same until few, if any, animals remain."

This alternative would eliminate the need for any range improvements solely for livestock; however, wild horses would still require some range improvements, especially water and fence developments. Wildlife may also benefit from continuing to maintain existing water developments. All existing range improvements would continue to be maintained and kept functioning for wildlife and wild horses.

3.2 Fisheries, Riparian, and Water Quality Resources

3.2.1 Affected Environment

Fisheries, riparian, and water quality resources are only present within the North Foothills #2, South Foothills #3, and Pike Creek #9 pastures of the Alvord Allotment. Therefore, the effects analysis area for these resources is these three pastures, hereafter referred to as the "Foothills" unless otherwise specified. In all other pastures, naturally occurring water resources are excluded from livestock use.

There are six perennial streams within the Foothills that are occupied by recovery populations of LCT and two streams that do not contain any fish (Table 19). LCT are considered "threatened" pursuant to the Endangered Species Act (ESA) and were introduced into the Alvord Lake subbasin in Oregon from Coyote Lake subbasin between 1970 and 1980 (USFWS 1995). Populations were verified for each stream during a 2019 survey of LCT occupied streams (USFWS 2019). There are no other T&E or SSS fish within the allotment.

Streams in the Foothills pastures originate along the east slope of Steens Mountain (9,700 feet) and drain into the Alvord Desert (4,000 feet). Stream slope is very high with an average gradient of 21 percent. Streams flowing down this gradient are characterized by similar geology and plant community types that can be grouped into three elevation bands: headwaters (6,800 to 5,200 feet), mid-elevation (5,200 to 4,260 feet), and low elevation (4,260 to 4,100 feet). The corresponding potential vegetation associated with these elevation bands is black cottonwood /Pacific willow, Pacific willow-black cottonwood/aspen, and mixed willow, respectively (ODEQ 2003).

Because streams in the Foothills pastures exhibit these similarities and are subjected to the same grazing management, designated monitoring areas have been identified to focus monitoring efforts. These key areas are randomly placed within reaches that are the most sensitive to grazing effects and are expected be representative of management effects. Photo trend was taken at a representative site on each stream. There are two MIM sites, one in the North Foothills #2 and one in the South Foothills #3 pastures. Since livestock use is divided using the pasture fencing between the North Foothills #2 and South Foothills #3, a representative monitoring site was selected in each. These sites are in the lowest gradient stream reaches within the Foothills pastures, which are most accessible to livestock and would be most vulnerable to degradation. The results of monitoring in these key areas are outlined in Table 19.

Table 19: Stream Habitat Conditions Within Alvord Allotment

Stream	Pasture	Fish Bearing/ Species Present	PFC Rating/ Year Assessed	Riparian Seral Status (MIM)	Photo Trend/ Year Assessed	Temp. Standard Met	Shade Survey 2004 Mid-Elevation Reaches (%)	Wildfire (Year)
Pike	Pike Creek #9	Yes – LCT[44]	PFC 2021	N/A	Upward 2021	Yes	83,96	94
Mosquito	North Foothills #2	Yes – LCT	PFC 2021	N/A	Upward 2021	Yes	28	85,97
Cottonwood	North Foothills #2	Yes – LCT	PFC 2021	N/A	Upward 2011	No	59	92,97
Big Alvord	North Foothills #2	Yes – LCT	PFC 2021	N/A	Upward 2016	Yes (2005)	54,55	92
Little Alvord	South Foothills #3	Yes – LCT	PFC 2021	Late Seral	Upward 2020	Yes	80,72	92
Willow	North Foothills #2	Yes – LCT	PFC 2021	Late Seral	Upward 2017	No	8,36	94
Buena Vista	North Foothills #2	No	PFC 2000	N/A	Upward 2020	N/A	N/A	85,97,17
Indian	Pike Creek #9	No	PFC 2000	N/A	Upward 2021	N/A	N/A	94

In general, riparian areas throughout the Foothills pastures are considered to be in PFC or better. Riparian trend photos and MIM monitoring indicated that riparian and stream conditions are trending upward with vegetation exhibiting all characteristics (except height due to fire) of late seral community types.

Livestock grazing associated with Alvord Allotment occurs primarily in the middle and lower elevation stream reaches and is currently authorized every other year in the spring. In Pike Creek #9 Pasture, livestock are typically excluded from land in its upper elevations because it is covered in snow when livestock use is authorized (spring use period), though periodically a temporary season of use in early summer has been authorized. In addition, livestock movement between Pike Creek Pasture, proper, and the Indian Creek Use Area is limited by gap fences and topography, to livestock tend to be moved between these two areas, and do not distribute naturally. The USFWS determined in a biological opinion dated

[44] Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi)*

March 29, 2022, that the current grazing management is likely to adversely affect but not likely to jeopardize the continued existence of threatened LCT (USFWS 2004, USFWS 2022). Detailed information on the history of LCT in this allotment and current baseline conditions can be found in the Final December 2021 Livestock Grazing on the Alvord and Mann Lake Allotments Biological Assessment. The BLM will continue to work with the USFWS on formal consultation as needed.

Water quality has been recently assessed on all fish-bearing streams in the Foothills pastures, except Indian Creek where air exposure of temperature probes has prevented reliable data (see Table 20). Three of the streams (Cottonwood Creek, Big Alvord Creek and Willow Creek) did not meet the ODEQ standard for temperature. Big Alvord was above the 68ºF 7-day average standard, but did not exceed the average of 72ºF considered to be optimum for LCT by Coffin and Cowan (1995). Willow Creek failed to meet the ODEQ standard in the lower elevation in both 2016 and 2021, sampling further upstream in 2021 met the 68ºF standard. Temperature data collected in 2004 at Cottonwood Creek exceeded the 68°F standard in only the lower elevation of the creek, with recent monitoring at Cottonwood Creek exceeding the standard in both upper and lower elevations, though only the lower elevation exceeded the 72ºF considered to be optimal for LCT. Monitoring in 2021 coincided with drought conditions and abnormally high summer temperatures, but all LCT inhabited streams had thermal refuge available below 72ºF for LCT during the hot summer months. Temperature continues to be monitored within these creeks.

Table 20: Temperature Data History for East Steens LCT Streams

SITE NAME	SEASONAL MAXIMUM		7-DAY AVERAGE		
	DATE	VALUE °F	START DATE	STOP DATE	DAYS > 68 °F
Little McCoy (LM_1.6)	8/9/2018	64.2	6/2/2017	6/16/2020	0
Little McCoy (LM_2.8)	8/11/2018	61.72	6/2/2017	6/16/2020	0
Willow (WI_1.8)	8/12/2021	79.0	7/9/2021	10/18/2021	51
Willow (WI_2.6)	8/12/2021	67.8	7/9/2021	10/18/2021	0
Cottonwood (CT1_2.9)	8/12/2021	79.4	7/13/2021	10/19/2021	51
Cottonwood (CT1_3.4)	8/12/2021	73.7	7/13/2021	10/19/2021	21
Big Alvord (BA_2.8)	8/12/2021	71.4	7/9/2021	10/18/2021	13
Little Alvord (LA_3.0)	7/30/2021	67.2	5/20/2020	5/13/2021	0
Pike (PI_0.5)	7/20/2020	69.6	5/13/2020	11/6/2020	0
Mosquito (MQ_3.2)	9/5/2020	63.47	6/24/2020	7/5/2021	0
Mosquito (MQ_4.7)	9/18/1999	68.2	6/15/1999	11/9/1999	0

In 2003, the ODEQ developed the total maximum daily load (TMDL) allocations for the Alvord Lake Basin to address water quality impairment (high stream temperatures) in the Basin. ODEQ developed shade surrogate values as benchmarks towards meeting stream temperature standards. The surrogate shade values are based on site potential vegetation. ODEQ's modeled average *potential* shade values for the Foothills pastures ranges from 65 percent (mid-elevation) to 85 percent (headwaters). Shade has been monitored on several key streams and indicates that in some areas, benchmarks are being achieved, but on Big Alvord Creek, Cottonwood Creek, Mosquito Creek, and Willow Creek shade surrogate benchmarks are not being achieved (see Table 19). This complete reach survey was completed jointly by Oregon Department of Fish and Wildlife (ODFW) and BLM in 2004. Since 2004, trend monitoring efforts have shown upward trend in riparian vegetation, but shade monitoring has not been reassessed.

Stream temperatures or shade benchmarks were not achieved where wildland fires in 1992, 1994, and 1997 set back the ecological status of the riparian area. Following 20 to 26 years of recovery, these streams now have highly stabilized streambanks, a later seral community, and a diverse composition of woody riparian plant species. However, while there are ample seedling and young woody species, there is not a taller, mature age class yet. Because of this, shade surrogate values, modeled after site potential vegetation heights, are still not met. Because shade values are highly correlated with riparian vegetation, the upward riparian trend data is also indicative of improving shade values on all streams. Since

Mosquito Creek is meeting the stream temperature standard, the shade surrogate benchmark is not an issue for water quality.

Data indicates livestock grazing has had little influence on post fire recovery of the woody riparian community in the Foothills pastures. Direct measurements of livestock browse on woody riparian plants and streambank alteration on Willow and Little Alvord creeks were taken in 2017 following the MIM (TR 1737-23) protocol. Woody use was calculated as none to slight and bank alteration was 1 percent. This lack of use is attributed to the current grazing/rest rotation that these areas receive. Grazing early in the year when upland grasses are still green often results in better livestock distribution away from riparian areas and into upland areas and provides more opportunity for regrowth of hydric herbaceous species and plant recovery. This system benefits riparian vegetation by allowing regrowth each year and by minimizing livestock use of woody plants (Elmore 1992). Shrubs are generally not grazed during this time because the green grass is more palatable (Elmore 1992).

The 2018 S&G assessment documented that Standard 2 (Watershed Function – Riparian/ Wetland Areas) was achieved for all streams within the allotment, but Standard 4 (Water Quality) and Standard 5 (T&E Species - LCT) were not achieved on Big Alvord Creek, Cottonwood Creek, and Willow Creek. These two standards are entwined as water temperature has one of the greatest effects on salmonid habitat. Because stream temperature or shade surrogate values were not achieved on half of the LCT streams, Standard 4, and thus Standard 5, were not met. Monitoring in 2021 indicates that standards are currently being met on Big Alvord Creek, with water temperatures remaining below the threshold of 72 ºF found to be optimal for LCT. Current livestock grazing management was not considered a causal factor for non-attainment, but rather geomorphic constraints and disturbance from wildfires that the streams are still recovering from is the causal factor.

All monitoring has shown that current livestock use is allowing for an upward trend in the health of riparian and stream communities within the Alvord Allotment and that all riparian areas are meeting Standard 2. Data suggests that riparian vegetation is either at or moving toward potential natural conditions under the current permitted use. Diverse communities of riparian woody species are present along each stream, which, paired with embedded rock, form highly stabilized banks.

3.2.2 Environmental Consequences

3.2.2.1 Issue Questions

- What would the effect of livestock grazing be on riparian areas and T&E fish?
- What would be the effect of range improvements on riparian areas and T&E fish?

3.2.2.2 Effects Common to All Alternatives

The CEAA for riparian, water quality, and T&E species is the Big Alvord Creek Watershed (Hydrologic Unit Code 1712000903). This includes the headwaters of all of the LCT streams that flow through the Alvord Allotment.

The RFFAs with potential to affect aquatic resources within the Big Alvord Creek Watershed are livestock grazing, irrigation withdrawals on private lands, and proposed right-of-way improvements to the Pike Creek Road.

The proposed ROW improvements would include improving a stream crossing through Pike Creek and a public parking area at the start of the Pike Creek Trailhead. Expected impacts to riparian, water quality, and T&E species resources would be from sediment entering the stream. Pre-analysis of these actions indicated that very little sediment would be delivered to the stream from road improvements and parking area construction. The amount of sediment would not exceed natural fluctuations caused from runoff events. Stream crossing type is not fully identified but would either be a hardened-rock ford or bridge spanner. Both would be designed to allow fish passage at low flow in accordance with ODFW standards for all local native fish species. Turbidity and downstream sedimentation vary based upon crossing type, but the effects would be confined to the stream reach downstream of the stream crossing. BMPs would be employed to further reduce effects of sediment entering the stream from construction activities. Full NEPA analysis would be completed for the proposed Pike Creek Parking EA prior to actions being taken related to the stream crossing. A temporary (up to 2 years) closure of the Pike Creek Road is currently in place in order to preserve riparian resource condition at the crossing until improvements can be made. As described in the no action alternative effects section below, current and proposed grazing would have very little effect on stream condition. Therefore, cumulative effects of these actions would be none to minimal.

Private water rights allow for diversion of most streams once they leave BLM-administered lands in the Foothills pastures and enter privately owned lands. These diversions make fisheries habitat highly unlikely due to limited flows during the summer months. Historically, the lower elevation portions of these streams would be seasonally dry due to geomorphic constraints, which are described in the Alvord Lakes Subbasin TMDL (ODEQ 2003). This historic record of seasonally dry conditions in the stream at the lower elevations indicates that water diversion in the lower elevation areas on private lands has not likely contributed to any cumulative loss of fish habitat.

With the exception of Mosquito Creek, which flows through the Mann Lake Allotment, all headwaters upstream of the Foothills pastures are within the Steens Mountain Wilderness No Livestock Grazing Area. Because of this, there are no expected cumulative grazing effects to these streams.

The headwaters of Mosquito Creek are located in the Mann Lake Allotment and have similar use to the Foothills pastures of the Alvord Allotment. They are both normally spring grazed (April–June) with alternate year’s rest. Monitoring shows that riparian vegetative response within the Mann Lake Allotment is on a positive trend toward potential natural condition. The proposed action includes early-graze grazing treatments in the Foothills pastures with no changes to grazing pressure. Because of that, there are no to minimal expected cumulative grazing effects to Mosquito Creek.

3.2.2.3 Alternative A: No Action

Livestock use in the Foothills pastures of the Alvord Allotment has been consistent for nearly 30 years. Livestock have been permitted to graze from April to mid-June (spring use) throughout the three Foothills pastures with alternate years rest. Livestock would continue to be naturally excluded from Indian Creek Use Area in the upper elevations of Pike Creek #9 Pasture except for periodic use when snowpack is low and the areas is accessible for livestock turnout early in the year, or in a temporary season.

Vulnerability of LCT to the effects of grazing is greatest during early development stages. During those early phases of their life cycle, fish have little or no capacity for mobility, and large numbers of embryos or young are concentrated in small areas. Cattle present in the spawning areas can trample redds, and dislodge embryos and alevins. Embryo and alevin mortality can also result from localized sedimentation of spawning beds (Bjornn and Reiser 1991). Within the Eastside Steens Watershed, cattle have access to streams and streamside areas primarily at lower elevations which generally are on private and are not inhabited by LCT. The timing of early season grazing, duration (approxiamately two months), monitoring, dense woody vegetation, and rugged terrian limits the intensity of these impacts. This alternative would not increase LCT mortality associated from grazing, but the potential threat of redd trampling would remain.

Monitoring of livestock use within the Alvord Allotment has shown that the permitted use is allowing Standard 2 to be met, and while Standards 4 and 5 are not being met, livestock are not a causal factor. This alternative would allow for continued progress to be made towards achievement of Standards 4 and 5.

3.2.2.4 Alternative B: Proposed Action - Management Changes, Range Improvements

The proposed action would continue to implement a graze-rest rotation treatment in the Foothills pastures and the effects to Standards 2, 4, and 5 would be the same as the no action alternative. The rotation in the North Foothills #2 and South Foothills #3 pastures would continue to allow use in one pasture while the other pasture receives full rest, and they would switch the second year.

The largest difference between this alternative and the no action alternative to riparian areas is the creation of the Indian

Creek Pasture and extended grazing treatments. The Indian Creek Pasture would be carved out of the upper elevation portions of the Pike Creek #9 Pasture, which are typically inaccessible during the current spring grazing due to snowpack. Currently, use in this area is limited to years with low snowpack or when a temporary season is authorized later in the year. The new Indian Creek Pasture would be assigned 222 AUMS, with a later grazing season of use than currently authorized, with alternate years of rest. This change should have no effect to Pike Creek or any other streams containing LCT in the allotment. Steep, rugged topography and several existing gap fences would keep livestock from accessing Pike Creek Pasture later in the season or other LCT streams. Therefore, there would be no effect to the threatened LCT. Terms and conditions that would be included on the grazing permit and any letters of authorization that include this pasture would specify requirements if livestock did drift into Pike Creek Pasture while permitted in the Indian Creek Pasture. These would ensure that livestock were not allowed to loaf unmanaged in Pike Creek Pasture. If livestock were to graze unmanaged in Pike Creek Pasture, it may affect the Alvord Allotment's ability to meet Standards 2, 4, and 5 for LCT, due to grazing pressure on riparian vegetation, streambank alteration from trampling, increased sedimentation, and take of LCT by cattle.

The upper elevation reach of Indian Creek Pasture would change from sporadic use in the spring, or when a temporary season is authorized, to later use every other year. Within the proposed pasture, Indian Creek is not highly accessible due to confinement and high gradient. These reaches are dominated by rock and woody riparian species, and livestock use would primarily be at water crossings. While livestock use for the Indian Creek Pasture would take place during the summer, upland vegetation at this elevation would still be green and highly palatable, reducing the likelihood livestock would browse the riparian woody species along the stream channel. At this elevation, this use would mimic spring use at lower elevation reaches. Monitoring of woody species would take place within the pasture to ensure riparian systems continue to function properly. The proposed use would not affect the Alvord Allotment's ability to meet Standards 2, 4, and 5 because livestock would be targeting the highly palatable grasses located in the uplands and protections would be in place through terms and conditions.

3.2.2.5 Alternative C: Termination of Suspended AUMs

NR use in the allotment is not associated with any of the Foothill's pastures. Therefore, there would be no effect to any aquatic species or Standards 2, 4, or 5 from the elimination of NR forage from the permit. Effects of Alternative C would be the same as those described under Alternative B.

3.2.2.6 Alternative D: No Grazing

The no graze alternative would remove livestock use from all streams within the Foothills pastures. There would be no negative impacts to vegetation or LCT or their habitat from livestock grazing. Monitoring of riparian vegetation showed positive trend in riparian condition from the current permitted livestock use. While negative impacts from livestock grazing do exist, they are currently minor and tend to happen in the short-term and on an individual, not landscape, scale. It is not expected that removal of livestock would result in measurable benefits to these resources above what is currently occurring with managed grazing.

The major factor impacting the riparian condition within the Foothills pastures was wildfire occurrence in 1992, 1994, and 1997. With livestock grazing removed from the Alvord Allotment, the risk of wildfire increases. Fine fuel accumulation, especially in areas with cheatgrass presence (often at the lower elevations), would produce fuel continuity that would increase the ability of wildfires to spread. "Annual grass invaded communities had higher fine fuel amounts, greater fuel continuity, smaller fuel gaps and lower fuel moisture content than did non-invaded plant communities. These conditions would increase the probability that ignition sources would contact combustible fuels and that fires would propagate" (Davies and Nafus 2013). The ODEQ-approved water quality restoration plan for this area identified an altered fire regime and shortened fire cycles as a result of cheatgrass invasion as a threat to water quality (ODEQ Appendix A 2003). There would be a small potential benefit and a higher potential risk to riparian, water quality, and T&E species in the Alvord Allotment under the no graze alternative.

The removal of livestock use in the no graze alternative would not affect the Foothills pastures' ability to meet Standards 2, 4, and 5, as it is currently meeting those or grazing is not a causal factor. However, if the lack of grazing use causes increases in annual grass communities, it could increase the threat of wildfire. Wildfires that remove riparian vegetation would impact the Foothills pastures ability to meet Standards.

3.3 Migratory Birds/Wildlife/GRSG

3.3.1 Affected Environment

Wildlife habitat is defined as the juxtaposition of existing soils, topography, water sources, and vegetative communities within a given area that fulfill a biological or behavioral need of wildlife species. Vegetative communities within the allotment consist primarily of sage steppe, native and nonnative bunchgrasses, juniper woodlands, desert scrubland consisting primarily of greasewood and shadscale communities, deciduous riparian trees, and shrubs where seasonally persistent or perennial water is available and playas. Available water within the allotment exists in the form of creeks, springs and seeps, snowmelt runoff, seasonally wet playas, and livestock water developments such as reservoirs, developed springs, and water troughs. Competition for water can occur in areas where water is scarce. The 2017 rangeland health assessment for the Alvord Allotment determined that Standard 5, for Wildlife Habitat, is being met at this time, but is at risk of not being achieved in the future due to annual grasses, wildfire, and/or wild horses.

In addition to the specific animals discussed below, this allotment also provides habitat for a number of small mammals including American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), black-tailed jackrabbits (*Lepus californicus*), cottontail rabbits (*Sylvilagus* spp.), deer mice (*Peromyscus maniculatus*), and wood rats (*Neotoma* spp.). Bushy-tailed wood rat (*Neotoma cinerea*) and canyon mouse (*Peromyscus crinitus*) are likely present in rimrock and other areas of rough topography. Some reptiles and amphibians such as bull snakes (*Pituophis catenifer sayi*), western rattlesnake (*Crotalus oregonus lutosus*), long-nosed leopard lizard (*Gambelia wislizenii*), western whiptail lizard (*Cnemidophorus tigris*), and western toad (*Anaxyrus boreas*) occur in this area. Game birds such as chukar (*Alectoris chukar*) are found along rimrock areas and California quail (*Callipepla californica*) are present where dense shrub habitats are available. Raptors such as red-tailed hawk (*Buteo jamaicensis*), Ferruginous hawk (*Buteo regalis*), great-horned owl (*Bubo virginianus*), turkey vulture (*Cathartes aura*), and American kestrel (*Falco sparverius*) are also common throughout the area. It is not expected any of the proposed actions would have a measurable impact on these species.

Migratory Birds

There are over seventy species of migratory birds that occur annually within the Alvord Allotment; a full list is in Table 21. Neotropical migratory birds are birds that breed in Canada and the United States during summer and spend winter south of the Tropic of Cancer. The arrival of these migratory birds varies with elevation, precipitation, and temperature each year (seasonal variation), as well as by species. Generally, migratory birds arrive from March to early May. Breeding season for migratory birds begins in mid-April with most young fledging sometime in late June to early July. Migratory birds depart for winter home ranges in late summer through mid-fall with some species, such as robins (*Turdus migratorius*), occasionally staying into the winter months.

The Migratory Bird Treaty Act of 1918 identifies 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 Alvord Allotment include current and historic grazing, noxious weed and invasive species establishment and spread, wildfires, and drought. Breeding bird surveys conducted in the vicinity of the allotment show a stable trend in species richness and abundance with changes to species composition occurring in response to wildfires and subsequent increase in species favoring grassland habitats and a corresponding decrease in shrubland adapted species (Sauer et al. 2017). Migratory bird surveys have been conducted within the vicinity of, and in, the Alvord Allotment. As adjacent surveyed habitats are similar to those present within the allotment, 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 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*).

Nesting, foraging, and perching habitat for migratory birds occurs throughout the area in and around Alvord Allotment. Available habitat located within the analysis area includes sagebrush steppe, alkali shrubland, playa, cliffs and rocks, riparian areas containing willow and other deciduous shrubs, ponds, bare ground, and both native and non-native perennial bunchgrass communities. It is assumed that habitat quality and quantity are dependent on location and the specific habitat type and patch size required for individual bird species.

Table 21: Migratory Birds Observed in the Alvord Allotment

Common Name	Scientific Name
Black-throated Sparrow	*Amphispiza bilineata*
Brewer's Sparrow	*Spizella breweri*
Brown-headed Cowbird	*Molothrus ater*
Chukar	*Alectoris chukar*
Gray Flycatcher	*Empidonax wrightii*
Horned Lark	*Eremophila alpestris*
House Finch	*Capodacus mexicanus*
Lark Sparrow	*Chondestes grammacus*
Loggerhead Shrike	*Lanius ludovicianus*
Mourning Dove	*Zenaida macroura*
Rock Wren	*Salpinctes obsoletus*
Sage Sparrow	*Amphispiza belli*
Sage Thrasher	*Oreoscoptes montanus*
Vesper Sparrow	*Pooecetes gramineus*
Western Meadowlark	*Sturnella neglecta*
Western Snowy Plover[45]	*Charadrius alexandrinus nivosus*
Yellow-billed Cuckoo	*Coccyzus americanus*

Observations made during field visits to the various habitat types within the general area 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 and cliffs, in shrubs, or on the ground is present within the analysis area where such habitat features are available. Limited tree nesting habitat is also present. Foraging habitat for migratory birds also occurs throughout the allotment and, as with nesting habitat, quantity and quality of available habitat are dependent on the type of forage being sought, the ecological condition of the site, and the patch size of contiguous habitat.

Research related to how short-term construction noise affects songbirds is limited. However, Francis and others (2009) utilized air compressor noise within songbird habitat to ascertain the distance various species of songbirds would nest from that particular noise source. Results indicated that birds were willing to nest 221–298 meters from the noise source, depending on bird species. While composition of bird species represented in the study is not necessarily representative of what species occur in the vicinity of proposed sites, represented taxonomic families are similar as well as general nesting habitat types selected.

Goals and objectives for migratory birds are the same as those for SSS (Appendix B).

GRSG

Currently, there are six active or status pending leks inside the Alvord Allotment and five outside the allotment but within

[45] Species classified as BLM Sensitive Species.

four miles of the allotment boundary. These leks are not associated with a priority area for conservation (PAC). Monitoring of leks not associated with a PAC has not been consistent, making the assessment of population trends for these leks difficult. However, current populations in the surrounding Folly Farm, South Steens/Pueblo, and Trout Creek PACs are stable or improving (ODFW 2020), and populations of GRSG in the area fall within the adaptive management thresholds as defined in the 2015 Oregon GRSG ARMPA. As GRSG habitat and populations are managed in accordance with the Andrews RMP and 2015 Oregon GRSG ARMPA, and are susceptible to the same seasonal weather and other environmental factors it is assumed that stability of relatively unmonitored populations is similar to those of more consistently monitored populations within the adjacent PACs.

Approximately 93 percent of the allotment is classified as general habitat management area (GHMA), with the remaining 7% of the allotment (the SW corner of the Desert Pasture) not being within a habitat management area. No priority habitat management area (PHMA) or PACs are present within the Alvord Allotment (Table 22). The Alvord Allotment overlaps three fine-scale boundaries within the multi-scale habitat assessment delineations. Final spatially stratified seasonal habitat suitability modeling at the mid-and fine scale are not available at this time. However, the BLM is in the process of collecting and analyzing additional quantitative GRSG habitat data in order to determine seasonal habitat suitability based on criteria established in Table 2-2 of the 2015 Oregon GRSG ARMPA and final site suitability ratings and modelling for existing seasonal habitats within the allotment based on existing plot data should be available soon. While finalized seasonal habitat models are not currently available for this area, preliminary analysis of the area has been completed. Data used in these designations is largely based on AIM and LMF plots, that look at many indicators, including perennial grass height (height may be limited by the ecological site description (ESD) and site potential). Indicators are considered together to determine suitability and are not based solely on whether or not any one indicator is achieved.

Potential winter habitat likely occurs on approximately 73 percent of the allotment (169,085 acres) where sagebrush dominated vegetation is present below 5,500 feet elevation. Spring breeding and early brood-rearing habitat is likely to occur in the same areas. Occupancy of early brood-rearing habitat likely fluctuates year-to-year based on the amount of annual snowmelt and spring precipitation that influence forb and bunchgrass production. Summer brood-rearing habitat is limited within the Alvord Allotment to sagebrush dominated areas above 5,500 feet elevation and where sagebrush occurs in close proximity to water features that provide mesic vegetative conditions with the potential to provide forbs required for GRSG chick development. Such water features are rare within the allotment and are limited to ephemeral riparian areas and springs that occur on steep, rocky gradients and farmed pivots located on private property that are adjacent to sagebrush habitats. Together, sagebrush habitats above 5,500 feet elevations and mesic areas likely to provide adequate summer brood rearing habitat conditions are estimated to occur on approximately 16,600 acres of the Alvord Allotment, largely in the Foothills area of the pasture.

Table 22: GRSG Habitat by Type

Habitat	Acres	% of Allotment
GHMA	213,578	93%
PHMA	0	0%
Sagebrush Focal Area (SFA)	0	0%
Total	**213,578**	**93%**

An IDT that included a wildlife biologist determined that Standard 5 is being met for wildlife. In addition, available lek monitoring data indicates that populations of GRSG utilizing leks within and adjacent to the allotment are consistent with trends observed in adjacent GRSG PACs. These adjacent GRSG PACS are above adaptive management trigger thresholds, as described in the 2015 Oregon GRSG ARMPA, for both GRSG habitat loss and population decline, indicating that habitat conditions are acceptable for maintaining existing populations of GRSG in the area.

West Nile Virus (WNV) was documented in GRSG in Wyoming near coal bed methane wells (Naugle et al. 2004). Water in new ponds constructed at the sites provided habitat for mosquitoes that carry WNV to live in areas that previously had little late season water. GRSG mortality was 25 percent higher in these areas versus control areas without late season water (Naugle et al. 2004). In 2006, approximately 60 GRSG carcasses/feather piles were discovered in a meadow area near Burns Junction, Oregon, approximately 10 miles from the Alvord Allotment boundary. Only three carcasses had

Table 23: Alvord Allotment – Preliminary GRSG Seasonal Habitat

Pasture Name	Spring and Summer Acres	Winter Acres
Desert #6	2,206	72
North Foothills #2	104	50
South Foothills #3	57	4
Pike Creek #9	494	83
Table Mountain #4	13,635	113
Alvord Seeding #1	0	0
TOTAL	**16,496**	**322**

enough body tissue left to be tested for WNV, which was found in all three (R. Garner, personal communication). While no instances of WNV have been documented in Harney County in GRSG populations since 2006, Malheur County has had several cases of humans infected with WNV. Areas near previous outbreaks have been checked by ODFW for evidence of WNV associated mortalities in GRSG populations but none have been found. Existing reservoirs in and near the project area have not had any known WNV outbreaks. If WNV were prevalent in the area, Malheur Lake and other nearby water sources outside of the allotment that consistently have water would be of more concern than sources in this allotment that contain only small amounts of seasonal water. The 2015 Oregon GRSG ARMPA provides guidance for BMPs and RDFs for project design that reduce mosquito reproduction and subsequent exposure to WNV by GRSG (Doherty 2007) and any relevant measures are included as PDEs.

Few studies have examined vertical transmission (female to egg) or transovarial transmission. However, existing research conducted in laboratory conditions indicated that vertical transmission was minimal, at most showing transmission occurring in 6.9 of 1,000 cases under ideal conditions (Goddard et al. 2003). The conditions in the project area are such that all areas freeze every winter, not allowing infected adult mosquitoes to overwinter. Based on research available and the conditions, professional opinion within the BLM is that there is little risk in this area of vertical transmission occurring. Therefore, unless infected mosquitoes or birds are introduced to the area, an outbreak of WNV would not be expected. Given that it is unlikely that infected mosquitoes or birds would be introduced to the area specifically as a result of the proposed action, effects of WNV to GRSG because of actions proposed in this document will not be further analyzed.

Within the allotment and across the Burns District, Aroga moth (*Aroga websteri Clarke; Lepidoptera: Gelechiidae*) infestation has contributed to sagebrush mortality, increasing the risk of catastrophic wildfire, and decreasing cover and food sources for birds. Mortality caused by Aroga moth has been observed in all sagebrush types within the district. It is believed that sagebrush mortality because of Aroga moth infestation was at least partially responsible for the large sizes of recent fires and limited number and size of unburned patches within the fire perimeters. These habitat component losses can result in declining GRSG populations due to increased nest predation and early brood mortality associated with decreased nest cover and food availability (Braun 1998, Moynahan 2007).

The Alvord Allotment is primarily bordered by barbed-wire fence. Mortality can occur if GRSG fly into and collide with fence wires, particularly during flushing events where large groups of birds fly at the same time to escape predators or some other disturbance (Van Lanen et al. 2017). The Burns District has identified hazardous fence sections throughout the district and is in the process of adding anti-strike markers to fences determined to be of high risk for GRSG collision in order to reduce instances of mortality. This is an ongoing project that should be completed over the course of the next several years.

In 2015 The Nature Conservancy (TNC) submitted a technical report to BLM modeling GRSG habitat connectivity in eastern and central Oregon. This model has not been verified on the ground, and as a model there is expected to be inherent error. However, it still provides good general information on connectivity. This model was used to identify potential barriers to movement between GRSG populations within and adjacent to the Alvord Allotment. The majority of the Alvord Allotment has Cost-weighted Connectivity Corridor Values are rated as either High or Moderate with a small portion of Low Connectivity located along the east slope of the Steens. Areas marked as Low Connectivity are located on steep, rocky slopes where vegetation is sparse or absent. Where Linkage Pinch points that would impede GRSG movements occur within the allotment, they are rated “Low”. A rating of “Low” indicates that GRSG are able to move relatively freely and are not generally limited in their routes of distribution. Based on the TNC model, the Alvord Seeding Pasture, is the only anthropogenic feature affecting GRSG connectivity within the Allotment; however, it is expected that this has minimal effect on connectivity as the pasture still provides cover in the form of deep-rooted perennial bunchgrass and sagebrush. Non-anthropogenic barriers to GRSG movement include natural features such as steep slopes, canyons, and high elevation areas where vegetation is limited. No recent or historic fires have resulted in habitat loss that limits GRSG movements. However, an expanding population of both cheatgrass and medusahead within and adjacent to the Alvord Allotment pose a significant threat of large fires in the future that would likely impact connectivity and degrade and/or remove existing habitat.

Big Game

The Alvord Allotment falls within the ODFW's Steens Mountain and Whitehorse Big Game Management Units. The Alvord Allotment contains year-round habitat for mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and bighorn sheep (*Ovis canadensis*), including designated winter range. Elk (*Cervus elaphus*) are not known to utilize habitats within the allotment and will thereby not be addressed in this analysis.

Big game populations are currently stable to increasing within the Steens Mountain Unit and slightly declining within the Whitehorse Unit. Declines within the Whitehorse Unit are likely due to large wildfires and subsequent habitat loss and conversion of sagebrush and bunchgrass communities to invasive annual grasses. Drought may also be a factor in declines as many natural and man-made water sources either dried completely or only offer water during the winter and spring months. Mule deer populations within ODFW's Harney District are currently below management objectives but have been increasing steadily over the past 6–7 years. ODFW's identified habitat for big game species is found within the allotment (Table 24). Habitat identified for mule deer is defined as winter range, while areas identified for bighorn sheep and pronghorn are defined as year-round habitat. However, all three game species that occur within the allotment occupy seasonally available habitat in the area year-round. While bighorn sheep habitat is identified within each pasture of the Alvord Allotment, no AUMs have been assigned to that species. As bighorn sheep prefer steep, rocky slopes where cattle are not likely to seek forage, these two species rarely compete for the same forage resources unless both are drawn to a water source. Forage allocations outlined in the AMU RMP for assessed allotments are listed in Table 25.

Table 24: Acres of Designated Big Game Habitat per Pasture

Designated Big Game Habitat Acres Per Pasture	Bighorn Sheep	Mule Deer	Pronghorn	Mixed Habitat Use	Total Habitat
Alvord Seeding #1	435	0	1,364	0	**1,799**
Desert #6	6,735	2	84,258	8,963	**99,959**
North Foothills #2	100	1,776	0	4,022	**5,897**
Pike Creek #9	1,332	321	0	3,629	**5,281**
South Foothills #3	307	52	0	3,693	**4,052**
Table Mountain #4	19,646	0	0	0	**19,646**
Total Habitat	**28,555**	**2,150**	**85,622**	**20,307**	**136,634**

Table 25:Forage Allocation to Big Game (AUMs)

	Bighorn Sheep	Mule Deer	Pronghorn	Total
AUMs	0	244	20	**264**

3.3.2 Environmental Consequences

3.3.2.1 Issue Questions

- How would the proposed alternative affect the various GRSG seasonal habitats?
- How would the level of livestock use under the alternatives impact grassland obligate ground-nesting migratory birds?
- How would the proposed alternatives affect big game species that occur in the area?

3.3.2.2 Effects Common to all Alternatives

The proposed alternatives are designed utilizing principles of proper grazing with the goal of sustainable use that provides ecological benefits to wildlife and their habitats within the affected area. As proposed grazing changes and range improvements would change the distribution of cattle throughout the affected pastures and, thereby, alter the vegetation that provides habitat for migratory birds, the CEAA for impacts resulting from proposed changes in grazing management would include all of the Alvord Allotment and extend five miles beyond the allotment boundary. The CEAA for impacts to migratory birds specifically related to sound disturbance would include an area extending 300 meters around each construction site and would persist for a period of one week after construction. The CEAA for big game occupying habitats within the Alvord Allotment includes all available habitat within the Steens Mountain Management Unit. The CEAA for GRSG extends up to 10 miles beyond the allotment boundary. As 80 percent of GRSG occupy habitats within 4 miles of a lek (Coates et al. 2013), a 10-mile buffer would encompass regular movements of virtually all GRSG that may be using the allotment. Vegetation communities in the allotment are representative of those across the CEAA. As the Alvord Allotment and surrounding area fall within an extremely remote area with very little development, anthropogenic disturbance in PHMA habitat within the CEAA falls well below the 3 percent threshold. There are currently no plans for any significant anthropogenic developments within the CEAA that would exceed the 3 percent disturbance cap as described in the 2015 Oregon GRSG ARMPA in the reasonably foreseeable future.

RFFAs within the CEAAs that have influenced wildlife within the allotment include wildfires, fire rehabilitation, livestock grazing, wild horse grazing, seeding, noxious and invasive weed control, restoration treatments, range improvements (including collision fence marking for GRSG), drought, and maintenance, collision fence marking, road maintenance, and recreation activities.

In addition, BLM has also developed a District programmatic plan to address restoration and improvement of natural water sources and is in the process of developing a strategy (with appropriate NEPA) to provide water for wildlife within and adjacent to the Alvord allotment where long-term drought has impacted historic water sources. Timelines associated with these events are long term and would persist in the affected areas until native shrubs and other plants are recovered to the extent that they provide adequate forage and cover for big game. Recovery time would range from one growing season to thirty years, depending on the severity of damage to available habitat in terms of loss of water sources, weed infestation size and extent of native vegetation loss, and size of fires and resulting native vegetation mortality. Continued drought would also delay habitat recovery in areas affected by fire and infestations of invasive plants. Combined, increased competition from invasive plants and the subsequent risk of large wildfire could contribute to long-term population declines within the CEAAs.

3.3.2.3 Alternative A: No Action

Under this alternative, no grazing management changes or range improvements would be implemented. Current season of use allows for cattle grazing during the nesting season for migratory birds (April 15–July 15) in the Alvord Foothills, Table Mountain #4 and Alvord Seeding #1 pastures. Given that cattle may inadvertently trample nests, grazing during this time period could result in damage to the nests, eggs, and nestlings of ground and low shrub nesting birds. Occurrences of nest trampling could have an adverse effect on individual birds, but such incidents of nest trampling are few due to utilization limits and the fact that cattle typically avoid shrubs while grazing, and are not likely to affect the population of any given species. Prescribed grazing that occurs during the breeding season for migratory birds alters the nesting environment, particularly for ground and low shrub nesting species. Grazing cattle can affect reproductive success by reducing the amount of new growth vegetation, which can result in decreased availability of potential nest sites (Harrison 2011; Ryder 1980). Decreased ground vegetation also decreases the amount of hiding cover for ground nesting species, which can result in increased nest predation (Fondell and Ball 2005, Keyser et al. 1998, Picman 1988, Ryder 1980). Cattle present during the nesting season can also trample nests (Guthery and Bingham 1996, Koerth et al. 1983, Paine et al. 1996, Sharps et al. 2017). However, as grazing thresholds would not change under the proposed grazing prescription, resources currently available for seasonally residing migratory birds within the allotment would remain the same. As such, areas of the allotment near reliable water sources would continue to be disproportionally affected by concentrated livestock and wild horse use when compared to available upland habitats with sufficient residual vegetation for nesting in the uplands. However, given the scarcity in of water sources throughout the allotment, underutilization of upland habitat by nesting birds is likely to continue.

As this action would continue current grazing management practices and would not allow for the construction of any new range developments, available habitat would remain the same. Water is a very limited resource in the Desert #6 and Table Mountain #4 pastures. Several reservoirs that were once reliable sources of water for wildlife have either dried up because of long-term drought conditions or only provide water during late winter and early spring. Available sources of water in these areas may be separated by many miles, forcing wildlife to either travel long distances to drink or abandon potential habitat between water sources to remain relatively close to water. The distribution of cattle would remain the same, water sources and adjacent wildlife habitat would not change, and available vegetation would remain the same as what is currently available. Therefore, there would not be an increase or decrease in forage competition and/or displacement of big games species utilizing the allotment from what occurs currently. However, should current distribution of cattle remain unchanged, in underutilized areas, particularly in pastures where cheatgrass and medusahead continue to persist, expansion of these invasive annual grasses and subsequent accumulations of fine fuels resulting from annual growth would continue to pose an increased threat of large wildfire and subsequent loss of habitat and potential alteration of the existing ecosystem. This would be expected to be highest during drought years and lowest during wet years since in those years there is more late-season water, and the use area would expand to include areas around variable water sources.

3.3.2.4 Alternative B: Proposed Action

Under this alternative, proposed grazing changes would improve distribution of cattle into areas where invasive annual grasses persist, particularly in pastures where grazing occurs during the winter and early spring months when newly sprouted invasive annual grasses are likely to be targeted by cattle. Decreased accumulation in new growth of invasive annual plants would result in a decrease in fine fuel accumulation and distribution thereby reducing contiguous fine fuels that contribute to large fire growth. Targeting of invasive annual grasses by cattle, particularly in the winter and early spring, would also reduce competition for native vegetation that typically germinates during the spring after invasive annual grasses have already established. Reducing and inhibiting the expansion of invasive annual grasses and improving growing conditions for native vegetation would provide additional forage opportunities that would be beneficial for big game species.

Proposed range management changes, including NR use or reinstatement of suspended AUMs, would not increase overall utilization above what is currently authorized; therefore, the effects of forage consumption by cattle to migratory bird habitat would be the same as current grazing practices. This is especially true when compared to years when full suspended use was used as NR AUMs. The proposed season of use changes in the Foothills area would continue to allow grazing during the nesting season for migratory birds (April 15–July 15) could result in impacts to ground and low shrub nesting birds. In the Indian Creek Pasture, use would be authorized to occur later in the year, more regularly, which may increase use during late nesting season since these areas were not grazed (regularly) before due to access. Occurrences of nest trampling could have an adverse effect on individual birds, but such incidents of nest trampling are few due to utilization limits and are not likely to affect the population of any given species. As alternating years of graze treatment would continue to occur, this increased (but still low) risk would only be present every other year in those pastures.

Late-season use of identified GRSG habitat would decrease residual cover the following spring and may reduce nest success in areas used by GRSG for nesting. However, since utilization levels would remain at or below the target level of 50 percent under each grazing alternative, which would leave residual vegetation for forage and nesting cover, it is expected that nest success would not measurably change from current success rates within the allotment. Grazing changes that include allowing growing season grazing in GRSG brood-rearing habitat may also reduce forbs, identified as being important for juvenile GRSG, resulting in increased chick mortality. Utilization limits would also result in forbs being left after grazing and they protect the site from being fully searched. Grazing that occurs in the late summer through winter would not reduce forbs as grazing wouldn't occur during the growing season. Proposed grazing changes and range improvements would improve distribution of grazing throughout the allotment, which would limit this effect of grazing in any one area. Improved distribution and utilization of invasive annual grasses and fine fuels would be beneficial to wildlife and reduce the potential for large catastrophic wildfires and subsequent habitat loss that would alter plant communities and ecological function within and adjacent to the fire area for the foreseeable future and result in habitat loss for GRSG and other wildlife.

Alternative B includes a permanent increase in AUMs within the Desert #6 Pasture. However, these AUMs have been authorized in the past as NR AUMs. The Desert #6 Pasture provides habitat for all three big game species occurring in the Alvord Allotment. As utilization would remain at or below 50 percent with or without additional AUMs, the amount of available forage for wildlife would be the same as what is currently available in years when the suspended use is taken as NR AUMs. However, since the increase in AUMs is contingent on the construction of new wells, in an area outside of the current use area, the forage removed by reinstating the suspended AUMs would be expected to be in an area not currently grazed by livestock, spreading livestock use over a larger area. In general, most wildlife are tolerant of cattle, and their presence has little or no effect on normal behavior. However, the presence of cattle may result in the temporary displacement of some wildlife species in affected areas, bighorn sheep and deer, in particular. Displaced wildlife would likely occupy adjacent available habitat when cattle are present and return to occupy those areas once cattle are removed. Due to the large size of the Desert #6 Pasture, it is expected that these areas would still be within the allotment. As the utilization cap for grazing would remain the same regardless of the number of cattle present, an increased number of cattle could reach the utilization limit on available forage more quickly, thereby reducing the amount of time cattle would be present within the pasture and subsequently reducing the length of time temporarily displaced wildlife are affected by the presence of cattle. Species that tolerate the presence of cattle would not be affected.

Adding deferred grazing to the Table Mountain Pasture would allow cattle to graze on available forage after the growing season. While the amount of forage removed would be the same as under Alternative A, when defer grazing occurred the later season would eliminate the potential for regrowth to occur after grazing, which may reduce the amount of post-growing season vegetation available. While some new growth may begin to occur before migratory birds begin nesting in mid-April, the reduction of residual post-growing season vegetation could decrease the amount of hiding and thermal cover for ground-nesting birds slightly beyond what currently occurs and may lead to a slightly increased risk of nest predation and reduced nest success. However, the risk of this occurring would be minimal as utilization thresholds would remain in place and residual cover available should still provide adequate protection from weather and predators. As with migratory birds, cattle presence within GRSG nesting habitat increases the risk of nest trampling and subsequent nest destruction and mortality of eggs and nestlings (Sharps et al. 2017). However, GRSG tend to nest under sagebrush canopy that cattle are likely to walk around rather than through. Therefore, the risk of cattle trampling nests would be less than would be expected for ground-nesting birds that construct nests in the open or under grass cover. Incidental trampling would be rare and would not have a measurable effect to a given population over time.

All construction activities would be in conformance with BMPs, PDEs, and relevant management direction (MD) and objectives as described in the 2015 Oregon GRSG ARMPA. Proposed range improvements would occur on small sites within habitat. However, cattle are expected to congregate at newly constructed water sites. Congregation can lead to overutilization of vegetation near the water site and soil compaction that would reduce migratory bird habitat in very small, impacted areas (typically <1 acre but typically no more than 5 acres). Reduction in habitat would be very small cumulatively considering the size of the allotment and the availability of adjacent habitat. While the allotment is considered GRSG habitat, and is important to GRSG, all developments would be outside the most important habitat (1.2 miles of a lek) and the small, disturbed sites in such a large allotment would be offset by the benefit of improved distribution that would occur for both livestock and wild horses which are present year-round. Improved distribution and development of additional water sources would also be beneficial as it would reduce continued overutilization of vegetation near the few existing water sites. Improved distribution would also be beneficial to migratory bird and wildlife habitat overall as it would result in more even consumption of forage and subsequent reduction in contiguous fine fuels that contribute to an increased risk for large wildfire.

Construction activities that may take place from September through March would be expected to result in negligible levels of disturbance to GRSG since GRSG are not as dependent on specific seasonal habitats during that time. GRSG temporarily displaced by construction activities would be expected to return to normal activities at and adjacent to the disturbed site shortly after construction activities have ceased. Should construction occur from June 15 through July, there could be localized disturbance to nesting within a 0.5-mile radius of the activity. Initially, there would be about 0.25 acre of habitat impacted by construction activities. These areas would be rehabilitated once construction is completed. Rehabilitation would include revegetation of native plants and invasive weed treatments. Permanent disturbance would be approximately 0.01 acre at each site. Construction March to June 15 may disturb lekking GRSG but this would be minimized by following GRSG ARMPA RDF 19, which limits disruptive activities to two hours after sunrise. Some disturbance to nesting birds may also occur during this time.

Construction of water sources at each site is expected to be completed in less than one week. The timing of construction is dependent on availability of resources and funding and may occur during the nesting period (April 15–July 15); however, PDEs from the 2015 Oregon GRSG ARMPA would be followed. Should construction take place during the nesting season, nests, eggs, and nestlings located inside the immediate construction area are at risk of being damaged or destroyed by vehicles or equipment. This would be mitigated by surveying the site prior to beginning construction to identify occupied nest sites within the work area in order to avoid harm to nests, eggs, and nestlings. Should nests be located on the site, construction would either be delayed until nesting is complete, or nest sites would be identified and avoided. Given that compressor noise would be similar to the loudest noise that would be produced during proposed construction, it is assumed that birds within a conservative range of 300 meters may be affected by noise generated by construction activities during the nesting season. Birds nesting or otherwise occupying habitats within 300 meters of construction sites may temporarily avoid the area while work is taking place. Individuals displaced by construction activities would likely move to adjacent habitat and resume occupancy of the disturbed site shortly after work ends each day and continue normal activities after construction activities are completed. As construction would take place over a relatively short period and avoidance measures would be in place, no measurable negative long-term impacts to migratory birds, GRSG, or their habitat are expected as a result of proposed construction and improvements.

Increased availability of water resulting from proposed range improvements would benefit migratory birds. As water availability is a limiting factor for migratory birds in some areas of the Alvord Allotment, improvements to existing developments, new developments, or water hauling would increase availability and access to water for migratory birds utilizing adjacent habitats and would likely result in a beneficial effect to migratory birds. All new troughs would be required to have a bird ramp, which would remove the risk of drowning. Areas within 0.25 mile of the new wells and troughs would show reduced grasses and forbs due to increased presence of cattle and subsequent utilization of vegetation and soil compaction resulting from hoof action. As grasses and forbs are important food sources for young GRSG, if sites occurred in brood-rearing habitat, female GRSG with broods would have to search outside these small areas for sufficient food. Should impacted areas occur in nesting habitat, GRSG may experience nest failure resulting from loss of vegetative hiding cover and subsequent predation. However, if these new congregation areas were established prior to nesting, it is expected that GRSG would not nest in these areas and impacts would be reduced to negligible. GRSG utilizing troughs provided for cattle as a source of water would be at risk of predation due to the lack of hiding cover around those features. However, the addition of water sources may allow GRSG to utilize habitats that may not otherwise be available. Similar effects with regard to construction activities and the creation of new water developments would also be expected for other wildlife.

The sagebrush plant communities that support GRSG are very complex and successionally dynamic as are the effects of livestock grazing within these communities, often making it difficult to form large-scale conclusions about the impacts of current livestock grazing practices on GRSG populations (Crawford et al. 2004). However, research suggests it is possible for livestock grazing to be managed in a way that promotes forage quality for GRSG since grazing can set back succession, which may result in increased forb presence (Vavra 2005). Anderson and McCuistion (2008) found grazing management, when upland birds are present, should be flexible, but limited to a light to moderate use (30–50 percent utilization) with deferred or rest-rotation grazing to limit grazing disturbances during critical bird life stages such as nesting. Anderson and McCuistion (2008) also acknowledged the complexity of managing grazing within GRSG habitat and determined no one grazing system is best suited in all cases but should be site specific. When grazing is periodic (versus continuous) and allows forbs to regrow or prevents their utilization by livestock, the number of forbs available to GRSG may increase (Vavra 2005). They recommended light to moderate use in their conclusion; this level can increase forb quality and quantity since grazing can delay the maturation of forbs, extending their availability throughout the season (Anderson and McCuistion 2008). Proposed grazing management is in line with above recommendations and would not be expected to have any effect on GRSG. As utilization within the allotment would have the same thresholds, the total amount of forage that can act as cover for GRSG would be no greater than under the no action alternative. Even with additional developments, there would still be large areas of accessible habitat that would receive little or no defer grazing, which can provide the required habitat characteristics without any modification by livestock, though modification by wild horses may still occur.

Currently the Alvord Seeding is rated “moderate” for cost-weighted connectivity. Based on the TNC model, “moderate” falls between “high” and “low”, meaning that the site is of “moderate” significance with regard to its value as connectivity habitat. Per ARMPA MD SSS 12, the BLM is required to look at areas outside of PHMA that function as connecting habitat when doing analysis. During seeding maintenance in the Alvord Seeding, if sagebrush cover was reduced to below 15 percent it would likely reduce the connectivity rating to “low” within the affected area and may reduce its value with regard to GRSG use. Removal of sagebrush would also likely increase the barrier posed by the presence of the seeding to GRSG movement from “low” or “moderate”, based on the TNC model, to “high” meaning the presence of the seeding would increase as a barrier to GRSG movement (due to the reduction in cover). However, given the relatively small footprint of the pasture on the landscape and within the connectivity corridor, and that the seeding has been maintained as such for over 50 years, impacts to GRSG movement within the Alvord Allotment would be minimal. Negative effects to connectivity habitat could be avoided if adequate sagebrush cover (≥15 percent) is retained as part of seeding maintenance. While the ARMPA Table 1-6 does have an objective to keep a minimum of 15 percent sagebrush cover on site during sagebrush removal activities, such as brush beating, that objective is specific to PHMA. The ARMPA does not provide an objective specific to GHMA. The Alvord Seeding is also outside all 4-mile lek buffers. Brushbeating in strips or mosaics per ARMPA MD VEG 15 would help to minimize the impact to GRSG, including connectivity, since sagebrush would be left throughout the pasture in strips or islands. While native species would be preferred to maintaining the seeding with crested wheatgrass, site characteristics, including the presence of invasive annual grasses, would make reseeding with natives unlikely to be successful with a low probability of establishment. Crested wheatgrass provides the same function as other deep-rooted grasses and helps protect the site from further annual grass invasion. Other proposed range improvements and grazing schedule changes would not impact connectivity or increase barriers to GRSG movement.

Overall, it is expected that increased water availability would be beneficial to wildlife, as water is a limiting resource for habitat occupation in areas of the allotment where water is scarce. Improved dispersal, particularly in the winter use allotments, would allow for targeting of invasive annual grasses while native bunchgrasses are dormant. Reduced competition by invasive annual grasses to native plant communities would improve habitat conditions for wildlife and reduce the risk of catastrophic wildfires that may potentially destroy habitat and alter the ecology of affected areas for the foreseeable future.

The Alvord Allotment is 213,578 acres of the 3,055,778 acres of the Burns District. This represents about 7 percent of the total District area. This EA is proposing development on a small number of acres within the allotment. The actions proposed in this EA would not increase grazing utilization but would allow an additional 1,670 AUMs on the landscape or until utilization thresholds have been reached. If more cattle would be present at a given time, it can be assumed that utilization limits would be reached in a shorter duration of time before cattle are removed. Increased numbers of cattle over a shorter duration would not likely have a measurable impact to SSS or wildlife as utilization of vegetation would remain the same. Proposed management changes and range improvements would improve dispersal of cattle throughout the allotment while utilization of available vegetation would remain the same. Therefore, proposed grazing changes would not further fracture or degrade the landscape and would result in no net loss of remaining, intact sagebrush communities on the landscape. Consequently, impacts of proposed grazing changes and range improvements throughout the allotment are expected to be negligible or have a positive effect to GRSG and other wildlife.

3.3.2.5 Alternative C: Termination of Suspended AUMs

Under this alternative the effects to migratory birds, GRSG, and big game would be similar as under Alternative B as all range improvements would still occur, as would changes in grazing management. However, under this alternative the currently suspended AUMs would be fully terminated, and no NR AUMs would be authorized in any year. This would result in fewer AUMs being removed in the long-term under this alternative than under any other grazing alternative. With fewer AUMS removed, fine fuels would accumulate at a faster rate, which would increase the risk of catastrophic wildfire beyond Alternatives A and B, but it would still be less than under Alternative D. However, as fewer AUMs would be taken, the risk of impacts to nests would be reduced and there would be less competition between livestock and wildlife for forbs when compared to Alternatives A and B. While these changes would occur, it is not expected these things would result in population changes under any alternative, therefore, these changes are not expected to result in a population level increase or decrease to any wildlife species as the effects would be localized and affect individuals.

3.3.2.6 Alternative D: No Grazing

Under this alternative, there would be no effect from livestock grazing, well construction, reservoir improvement, or fence construction as none of these activities would occur. Removal of cattle would eliminate the need for barbed-wire fences, unless needed for wild horse management, adjacent allotments, or private property. Removal of interior barbed-wire fences would eliminate incidents of mortality when GRSG and other wildlife collide with wires but this would be minimal as most fences are needed for wild horse management. As grazing reduces accumulation of dead plant material, removal of cattle could have a negative effect on plant vigor and increase the likelihood and severity of wildfire due to fine fuel loading.

Removing cattle from the allotment would reduce the risk of nest trampling and removal of hiding cover for migratory birds due to cattle grazing. However, removal of cattle would also increase the likelihood of large fires and subsequent alteration of current vegetative conditions to a more fire-prone ecological condition. An ecosystem dominated by invasive annual grasses and subsequent frequent fires would reduce habitat diversity and subsequently alter and reduce the diversity and abundance of migratory bird populations.

As removing cattle from the allotment would eliminate the need for additional range improvements or developments, proposed range infrastructure changes would not take place and would subsequently have neither positive nor negative effects. Removing cattle would reduce competition for available forage, which would benefit wildlife. However, as invasive annual grasses are capable of cold germination, these species begin their growth cycle in late fall to early winter. The green forage produced by these grasses is frequently targeted by cattle. Reduced abundance of invasive annual grasses because of grazing improves the ability of native forage to compete for growing space when they begin their growth cycle in the spring. As native vegetation is important for native wildlife for forage, hiding cover, and maintaining ecological integrity of wildlife habitat, winter grazing that reduces the abundance of undesirable plants can be beneficial to wildlife. Removing grazing from the allotment would allow for the accumulation of dead plant material and invasive annual grasses that contribute to a greater risk of catastrophic wildfires that may destroy habitat and alter the ecology of the affected area. Removing cattle would not negate the need to maintain developed water sources. These water sources are used by wild horses and have become important for wildlife as long-term drought conditions and the presence of wild horses have impacted naturally occurring water availability.

3.4 Social and Economic Values

3.4.1 Affected Environment

The socioeconomic planning area is Harney County.[46] 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.[47]

[46] 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. Available at: https://headwaterseconomics.org/tools/economic-profile-system/#demographics-report-section.

[47] State of Oregon Employment Department, using data from U.S. Bureau of Economic Analysis. Available at: https://www.qualityinfo.org/-/-per-capita-personal-income-in-oregon.

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 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 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. Census 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 study area. Many ranching operations rely on public lands for livestock grazing during some portion of the year. Regulations and management decisions concerning these lands have the potential to significantly affect the operation of ranches throughout the County. Allotments support agricultural jobs and income as well as the ranching way of life for many families. Communities surrounding the project area 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.

The Alvord Allotment provides forage for cow-calf livestock operations[48] from December through June. The Andrews/Steens RMP/ROD allocated a total of 7,355 active[49] AUMs and 1,892 suspended[50] AUMs for livestock grazing.

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[48] A cow-calf operation is a method of raising beef cattle in which a permanent herd of cows is kept by a rancher to produce calves for later sale.

[49] Active use means the current authorized use, including livestock grazing and conservation use. Active use may constitute a portion, or all, of permitted use. Active use does not include temporary nonuse or suspend use of forage within all or a portion of an allotment.

[50] Suspension means the temporary withholding from active use, through a decision issued by the authorized officer or by agreement, of part or all of the permitted use in a grazing permit or lease.

The active permitted use calculates to providing forage for 1,245 cow and calf pairs for 4.5 months and 700 cow and calf pairs for 2.5 months. The cows, assuming an 85 percent calf crop, would produce an estimated 1,653 calves.

Generally, calves are sold when they are weaned from their mothers. For a livestock operation that only calves in the spring, the sale of weanling calves is likely the main basis for annual income. Based on the current price, $1.6236/lb. for feeder cattle (Koontz 2021) at a sale weight of 500–600 lbs., the sale of livestock from the allotment would generate a gross income of about $811.80-$974.16 per calf.

In addition to the active permitted use, up to 1,892 AUMs of NR is permitted from December 1 to April 15 in years of favorable forage and water availability. This equates to approximately 420 cow-calf pairs over the 4.5-month period. However, the NR AUMs represent a non-secure source of forage for the permittees. Climatic and vegetative conditions are the driving factor for whether NR is permitted in any given year. It is difficult for a producer to be able to suddenly increase their herd during more productive years as well as find additional forage for the remainder of the year. Because of this, the overall value of the NR is reduced.

While public land permits cannot be sold (only transferred), they do increase the property value of the ranch holding the permit. Various factors have been explored to explain this effect. Significantly, the research has found that the added forage and permit fees for grazing on public lands do not entirely explain the increase in property value associated with the permit itself. Research has found that the added acreage associated with a public land permit is perceived as adding semi-private open space to the property thus increasing the value of the ranch (Rimbey et al. 2007).

3.4.2 Environmental Consequences

3.4.2.1 Issue Question

- What are the anticipated costs associated with the implementation of the alternatives?
- What are the economic effects of the alternatives on the local economy?

3.4.2.2 Effects Common to All Alternatives

The CEAA for this EA is Harney County. RFFAs include new recreation infrastructure within the Alvord Allotment and continued grazing on public lands throughout the county. Under all alternatives, public lands in and around the allotment would continue to contribute to other social amenities such as open space and recreational opportunities. These amenities encourage tourism in the surrounding region and provide economic benefits to nearby communities such as Crane or Burns.

3.4.2.3 Alternative A: No Action

This alternative would analyze issuing a grazing permit on the Alvord Allotment for ten years with the current terms and conditions. This would continue grazing management as it is currently authorized on the grazing authorization. No new range improvements would be constructed.

This alternative would result in the BLM issuing a grazing permit for 7,355 AUMs. The permit is estimated to allow for production of about 1,653 calves each year, with forage being provided by Alvord Allotment for 4.5 to 7 months. A rough estimate of how this would translate into jobs and labor income was developed using estimates from the Jarbidge RMP/Final Environmental Impact Statement (BLM 2014). 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 are therefore used in the analysis.[51] As a result, the 7,355 AUMs could be expected to generate at least 29 jobs and $506,906 in labor earnings. There would be no potential additions to the local economy through range improvements. As NR use could be authorized under this alternative, there could be a higher economic benefit in years when that NR grazing occurred.

3.4.2.4 Alternative B

This alternative was developed by a BLM IDT based on scoping and in coordination with the permittee. One 10-year livestock grazing permit would be issued for Alvord Allotment. This alternative would result in the BLM issuing grazing permits for 9,247 AUMs. Under this alternative, the permittee would be able to support more cow-calf pairs and produce more cows than under Alternative A since the suspended AUMs would become active use AUMs and would be available every year, along with potential for additional NR AUMs in years of high production. Using the assumptions described under Alternative A, these AUMs would be expected to generate at least 37 jobs and $637,303 in labor earnings. As NR use could be authorized under this alternative, there could be a higher economic benefit in years when that NR grazing occurred.

Range improvements would be constructed, including removal of 1.05 miles of fence, construction of 8.9 miles of new fence, installation of 7 new wells and up to 11 new troughs, maintenance of 4.8 miles of pipeline, and approximately 2 miles of new road. 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 $146,850. Fence removal is estimated to cost $4,000 per mile, for a total of $4,200. The BLM currently estimates new wells to cost approximately $80,000 each to drill, plus approximately $5,000 per trough for materials and labor. Pipeline reconstruction is estimated at $15,900 per mile for labor and materials. While road construction would occur, it would be done largely through the passage of vehicles, not construction, so that cost would be variable and expected to be small, less than $5,000. Considering all proposed developments, Alternative B would result in a total of $847,370 in labor and materials. These costs to hire a contractor would be paid by the BLM or the permittee; if the contractor is a resident who purchases supplies in the area, there would be additional local economic benefits, although this cannot be guaranteed and would depend on the contracting process results.

3.4.2.5 Alternative C - Termination of Suspended AUMs

The effects of this alternative for grazing AUMs would be similar to those described under Alternative A. However, as no NR forage would be authorized under this alternative, there would be no potential for higher economic stimulus in years where forage production is high. As the same range improvements proposed under Alternative B are proposed under this alternative, the economic effects associated with range developments would be the same as described under Alternative B.

3.4.2.6 Alternative D: No Grazing

Under the no grazing alternative, forage from Alvord Allotment currently used to support ranch operations would not be available. The BLM would not issue a grazing permit for the Alvord Allotment. No new range improvements would be constructed, and existing rangeland improvements would not be maintained unless needed for other resources. This alternative would result in the BLM not authorizing any AUMs on BLM-managed land within the allotment; permitted livestock grazing would be completely removed from all BLM-managed land. The affected permittee would need to identify a different source of forage either by leasing other lands for grazing (if available) or from grown or purchased hay. Based on current hay market prices in Harney County, it would cost approximately $523,676.00 to replace the lost AUMs. It is expected that the ranch operator would reduce herd sizes. No jobs or labor earnings would be generated by the AUMs, and there would be no potential additions to the local economy through range improvements. In addition, the property value of the ranch would also decrease without a BLM permit attached to it. One model suggested the value of this in eastern Oregon was $112.00 to $160.00 per AUM in 2007 (Rimbey et al. 2007). If this figure held true today, property values could be decreased by $823,760.00 to $1,176,800.00.

[51] 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.

In addition to this economic impact, there would be a social impact given that 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 (Lewin et al. 2019). The loss of a ranch operation can have an adverse effect on community cohesion and other social conditions. The loss of ranching operations can affect schools and local businesses as school aged children and families who operate small businesses in these small communities are forced to find employment elsewhere. This effect would only be seen under this alternative.

3.5 Visual Resource Management

3.5.1 Affected Environment

The project area consists of classic basin and desert plateau topography. Landscapes can vary from desert sagebrush flats to rough, rocky jagged escarpments. Representative colors can vary with the season and moisture levels. Browns, tans, yellow, greens, grays, and reds are most common. VRM classification also varies within the project area. It is worth noting that the majority of proposed range improvements are with VRM class IV lands, allowing for the most landscape modification.

VRM class objectives are applied to spatially delineated visual management units designated for all BLM public lands during the land use planning process. Each VRM class objective is definitive, authoritative, and measurable. They establish the thresholds of allowable visual change to the landscape character and set forth the criteria to which land use authorizations shall conform. These area-specific objectives provide the standards for planning, designing, and evaluating future management actions when implementing the land use plan.

3.5.2 Environmental Consequences

3.5.2.1 Issue

- How do proposed range improvements affect visual resources within the project area?

3.5.2.2 Alternative A

No new range improvements or other developments are proposed in this alternative, therefore, effects to visual resources would remain unchanged.

3.5.2.3 Alternative B

This alternative includes proposed range improvements. It is worth noting that all proposed developments described are in remote areas along rarely traveled roads.

Seven new wells are proposed in the Desert #6 Pasture. A road would be constructed to the well in section 14. This road would be approximately 2 miles long and would primarily be constructed by the passage of vehicles. Within the Desert #6 Pasture, 3.1 miles of existing but non-functioning pipeline would be repaired and maintained and at least one but up to two new troughs would be placed along the maintained pipeline. The second trough may be placed at the end of the maintained pipeline, as an alternative to the pipeline crossing the road and entering WSA to drain in an existing reservoir (as occurred following initial construction). Draining the pipeline into the existing reservoir just inside the WSA boundary would remove one of the proposed troughs but extend the pipeline. The existing reservoir is located in VRM Class I. The extended pipeline would follow original construction, would be buried, and would empty into an existing reservoir. The level of change to the existing landscape would be very low and would not attract attention. Draining into the existing reservoir would also eliminate the potential landscape alteration of an additional trough.

Within the Alvord Seeding #1 and proposed Alvord South Seeding #11 pastures, an existing non-functional pipeline would be reconstructed. New pipe would be laid in the same location as the existing pipeline and in the same footprint as the existing pipeline, reducing visual disturbance. Two troughs would be installed on the maintained pipeline to replace two existing metal 4 by 10 troughs. Changes to the landscape could be noticeable initially during and after construction, but over time (less than 5 years) those changes would disappear with the growth of new vegetation.

Each of the proposed range developments described above is located within VRM class IV lands.

Class IV land objectives are to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and may be the major focus of viewer attention. These developments meet VRM class objectives.

PDEs would be used to reduce visual impacts. Water troughs would have coarse rock placed around them to assist in blending the site with the surrounding area. Vegetative and topographic screening would be utilized as much as possible to minimize visual disturbance at well sites. Storage tanks, where required at wells, would be painted to blend in with the surrounding landscape. The color would be chosen from the BLM Standard Environmental Color chart and would be approved by BLM prior to painting. Disturbed areas would be seeded with native, or desirable nonnative, species to increase the rate of recovery.

Alternative B also proposes the construction of additional fence.

Alvord Seeding #1 would be divided using a 1.7-mile-long division fence (Appendix A: Map 5 - Proposed Range Improvements). The fence would be constructed from T. 33 S., R. 34 E., section 13, NE¼SE¼ to T. 33 S., R. 35 E., section 8, SE¼NE¼. This proposed division fence is in both VRM class II and III lands. VRM class III management objectives are to partially retain the existing character of the landscape. The level of change can be moderate and may attract attention but should not dominate the view of the casual observer. This development meets class III objectives. VRM class II management objectives are to retain the existing character of the landscape. 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. This development meets class II objectives.

Alternative B also proposes moving the pasture boundary fence between the new Alvord Seeding South #11 and the Desert #6 Pasture further south. This new fence would be approximately 7.2 miles long. The 1.05 miles of existing pasture boundary fence would be removed. This proposed fence follows the boundary of multiple VRM land classes. A development of this type meets objectives for VRM classes II, III, and IV. This fence would be located on the opposite side of a road, adjacent to VRM class I lands. Class I management objectives are to preserve the existing character of the landscape. A linear development such as a fence does present some visual contrast that would be visible from VRM class I lands. This proposed fence would meet VRM objectives as long as it is constructed fully outside of VRM class I lands.

Fences would be constructed to BLM specifications for a 4-strand, barbed wire fence. Posts would be standard metal posts and solid green in color. Green, brown, or gray steel braces and stretch panels would be used to reduce additional visual impacts.

3.5.2.4 Alternative C - Termination of Suspended AUMs

This alternative contains proposed range developments described and analyzed above. Therefore, the effects would be the same as under Alternative B.

3.5.2.5 Alternative D - No Grazing

This alternative proposes the removal of all grazing activities. The removal of grazing activities and gradual degradation of range improvements could gradually improve visual resources as visual contrasts are reduced over time. However, many range improvements would continue to be maintained for use by wild horses, reducing this effect.

3.6 Wilderness, WSA, and Lands with Wilderness Characteristics

3.6.1 Affected Environment

Wilderness

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 the foothills area of the Steens Mountain from Pike Creek in the southern portion to Mosquito Creek in the northern portion. This segment is about 8.5 miles long. There are segments of wilderness in the North Foothills #2 and South Foothills #3 pastures and the Pike Creek #9 Pasture. The proposed Indian Creek Pasture is entirely within wilderness and is adjacent to the no livestock grazing area of the CMPA.

The proposed Indian Creek Pasture is in the upper elevations of the mountainous terrain of the larger Pike Creek #9 Pasture. Range developments within the proposed Indian Creek Pasture date back to the 1960's. In 1989, the Indian Creek Area was part of the Serrano Point Allotment, as its own pasture, with a permitted season of use from April 1 through October 31. In 1999, the Indian Creek Area was moved into the Alvord Allotment and became part of Pike Creek Pasture. BLM records show that this area was historically used season-long, as possible dependent upon weather conditions. Table 26 shows historic actual use within this area. In years when the proposed Indian Creek Pasture area was used in combination with other pastures, use typically followed green-up going up the mountain. This means that livestock were turned out into the lower elevation areas, and then livestock moved up the mountain later in the year to take advantage of the more nutritious green grass.

Table 26: Historic Indian Creek Actual Use[52]

YEAR	HEAD	TURNOUT	GATHER	AUMS
2020	200	7/15	8/17	224
2016	100	6/25	8/25	204
2013	245	5/15	7/1	387
2005	250	4/10	6/10	510
1998	350	4/1	6/15	874
1994	250	4/4	6/4	510
1992	200	4/15	6/15	408
1990	364	7/16	9/1	574
1989	200	6/1	7/31	401
1988	150	6/2	6/30	145
1987	230	5/15	7/6	399
1981	325	5/16	6/15	325
1980	100-400	5/16	9/21	1,153
1979	125-209	4/16	8/15	752
1978	44-93	4/16	10/15	595
1977	150	6/1	8/31	450
1976	166	5/1	7/15	415
1975	119	5/16	7/31	301

[52] Historically, this area was used both as its own pasture, and in conjunction with an adjacent pasture; therefore, actual use AUMs shown in the table may be for an area larger than just the Indian Creek Area. In addition, years that do not show use may have received use under a blanket allotment authorization (no pastures were specified). Those years are not shown in the table below since records are limited and it would be difficult to say the Indian Creek area was definitively used.

Boundaries and acreages have changed on the Indian Creek Area over time so a 1:1 comparison of AUMs historically used to AUMs proposed is not appropriate. The BLM has utilized historic maps and AUM data, along with current vegetation, to determine the proposed general AUM level of 222 AUMs.

The Steens Act of 2000 resulted in this area being designated as Wilderness, but not as part of the No Livestock Grazing Area. 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)) which the proposed Indian Creek Pasture is a part of. Use occurred in the proposed Indian Creek Pasture area both before and after designation of Wilderness, and the proposed action is in compliance with the Steens Act. Prior to the Steens Act of 2000, there is no record of the BLM requiring the area in Indian Creek to be rested or use following a rotation; the Indian Creek Area was used when available, as needed.

Drainage areas below the proposed Indian Creek Pasture include Pike Creek Canyon with its Pike Creek trail system. The Pike Creek trail system connects to the Dry Creek trail and the Desert trail within the proposed Indian Creek Pasture. Data shows an average of 1,781 annual trail users between 2016 and 2018 (TRAFx Datanet). Weston Basin Road is designated an all-terrain vehicle (ATV) road in the district road network. It is also the southern boundary of the proposed Indian Creek Pasture and is the main road into the pasture. Developments in the proposed Indian Creek Pasture are located on un-named roads in the pasture. Weston Basin Road provides access to historic mercury mines and the remains of cabins and mercury processing facilities. Visitors to the area use the Pike Creek trail system to hike into the upper elevations of the Pike Creek drainage. Visitors can also use the Weston Basin Road to access historic mining operations sites along the designated ATV route. Pike Creek trailhead, the Pike Creek access road and the Weston Basin off-highway vehicle (OHV) route are how the public access wilderness areas on the east face of Steens Wilderness. Pike Creek trailhead begins at the entrance to Pike Creek Canyon and is at an elevation of 4,400 feet. The East Steens Road a mile to the east is at an elevation of 4,100 feet. The southeast corner of the proposed Indian Creek Pasture is approximately the intersection of Weston Basin Road and Indian Creek Road at an elevation of 4,700 feet. The highest point in the pasture is on the west side of the proposed pasture at an elevation of 7,400 feet. Existing surface disturbances in the proposed Indian Creek Pasture include the existing access road, administratively closed roads that were designated part of the trail network, Indian Creek waterhole, and Indian Creek Spring and trough.

Wilderness Study Areas

WSAs are managed in accordance with the BLM's WSA Manual 6330 (2012). 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 1989 Oregon Final Wilderness Environmental Impact Statement (EIS) and Wilderness Study Report for Oregon (USDI 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 (BLM Manual 6330). 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. *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 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. The WSAs are managed under the WSA Manual 6330 until Congress makes a determination regarding wilderness designation. WSA Manual 6330 states activities must comply with specific policy guidance, including the following non-impairment criteria:

> 1. The use, facility, or activity must be temporary. Temporary use that does not create surface disturbance or involve permanent placement of facilities may be allowed if such use can easily and immediately be terminated upon wilderness designation.
>
> 2. When the use, activity, or facility is terminated, wilderness values must not have been degraded so far as to significantly constrain Congressional prerogative regarding the area's suitability for preservation as wilderness. Exceptions to non-impairment criteria include emergencies such as fire suppression and search and rescue operations; reclamation of effects from WSA Manual 6330 violations; emergencies and pre-FLPMA impacts; grandfathered uses of facilities or valid existing rights; or uses and facilities to protect or enhance the land's wilderness values or that are the minimum necessary for public health and safety in use and enjoyment of wilderness values.

There are seven classes of allowable exceptions to the non-impairment standard defined in section 1.6.C.1 in BLM Manual 6330. 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" (Manual 6330 Chapter 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" (BLM Manual 6330, Chapter 1.6.D.3.a.ii).

The 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). The Andrews Management Framework Plan recognizes OHV and mechanized vehicle use occurred on the Alvord Desert Playa in the Alvord Desert WSA prior to the FLPMA enactment. The OHV and mechanized vehicle use of the Alvord Desert Playa does not impair wilderness values and does not preclude Congress from designating the area as part of the National Wilderness Preservation System. The BLM has allowed this use to continue based on the determination managed OHV and mechanized vehicle use would not preclude future wilderness designation. Should the Alvord Desert Playa be designated as wilderness, OHV and mechanized vehicle use would not be allowed on the playa.

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. In 1980 final inventory decisions were made.

Descriptions of the units covering the Alvord Allotment in 1979 show livestock grazing and recreation as the primary uses. Of the units within the allotment, six were designated WSA: High Steens WSA (14,089 acres), Alvord Desert WSA (97,759 acres), Winter Range WSA (15,517 acres), East Alvord WSA (22,161 acres), Table Mountain WSA (39,886 acres), and Wildcat Canyon WSA (8,543 acres).

The foothills area of the allotment includes portions of the High Steens WSA. Desert #6 Pasture includes portions of the other five WSAs.

Wilderness characteristics of High Steens WSA summarized below are from Volume I of the Wilderness Study Report for Oregon (1991).

Naturalness: High Steens WSA appears to be in outstanding natural condition. This WSA contains a variety of physical features that are the result of volcanism, faulting, and erosional processes. There are 3 ways totaling 5.3 miles, 8 fences totaling 6.9 miles, 2 fire rehabilitation seedings totaling 177 acres, and several locations of historic mining activity.

Solitude: High Steens WSA offers outstanding opportunities for solitude. These opportunities are enhanced by the varied and rugged topography. The extreme difference in elevations is the major screening factor. The drainages provide excellent opportunities for isolation. The eastern portions are completely screened from the northern segments. Vegetative screening also provides some opportunities for solitude. Aspens, willows, and other riparian species in the drainages provide screening.

Primitive and Unconfined Recreation: Opportunities for primitive and unconfined recreation in High Steens WSA are outstanding. The primitive recreation activities include day hiking, backpacking, camping, horseback riding, hunting, fishing, sightseeing, and photography. Game species include mule deer, pronghorn antelope, bighorn sheep, elk, and upland game birds. Fishing opportunities are outstanding, especially in McCoy Creek and its tributaries. Sightseeing and photographic opportunities abound. The rugged and sheer rock escarpments create fascinating views. Pike Creek Canyon is located near the southern end of this WSA. Pike Creek trail network begins at the entrance to the canyon. A public access road from the East Steens Road to the canyon is the only public access to the High Steens WSA on the east face of Steens Mountain.

Special Features: Geology, vegetation, wildlife, and scenic qualities substantially enhance the area’s wilderness values. The geology is the dominant special feature. Steens Mountain is a fault block mountain that dips gently westward and reaches a maximum elevation of 9,773 feet, with a 5,500-foot fault scarp on the east. Most of High Steens WSA contains outstanding scenery. Five plant species of special interest occur in High Steens WSA. Bighorn sheep, GRSG, Whitehorse cutthroat trout, redband trout, pika, and northern water shrew contribute to making wildlife a special feature.

Wilderness characteristics of Alvord Desert and East Alvord WSAs are summarized from Volume I of the Wilderness Study Report for Oregon (1991).

Naturalness: The Alvord Desert and East Alvord WSAs appear to be in a natural condition. The topography consisting of flat to gently rolling terrain surrounded by lava cliffs and plateaus is one of the outstanding natural attractions of the WSAs. There are few unnatural features, and they are relatively unnoticeable. The Alvord Desert WSA contains 5 reservoirs, 5 wells, a horse trap, the remnants of what might have been an old homestead or stagecoach stop, 2 barrow pits, several small mineral prospecting scars, 2 fences totaling 20 miles, and 16 vehicle ways totaling 65 miles. These developments have a minor visual influence due to the terrain within the study area. Much of the area is relatively flat to gently rolling so most developments are not visible from the surrounding terrain.

The water developments within the WSA are scattered. The largest concentration of developments occurs along the northern boundary road, where there are three wells and a reservoir. These are not large developments, and they have a minor influence on the area. Along the southern boundary, there is also a well and a reservoir. The remaining well is located in the northeastern corner of the WSA. The remnants of the old homestead or stage stop are not visible from the surrounding lands as the foundation and small portions of the walls are all that remain. Two borrow pits and small prospecting scars are located along the southeastern boundary. They are fairly minor disturbances and are not easily seen from the flat terrain in the immediate vicinity. The two sections of the BLM's district boundary and allotment division fence are located in the east-central portion of the WSA. These are not easily viewed and have a minor influence on the area. The horse trap site is located just east of the district boundary fence west of Coyote Lake. The site consists of rock cribs and is visible from the higher terrain to the west. A way, 3 miles in length, provides access to the trap site. The study area's gentle terrain plays an important role in reducing the effects of the 65 miles of ways. Due to the topographic and vegetative screening, the vehicle ways are not substantially noticeable. East Alvord WSA contains 11 unnatural features. Eight of the developments are reservoirs, one is a well and reservoir combination, and two are vehicle ways totaling three miles. It is estimated that approximately 3 percent of the area is influenced by these features. The water developments are scattered around the perimeter of the WSA. They are relatively minor disturbances, and because of their locations in small, shallow drainages, each has a limited influence on the natural qualities of the area. The way in the northwest corner is not easily viewed except in the immediate vicinity. It is located in flat terrain away from any higher areas that would provide views of the development, and it is somewhat screened by the surrounding vegetation. The other way is longer and located in the bottom of a drainage. It can easily be viewed from the adjacent higher terrain. This way tends to blend in with the drainage course and is also slightly screened by vegetation. In several places, the way receives more use from livestock and wild horses than from vehicles. In addition to these identified ways, there are vehicle tracks in the northwestern corner that are the result of occasional off-highway vehicle use. These tracks do not influence the naturalness of the area.

Solitude: The Alvord Desert WSA and the East Alvord WSA have outstanding opportunities for solitude. The Alvord Desert WSA is very large and would give a feeling of vastness to any wilderness visitor. The East Alvord WSA is not as large but does provide outstanding opportunities for solitude. The topography of both WSAs consists of flat to gently rolling terrain surrounded by lava cliffs and plateaus. The ridgelines and cliffs provide some topographic screening. The type of vegetation in both WSAs does not screen wilderness users from each other. Military jet aircraft use the area frequently for low altitude training flights. During the daylight hours there may be as many as five low-level flights daily. The influence of these flights on a visitor's perception of solitude is quite temporary, but extreme for a short period of time (one minute or less). These flights do not have a significant, long-lasting, adverse effect on a visitor's opportunity to find solitude.

Primitive and Unconfined Recreation: Opportunities for primitive and unconfined recreation in Alvord Desert and East Alvord WSAs are outstanding. The primitive recreation activities are day hiking, backpacking, camping, horseback riding, and sightseeing. Opportunities for day hiking are outstanding in both WSAs. In the Alvord Desert WSA, the opportunities for day hiking are best in the western and central portions of the area. The primary day hiking attractions would be the Alvord Desert playa and basin areas, the plateau area east of the Alvord, and the Coyote Lake area. Also of interest to the day hiker are the expansive views and open space available throughout the entire WSA. In the East Alvord WSA opportunities for hiking are not as outstanding, but the topography of the area is diverse and offers a variety of country for hiking. Mickey Hot Springs and the sand dunes, only short distances from the western boundary, would be of interest to the hiker. There are opportunities for backpacking and camping in both WSAs. However, Alvord Desert WSA offers greater opportunity due to its larger size and more numerous attractions. Day hiking could easily be extended into an overnight trip, although the availability of water is limited. The attractions mentioned for day hiking are also likely to be most attractive to the backpacker. Opportunities for sightseeing and photography are excellent in both WSAs, including background views of the Steens and Sheepshead Mountains. Other background views outside the WSAs, though less dominant, include the Pueblo and Trout Creek Mountains as a panorama to the south. In the East Alvord WSA, outside scenic views also include vistas of the Alvord Desert and the vast open expanse of land to the east, including Coyote Lake. Within the Alvord Desert WSA are impressive views of the Alvord Playa, the escarpment and plateau area, and the vastness of the open space associated with the general area. The number of opportunities for photographing and viewing typical desert wildlife and plants are particularly high along the eastern portion of the Alvord Basin and in the Coyote Lake area. A visitor might also have an opportunity to view and photograph wild horses. The Mickey-Alvord Well Road is the boundary road between Table Mountain WSA, East Alvord WSA and Winter Range WSA. Road counter data shows an average of 1,639 annual road users (vehicles) between 2017 and 2019 (TRAFx Datanet). Visitors to the area use this road to visit Mickey Hot Springs. They also continue past the hot springs to explore the ways throughout the area.

Special Features: There are several special features of the Alvord Desert and East Alvord WSAs that enhance the value of the area as wilderness. Geology, vegetation, wildlife, wild horses, and scenic quality are special features of both WSAs. Cultural resources are found primarily in the Alvord Desert WSA. The most significant feature of the area is the Alvord Desert. This area is roughly defined as a large basin between Steens Mountain on the west and a prominent ridgeline on the east. This basin is a structural graben (sunken area) bounded by fault zones and their associated escarpments (including Steens Mountain and the ridgeline on the east). The dominant feature of this basin is the intermittently dry playa. Mickey Hot Springs is located in the northern part of the East Alvord WSA. It is one of the hottest springs in BLM's Burns District, reaching temperatures of up to 210º F. Also associated with the springs are a variety of mud pots and steam vents. The location of the mud pots and vents appears to change frequently because of changes in hydrothermal activity. This site is unique within the Burns District and represents a definite attraction in the WSA. On March 29, 1989, Mickey Hot Springs was nominated as an ACEC. The most significant vegetative features of the area occur on the eastern side of the Alvord Basin, where the Alvord Desert ACEC, designated to protect both vegetation and wildlife values, is located. The ACEC extends from the eastern edge of the playa to the top of the plateau to the east and is distinctive due to the diversity of habitats within a small area. This diversity is the result of differences in topography, alkalinity, moisture, and soil. The East Alvord WSA also contains 510 acres of the 560-acre Mickey Basin RNA. The Alvord Desert and East Alvord WSAs also support an unusual variety of reptiles, small animals, and insects; most are found within the ACEC. Also of importance to the entire area is the presence of kit fox habitat[53]. A population of snowy plover occupies nesting habitat on the Alvord Playa[54]. Both WSAs contain cultural resources; those in the Alvord Desert WSA are especially noteworthy. Archaeological sites in the WSA give evidence of adaptations of prehistoric Indians to environments that have long since disappeared. In addition, portions of four wagon roads cross parts of the WSA. Scenery in portions of both WSAs is outstanding, including the entire western portion of both WSAs from the major ridgeline east of the Alvord Desert Playa west to the Steens Mountain. The Alvord Desert Playa, the sand dunes, and the ridgeline combine to create outstanding contrasts in color, landform, and vegetation.

Wilderness characteristics of Winter Range WSA (15,440 acres) are summarized from Volume I of the Wilderness Study Report for Oregon (1991).

Naturalness: Winter Range WSA appears to be in a relatively natural condition. The area contains a long ridge with escarpment, low basin, and dry lakebed. Scattered ridges and buttes in the eastern portion contribute to its naturalness. There are nine developments: three reservoirs, two wells, two fences totaling 1.5 miles, two ways totaling three miles in length, and a well. Water developments are scattered around the perimeter, are relatively minor, and are fairly well screened by location and adjacent topography. The vehicle ways and fences in the west side are not major influences due to terrain and vegetation. Features and activities outside the area do not detract from the area's wilderness character.

Solitude: Winter Range WSA offers outstanding opportunities for solitude, which are enhanced by its size and topography. The main, north-south ridge line and scattered ridges and buttes in the gently rolling eastern portion provide topographic screening, which enhances solitude values. Military jet aircraft frequently use the area for low altitude training flights. These flights do not have significant, long-lasting, adverse effects on solitude opportunities.

Primitive and Unconfined Recreation: The area provides opportunities for primitive recreation. Opportunities for day hiking, backpacking, camping, hunting, horseback riding, and sightseeing exist in the area. The Mickey-Alvord Well Road is the boundary road between Table Mountain WSA, East Alvord WSA, and Winter Range WSA. Road counter data (23 months of data) indicates an average of 140 vehicles per month use the road. Visitors to the area use this road to visit Mickey Hot Springs. They also continue past the hot springs to explore the ways throughout the area.

Special Features: Vegetation, wild horses, and scenery add to the wilderness values of Winter Range WSA. The size and condition of the Mickey Basin RNA winterfat community is uncommon in Oregon. Three plant species of special

[53] These WSAs are within the northernmost range of this species, which is on ODFW'S List of Threatened and Endangered Species and is also designated by BLM as a Sensitive Species in Oregon.

[54] Snowy plovers are also a BLM Sensitive Species in Oregon and are listed on ODFW's List of Threatened and Endangered Species. The Pacific Coast population of the western snowy plover is federally listed under the Endangered Species Act of 1973 as Threatened. The mapped range of the federally listed Pacific Coast population does not extend to include the Alvord population.

interest also occur in the WSA. Northern kit fox may range into the WSA. The scenery is most outstanding in the southwestern corner; the area from the top of Steens Mountain across the Alvord Basin can be seen.

Wilderness characteristics of Table Mountain WSA are summarized from Volume I of the Oregon Wilderness Study Report for Oregon (1991).

Naturalness: The Mickey Basin area in the Table Mountain WSA has an abundance of springs, seeps, and wet meadows and contains species not found over most of the rest of this WSA. Much of the study area is devoid of unnatural features. Most of the developments are unobtrusive because they are small and usually screened by either topography or vegetation.

In the Table Mountain WSA, ways are the primary influence on naturalness of the area. The ways frequently follow the base of the escarpments and are visible from the surrounding higher terrain, making the ways visible for a greater distance. The water developments are generally small and inconspicuous; however, some are easily viewed from surrounding higher terrain. The water developments in the southwestern corner are the most visible because they are located at the base of a broad, open slope. Within the WSA are three unnatural features: a water well located in T, 33 S., R. 35 E., Section 1 NW3NW3; and an old dirt airstrip and water well, both located at T. 32 S., R. 35 E, Section 24 N2NW3.

Solitude: Table Mountain WSA is large enough to allow dispersed use and provide outstanding opportunities for solitude. The primary screening factor within each WSA is topography. Opportunities for solitude in the Table Mountain WSA are outstanding due to the excellent topographic screening throughout the area. Table Mountain, Mickey Butte, and the other steep escarpments provide topographic diversity and enhance the opportunities for solitude. The Mickey Basin area doesn’t contain much topographic screening, but tall shrubs provide vegetative screening. Military jet aircraft use the area for low altitude training flights. The influence of these flights on a visitor’s perception of solitude, to some degree, is extreme for a short period of time (one minute or less); it is also temporary. These flights do not have a long lasting, adverse effect on a visitor’s opportunity to find solitude.

Primitive and Unconfined Recreation: Table Mountain WSA has good opportunities for a variety of primitive recreational activities, including day hiking, backpacking, camping, horseback riding, and sightseeing. Due to the topographic diversity in the area, there are many interesting and challenging areas to hike. Mickey Butte (in the southwest corner), Table Mountain, and the other escarpments around it provide a longer, more challenging hike. Horseback riding is also good, with the existing vehicle ways providing routes through some of the steeper areas. Broad vistas of the Steens Mountain, Trout Creek and Pueblo Mountains, and the Alvord Desert are available from the many high points and offer good opportunities for sightseeing and photography. The Mickey-Alvord Well Road is the boundary road between Table Mountain WSA, East Alvord WSA, and Winter Range WSA. Road counter data (23 months of data) indicates an average of 140 vehicles per month use the road. Visitors to the area use this road to visit Mickey Hot Springs. They also continue past the hot springs to explore the ways throughout the area.

Special Features: Among the WSA’s special features are a series of steep fault scarps that form the basin and range topography of much of southeastern Oregon. Uncommon vegetation, wildlife, and outstanding scenic quality are special wilderness features in some areas. There are plant species of special interest. The entire area is habitat for kit fox, which is on ODFW’s list of threatened species.

Wilderness characteristics of Wildcat Canyon WSA are summarized from Volume I of the Wilderness Study Report for Oregon (1991).

Naturalness: Much of the study area is devoid of unnatural features. Most of the developments are unobtrusive because they are small and usually screened by either topography or vegetation. Unnatural developments include ways, fences, water troughs, spring developments, reservoirs, wells, borrow pits, a crested wheatgrass seeding, some corrals, and cabins. In the Wildcat Canyon WSA, the reservoirs are scattered throughout the study area, with the heaviest concentration on the western side. The reservoirs are generally small and screened by topography. The ways are also generally screened by topography, but in the eastern part of the WSA several ways are located within broad, shallow valleys and are visible from the surrounding area. One water well is located in the Wildcat Canyon WSA in T. 32 S., R. 37 E., Section 15, SE of the SE3.

Solitude: Opportunities for solitude are outstanding in the western, central, and southern parts of the Wildcat Canyon WSA because of the topographic screening provided by rimrocks, and the canyons of Wildcat, Mickey, and Bone creeks. The remainder of the area consists primarily of rolling hills that provide slight topographic screening. Military jet aircraft use the area frequently for low altitude training flights. The influence of these flights on a visitor's perception of solitude, to some degree, is extreme for a short period of time (one minute or less); it is also temporary. These flights do not have a long lasting, adverse effect on a visitor's opportunity to find solitude.

Primitive and Unconfined Recreation: The area provides excellent opportunities for primitive and unconfined types of recreation. The major drainages and ridges provide a number of day hiking, backpacking, and horseback riding routes that vary greatly in distance and difficulty. Campsites along these routes are abundant, but the availability of water is a problem and would be a limiting factor. Interesting geological formations and panoramic desert vistas provide opportunities for sightseeing and photography. In Wildcat Canyon WSA, the opportunities for hiking, backpacking, camping, and sightseeing are good. Most day hiking and backpacking would occur in the scenic and rugged Mickey, Bone, and Wildcat canyons. Scenic views of the Alvord Desert and Steens Mountain are also available.

Special Features: Uncommon vegetation, wildlife, and outstanding scenic quality are special wilderness features in some areas. Plant species of special interest grow in the area. The entire area is habitat for kit fox, which is on ODFW's list of threatened species.

Lands with Wilderness Characteristics

In 2002, Oregon Natural Desert Association (ONDA) submitted citizen-proposed wilderness characteristics areas they named Grassy Ridge, Coffin Butte, Ancient Lake Addition, and the Big Basin Addition. These proposed units are adjacent to existing WSAs and cover all of the BLM-managed land within the allotment that isn't currently designated as WSA or Wilderness. A BLM IDT evaluated the units in 2003 in preparation for the 2005 Andrews/Steens RMPs. Two units, Grassy Ridge and Ancient Lake were considered as one unit (2-73) for the evaluation. The evaluation indicated that a portion of the area had wilderness characteristics. The unit appears to be in a natural condition and, when considered as a contiguous part of the Alvord Desert WSA, appears to have outstanding opportunities for solitude and a primitive and unconfined type of recreation. This was identified as a parcel with wilderness character in the 2005 Andrews RMP (RMP-75). The other portions of this unit, and the other proposed units, were not found to have wilderness characteristics.

Parcels with wilderness characteristics are not provided special management status. Parcels are managed according to RMP direction for surrounding non-WSA land. The protections afforded (e.g., the mineral withdrawal, prohibition on cross-county motorized/mechanized vehicle use, and adjacent ROW avoidance/exclusion areas) were considered as providing sufficient protection to meet the goal/objective (AMU RMP-76). While roadlessness is a wilderness characteristic that is considered when determining if areas contain lands with wilderness character, the 2005 Andrews RMP did not designate any roadless areas, or provide any management direction specific to these areas. Recognizing an area as roadless during an inventory does not require any specific management or prevent construction of new roads, but is a statement that the area does not currently have any roads; these areas would continue to be managed in accordance with the 2005 Andrews RMP as amended by the 2015 GRSG ARMPA.

3.6.2 Environmental Consequences

3.6.2.1 Issues

- How would the proposed changes in the Alvord AMP impact wilderness characteristics in lands with wilderness characteristics, WSAs, and wilderness and meet the non-impairment standard or an exception to it?

3.6.2.2 *Effects Common to all Alternatives*

For the purposes of this analysis, the CEAA for wilderness is the eastern portion of the Steens Mountain Wilderness, the six WSAs, and the identified lands with wilderness characteristics within the allotment. Past and present actions have influenced the existing environment within the CEAA. RFFAs in the CEAA that may contribute to cumulative effects to wilderness include ongoing noxious weed treatments and the comprehensive recreation plan (CRP). Noxious weed treatments include aerial spraying and spraying weeds from ATVs. The CRP provided for increased dispersed recreation by creating additional trail construction in the Pike Creek area. Connector trails between Pike Creek trail and Dry Creek trail are components of the CRP implementation plan. A proposed parking area at the mouth of Pike Creek Canyon would increase use of the Pike Creek trail system. Existing public parking is one mile from the canyon entrance. Additional RFFAs that may contribute to cumulative effects includes existing range improvement maintenance, road maintenance, weed treatment, livestock grazing, wild horse grazing, and recreation activities.

3.6.2.3 *Alternative A – No Action*

Under this alternative, the grazing permit would be renewed with the same terms and conditions as the current permit, and livestock grazing would be permitted to occur during the same season as previously authorized and that was occurring when the WSA was designated. Suspended AUMs would be kept on the permit and continue to be used as NR AUMs in years of favorable precipitation. This grazing is considered a grandfathered use and would be allowed to continue. The Indian Creek area of the Pike Creek #9 Pasture would stay within the Pike Creek #9 Pasture and would have no AUMs assigned to it to account for these additional acres being added to the allotment. AUMs taken from this area would continue to be from the existing active use AUMs for the allotment. Use in the Indian Creek area would continue to be sporadic as it would only be available in years when snowpack is low and the area is accessible in the spring. Under this alternative, there would not be any effects to naturalness, as no new developments would be constructed. In addition, there would be no potential risk to WSAs from increased permanent permitted grazing. There would be no new effect to outstanding opportunities for solitude or primitive and unconfined recreation. Under this alternative, grazing treatments within the Alvord Allotment would be limited to winter/early treatments in the Alvord Seeding #1 and Desert #6 pastures, and early/graze in all the other pastures. This means that in four pastures, grazing could only occur when perennial bunchgrasses are growing and most susceptible to damage from livestock grazing. While a rest/graze rotation would occur in most pastures, 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, would be limited.

Existing conflict between livestock and wilderness visitors would continue at the same level, largely in the Pike Creek trail area where both livestock and visitors use the same trail. There would be no improved grazing management that would work to ensure livestock are not loafing along Pike Creek or that could improve overall ecological condition. Unique, supplemental, or other features would not be affected beyond what has historically occurred under this alternative. Road maintenance would continue to occur on the boundary of the units but would not impact wilderness characteristics beyond what is currently occurring. Overall, there would be no changes to naturalness, solitude, primitive and unconfined recreation, or supplemental values under this alternative.

3.6.2.4 *Alternative B: Proposed Action – Permit Renewals, Management Changes, and Range Improvements*

Under this alternative, there would be an increase in permitted AUMs within the Alvord Allotment. This would be due to the conversion of suspended AUMs to active AUMs on the permit. Of the suspended AUMs, 222 would be designated as active AUMs to be used within the proposed Indian Creek Pasture. While this would be an increase in AUMs for the allotment, the area within the proposed Indian Creek Pasture has been grazed since before the Steens Mountain Wilderness was established, as well as after its establishment, though use has been sporadic due to accessibility. This would correct the administrative error that occurred when this area became part of the Alvord Allotment, and no AUMs were added onto the grazing permit. As this would not be an increase in grazing above what was previously allowed, has historically occurred, and what has occurred more recently, it would not have any effect on wilderness. Therefore, the effects of assigning these AUMs to be generally used in the Indian Creek Pasture in wilderness would be the same as the no action alternative.

The remaining 1,670 AUMs of currently suspended AUMs would be identified as being reinstated specifically within the non-WSA portion of the Desert #6 Pasture, therefore, it would not result in an increase in AUMs above what was permitted historically (including at the time of designation). While there are no fences separating the WSAs from the non-WSA lands, developments and grazing management would be used to limit livestock from removing additional AUMs from the WSAs.

This alternative proposes the construction of multiple wells in the non-WSA portion of the allotment. Water has been proven to be an effective tool for managing livestock distribution (Holechek et al. 2004, Valentine 1947, Heitschmidt and Stuth 1991, Bailey 2004, Ganskopp 2001). As these AUMs would not be authorized until additional water is developed in this area, it is expected that these developments would hold livestock within the non-WSA area, so no increase in use would occur within the WSA above what has recently and historically occurred. To test the assumption that additional water developments within the center of the non-WSA portion of the Desert #6 Pasture would increase the use area enough to provide the additional 1,670 AUMs, the BLM worked with a contractor to complete piosphere modelling[55]. Piosphere's are modeled as circular areas of grazing influence on vegetation radiating out from a single point, in this case proposed and existing reliable (year-round) water developments. Piosphere modelling utilizes remotely sensed continuous vegetation data and ESDs within the Alvord Allotment to determine vegetation production. Assumptions are that livestock would travel up to 3 miles from reliable water sources to graze, considering the topography and reproductive stage of livestock. Utilization limits were set at 50 percent within the first mile radius, 40 percent between miles one and two, and 30 percent from two to three miles. Terrain, specifically slope, was also taken into account to remove steep areas livestock are not likely to graze. The BLM ran an analysis on three different piosphere "areas" to provide the most complete picture of AUMs and livestock distribution within the pasture. The first analysis area consists of reliable, currently existing water developments. This area provides the BLM with a baseline of currently available AUMs and acres (Table 27, Appendix A6: BLM Existing Late Season Reliable Water Use Area - Desert Pasture). The second analysis area consists of currently reliable existing water and the three proposed wells located in the interior of the non-WSA portion of the pasture, one of which would be required prior to utilizing the reinstated AUMs (Appendix A7: BLM Existing Late Season Reliable Water + Proposed Water Developments for Reinstatement of Suspended AUMs Use Area - Desert Pasture). Comparison of this use area with baseline use area shows the projected increase in AUMs and grazeable acres, both within WSA and outside of WSA, following water development. The final analysis area includes the currently reliable water and all proposed developments (Appendix A8: BLM Existing Late Season Reliable Water + All Proposed Water Developments Use Area - Desert Pasture). While only the three wells in the interior of the non-WSA portion of the pasture are supposed to hold livestock, it is important to see how other proposed developments would change the distribution of livestock within the pasture and specifically within the WSA.

Piosphere modelling found that the development of the three wells in the interior of the non-WSA portion of the pasture would be expected to increase the use area within non-WSA by 9,211 acres and support an additional 1,415 AUMs. As this number is less than the proposed 1,670 AUMs of suspended use to reinstate, it must be assumed that the remaining 255 AUMs of reinstated use would be removed from the currently available use area, that may include WSA. However, if only 1,415 AUMs were reinstated, the BLM feels confident that these AUMs would be available in the non-WSA portion of the pasture, and there would be no increase in the level of grazing use within any of the WSAs.

However, if all proposed developments are completed, there would be an increase in non-WSA use area of 12,392 acres and would make an additional 1,900 AUMs available outside of WSAs. Therefore, it would be expected that full suspended use of AUMs could be reinstated following construction of all developments and the reinstated AUMs would clearly be available in non-WSA portions of the pasture and use in the WSA would not be increased.

[55] Models utilize imperfect data, such as remote sensing data, along with multiple assumptions. Therefore, models should not be considered 100 percent accurate and models using different data sources and making different assumptions would provide different outputs.

Table 27: Piosphere Analysis

	Non-WSA Designated Land		WSA Designated Land		TOTAL	
Use Areas	**Acres**	**AUMs**	**Acres**	**AUMs**	**Acres**	**AUMs**
Reliable Existing Water	41,739	5,667	27,268	3,648	**69,366**	**9,315**
Reliable Existing Water + Proposed Water Developments for Reinstatement of Suspended AUMs	50,950	7,082	27,628	3,648	**78,578**	**10,730**
Reliable Existing Water + All Proposed Water Developments	54,131	7,567	41,572	5,559	**95,703**	**13,126**

Without fences separating the non-WSA from WSA areas of the pasture, it is expected that livestock would move back and forth across the boundary, which would result in a small risk that livestock would take reinstated AUMs from within a WSA[56]. However, terms and condition, monitoring, and a phased in implementation are proposed to prevent that from happening. Reinstated AUMs would be phased in over 4 years to allow for increased utilization monitoring along and just inside the WSA boundaries. During this phased in period, if higher than historic utilization levels were documented within the WSAs, implementation would be put on pause while additional monitoring occurred. If monitoring continued to show increased utilization levels, the number of reinstated AUMs authorized would be decreased until utilization levels matched historic levels. If monitoring found utilization is still at historic levels, implementation could continue. The BLM would continue to make adjustments based on monitoring to ensure this increase in utilization was temporary based on annual conditions, and the increase utilization would not occur on a permanent basis. In addition, livestock grazing the non-WSA portion of the pasture would be required to be turned out at whatever water develops that have been completed. As livestock do not tend to travel more than 2-3 miles from water when resources (water and forage) are available, it is expected that only a small portion of these livestock would travel to the WSA boundary and be at risk of utilizing AUMs from within the WSA. This would be much higher if livestock assigned to graze the non-WSA AUMs were turned out anywhere within the non-WSA area. Therefore, the conversion of these suspended AUMs to reinstated active AUMs would not have an impact on WSAs as they would have no permanent increase in grazing, as ensured through terms and conditions, utilization monitoring and responses, and implementation actions.

Grazing at the AUM level established in 1976 is a grandfathered use in the WSA and would continue under this alternative. 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 native plants. There are no proposed permanent increases in active use AUMs within any portions of the WSA in the allotment and utilization levels are less than what was occurring in 1976. Therefore, effects to wilderness values from grazing under this alternative would be similar as under Alternative A. However, as livestock distribution would be improved under this alternative (see Section 3.1 and Maps 6,7, & 8) within the WSA as well as the non-WSA, it is expected that proposed livestock grazing management would meet an exception (F) to the non-impairment standard by protecting or enhancing the naturalness component of wilderness characteristics. Improvement from better distribution of livestock within the allotment spreads the negative impacts of livestock grazing out over a larger area, further reducing the likelihood of any one plant being negatively impacted resulting in more vigorous bunchgrass communities. In addition, improved distribution, especially after perennial grasses entered dormancy, would help reduce fine fuel accumulation in plant crowns, further improving figure. Fine fuels would be removed in more areas throughout the pasture due to increased use areas. This would result in a reduced risk of catastrophic wildfire and reduced risk of plant mortality following wildfire (for full analysis of effects on vegetation see Section 3.1). This improvement in the naturalness component of wilderness characteristics would not be seen under Alternative A.

The permitted season of use within the allotment would be increased 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

[56] This would occur if more livestock move into the WSA portion of the pasture than out of the WSA portion of the pasture.

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 fire risk and 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. 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. This would not occur in the wilderness and therefore would not affect it. However, this would be authorized within WSAs. NR use is authorized in WSAs as described under Alternative A. 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 compared to Alternative A.

Within this alternative there are two proposed new pastures, as the Alvord Seeding #1 Pasture is outside of wilderness and WSA the creation of the Alvord South Seeding Pasture would not affect wilderness character. The second pasture that would be created would be the Indian Creek Pasture. This proposed pasture is currently within the current Pike Creek #9 Pasture and the Steens Mountain Wilderness. Grazing currently exists within this area. Designating this area as its own pasture would allow for improved management of this area and the Pike Creek #9 Pasture by allowing them to be managed separately. This, along with proposed terms and conditions, should result in improved management of these upland areas along with associated riparian areas, which would maintain or improve ecological health. The pasture would be created using topography and existing gap fences and would not require any new developments. Therefore, the addition of this pasture, including the reinstatement of 222 AUMs to be used within it, is largely administrative and would not result in any new impacts from livestock grazing in this area.

Proposed water hauling, when within WSAs, would increase the surface disturbance within the wheel tracks of ways and increase their visibility. This increase in visibility of the way would not affect naturalness. Motorized use of the ways is permitted, and the increased disturbance is a result of their use. Since all water hauling and temporary portable troughs would occur at areas that are previously disturbed congregation areas for livestock, it is not expected that there would be an increase in surface disturbance above what has historically occurred at those locations. As troughs would be placed in existing disturbed sites, there would be no shading of vegetation under the trough and surface disturbance immediately around the trough would not cause any surface disturbance beyond what has occurred in the past. In areas that have smaller historic disturbance, surface disturbance may occur extending in a circular pattern around the trough. Naturalness could be temporarily diminished at these sites when the congregation area extends beyond the existing disturbance site. However, as these troughs are temporary, vegetation at the site would be expected to recover in the short term. In addition, these troughs would help distribute livestock better throughout the allotment. This improvement in distribution would decrease ecological disturbance by livestock that currently occurs mainly at the reliable water sources, which receive even heavier use during times of drought due to the livestock use areas being reduced. This would make areas of livestock congregation less noticeable across the allotment as a whole. When these troughs increase the use area for livestock, they would spread more evenly over the pastures, reducing impacts in any one location and improving ecological conditions, which meets an exception to the non-impairment requirement.

Under this alternative, there are multiple proposed range improvements including fence construction, well development, seeding maintenance, pipeline maintenance, and road construction as well as fence removal and road abandonment. Of the proposed range improvements, there is only one that would occur within WSA, and this is at the end of the pipeline proposed for maintenance in the Desert #6 Pasture where the end of the pipeline would run across the road and drain into an existing reservoir in WSA. This would match the original construction of the pipeline; however, due to maintenance issues, has not occurred in the recent past. This reservoir is not more than 100 feet inside the WSA and the area where the pipeline would run would be located in the disturbed area around the reservoir. While this development would not meet the non-impairment standard, it would be allowed under maintenance of existing developments, and it would meet exception F. Allowing water to fill this reservoir would further help improve livestock distribution by providing additional reliable water and increasing the use area available to livestock in all years. This would reduce congregation in any one area and spread-out surface disturbance caused by livestock. This would result in lower use of current congregation areas and improve ecological conditions. Within this alternative, the BLM is also considering placing a trough just north of the reservoir in the non-WSA if it is not feasible to run the pipeline into the reservoir, or the authorized officer decides not to select it. This trough would service the same use area as the reservoir; however, it would extend the existing disturbance area onto the other side of the road (outside the WSA) as a new congregation area would be established around the trough. In addition, this trough would be visible from within the WSA and would give the feeling of slightly reduced naturalness in this area. However, as it would be placed on an existing development, and is located near the WSA boundary, next to a road, and not in the interior, this reduction in naturalness would be very small. The improvement in ecological conditions by providing this water source, and not extending the area of surface disturbance by placing a trough in non-wilderness would be expected to be greater than the potential reduction in naturalness.

Even though all other developments are located outside of WSAs, many of them are near the WSA boundaries and would be expected to have some influence on naturalness and solitude in the area surrounding the WSA. Most acres of the WSAs 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 improvements, even though all activities and improvements would be outside the WSA. Some noise pollution would be expected to drift into the WSA from generators associated with wells, which could have a periodic negative effect on solitude. If storage tanks are needed at the well sites, these may be visible from within the WSA, even with painting, which may impact the feeling of naturalness from those located within a WSA. Maintenance and monitoring of these improvements may result in a slight decrease of solitude when the permittee is present. However, most developments are located away from known areas of prolonged visitor use (e.g., campsites, trails). As a result, visual or noise disturbance associated with the presence of proposed developments on visitor solitude or their experience is expected to 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.

While all other developments would be outside of the WSA, the pipeline proposed for maintenance in the Desert #6 pasture is also located within the BLM identified Alvord Desert Lands with Wilderness Character (LWC) unit, as are the two proposed troughs. However, per the 2005 Andrews RMP, this parcel is to be managed according to RMP direction for surrounding non-WSA land. Maintaining this pipeline and developing two new troughs would not negatively affect the ability of this unit to be designated as a WSA or Wilderness in the future. As the pipeline is currently existing (though needing maintenance), and the new troughs are proposed along the pipeline on the edge of the unit, it would not have a negative effect on wilderness character. Also, within this Alvord Desert LWC unit is a proposed road closure. Removing this road would decrease the number of roads within this unit, which may have a small positive effect on wilderness character within the unit.

Many of the other proposed developments, including additional road closures and road construction, are within citizen proposed wilderness character units. The proposed road would be considered a "cherry-stem" that would not bisect any proposed units and would therefore not result in any potential future parcels with wilderness character being reduced in size. However, these units were all analyzed in the 2005 Andrews RMP and were found (with the exception of the above-mentioned Alvord Desert LWC unit) not to have wilderness characteristics. None of the proposed actions in these areas are at a large enough scale to have an overall negative impact on any wilderness characteristics these units may contain. As there are currently few developments within this area, and roads within the area would also be abandoned, with only one road being constructed, none of these developments would result in a net decrease of naturalness or opportunities for solitude in these areas or preclude this area from being designated wilderness in the future.

Under this alternative all water 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 are left in the soil, by crushed vegetation, or by 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.

3.6.2.5 Alternative C: Termination of Suspended AUMs

Effects in this alternative would be the similar to Alternative B as range improvements would still be constructed. However, both positive and negative effects from grazing would be less thank under Alternative B and between the effects of Alternatives A and D as suspended AUMs would be fully removed from the permit and no NR use would be authorized in any year.

3.6.2.6 Alternative D: No Grazing

Under this alternative, livestock grazing, and associated operations, would no longer occur within the wilderness, WSAs, or LWC; 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 improvement sites as the range improvements would no longer be maintained unless needed for other resources. This impact would be limited in a large portion of the allotment since most developments are also used by wild horses, which would remain in the allotment. Ecological processes would be affected primarily by the forces of nature outside of the HMA. In these areas, 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. However, within the HMA these effects would not likely be seen as horses would continue to use trails and congregation areas year-round. 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. 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. These would occur mostly on the west side of the East Steens Road outside the HMA; within the HMA there would still be some fuel accumulation, however, there would be less since horses would continue to graze some vegetation. Wildfires in the area would have a negative impact on naturalness and opportunities for primitive and unconfined opportunities for recreation.

3.7 Transportation and Roads

3.7.1 Affected Environment

Currently within the allotment there are 182.1 miles of existing roads plus 44.8 miles of open ways (Appendix A2: Land Status Map). Roads within the allotment are currently able to be maintained, have maintenance intensities assigned, and are either outside of WSAs, border WSAs, or are cherry stems, where they go into a WSA but do not completely cross it and are not considered within the WSA. Ways are roads that are currently within WSAs and are not able to be maintained except by the passage of vehicles.

3.7.2 Environmental Consequences

3.7.2.1 Issue Questions

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

3.7.2.2 Alternative A: No Action

Under this alternative, there would be no construction of new roads or any change in the condition or maintenance of existing roads or ways.

3.7.2.3 Alternative B: Proposed Action – Permit Renewals, Management Changes, and Range Improvements

Under this alternative, a new road approximately 2 miles long would be constructed within the allotment (see Appendix A5: Alternative B map). This would add a new road to the transportation plan (Andrews RMP 2005) and maintenance would be allowed to occur on this road as needed as allowed, under the proposed maintenance intensity 1, to ensure it remains passible and provides continued access to the development. In order to offset the construction of this road approximately 5.9 miles of existing roads would be permanently abandoned and rehabilitated, as described in the 2005 Andrews RMP Appendix B – Best Management Practices for Road Design and Maintenance. This would result in a net decrease of 3.9 miles of roads in the allotment, reducing the miles of roads available to be maintained. All other roads in the allotment would be maintained as currently assigned.

3.7.2.4 Alternative C: Termination of Suspended AUMs

This alternative would have the same effects as Alternative B. However, the use of the new road may be less, and require less regular maintenance, since fewer AUMs would be authorized, and no NR AUMs would be permitted. This may result in a shorter period of time the permittee would need to access the development via this road. With fewer authorized AUMs, other roads and ways in the allotment may also receive less use associated with livestock grazing management.

3.7.2.5 Alternative D: No Grazing

Under this alternative, there would be no construction of new roads or change in the condition or maintenance of existing roads. With fewer developments being maintained and decreased use of the roads by the permittee, this alternative may result in roads being maintained less often.

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 (42 U.S.C. 1531).	The project was presented to the Burns Paiute Tribe through a letter sent in May 2021 and further discussed with the Burns Paiute Tribe Cultural Heritage Director on June 29, 2021, during the Burns District BLM quarterly meeting with the Tribe. This meeting was considered government-to-government consultation for the EA. No concerns have been raised by the Tribe.
Livestock Grazing Permittee	CCC with the three applicants for available forage, as required by 43 CFR §4100.	Alternatives and issues brought up during CCC have been incorporated into Section 2 of the EA.
USFWS	Formal consultation is required for this project due to the presence of Lahontan cutthroat trout; a biological assessment was completed by the BLM in December 2022 with coordination with the USFWS. Formal consultation was completed on March 29, 2022, when USFWS provided the BLM with a biological opinion.	The BLM will follow any requirements identified through formal consultation with USFWS on LCT and the associated biological opinion.

4.2 List of Preparers

TEAM MEMBER	TITLE	ANALYSIS/RESPONSIBILITY
BLM Burns District Office		
Autumn Toelle-Jackson	Assistant Field Manager, Andrews/Steens	Invasive/Noxious Weeds, Social and Economic Values, Wilderness, WSA, Lands with Wilderness Character, Roads and Transportation, BSCs, GIS, Review
Louis Clayburn	Rangeland Management Specialist	Grazing Management, Vegetation
Jamie McCormack	District Range Management Specialist	Invasive Annual Grasses, Review
Alec Barber	Natural Resource Specialist	Riparian, Fisheries, Water Quality
Katie Rhode	District Geologist	Geology, Minerals
Caryn Burri	Natural Resource Specialist (District Botanist)	Soils, SSS, and T&E-Flora
Anna Gahley	Realty Specialist	Lands and Realty
Kyle Wanner	Outdoor Recreation Planner	Recreation, VRM
Holly Higgins	Wildlife Biologist	Wildlife, SSS, and Migratory Birds
Matt Obradovich	Natural Resource Specialist (District Biologist)	Wildlife, SSS, and T&E-Fauna, Riparian, Fisheries, Water Quality
Carolyn Temple	Archaeologist	Cultural Resources
Doug Kile	GIS Specialist	GIS
Lisa Grant	Planning and Environmental Coordinator	NEPA, Wild Horses
Don Rotell	Field Manager	Review

5 APPENDIX: REFERENCES CITED

Allred, B.W., B.T. Bestelmeyer, C.S. Boyd, C. Brown, K.W. Davies, M.C. Duniway, L.M. Ellsworth, T.A. Erickson, S.D. Fuhlendorf, T.V. Griffiths, V. Jansen, M.O. Jones, J. Karl, A. Knight, J.D. Maestas, J.J. Maynard, S.E. McCord, D.E. Naugle, H.D. Starns, D. Twidwell, and D.R. Uden. 2021. Improving LandSat Predictions of Rangeland Fractional Cover with Multitask Learning and Uncertainty. Methods in Ecology and Evolution 12: 841– 849.

American Fisheries Society. 1980. Western Division. Position Paper on Management and Protection of Western Riparian Stream Ecosystems. 24 p.

Anderson, A., and K.C. McCuistion. 2008. Evaluating Strategies for Ranching in the 21st Century: Successfully Managing Rangeland for Wildlife and Livestock. Rangelands 30(2):8-14.

Angell, D.L., and M.P. McClaran. 2001. Long-term Influences of Livestock Management and a Non-Native Grass on Grass Dynamics in the Desert Grassland. Journal of Arid Environments 49: 507-520.

Angell, Raymond. 1990. Mixing and Matching: Grazing Wet Meadows and Desert Range. Oregon State University. Accessed September 2021: https://agsci.oregonstate.edu/sites/agscid7/files/eoarc/attachments/410b.pdf.

Archer, S. and F.E. Smeins. 1991. Ecosystem-Level Processes. In: R.K. Heitschmidt and J.W. Stuth (eds.) Grazing management: an ecological perspective, pp. 109-139. Timber Press: Portland, OR.

Arredondo, J.T., T.A. Jones, and D.A. Johnson. 1998. Seedling Growth of Intermountain Perennial and Weedy Annual Grasses. Journal of Range Management 51:584–389.

Bailey, D.W., J.E. Gross, E.A. Laca, L.R. Rittenhouse, M.B. Coughenour, D.M. Swift, and P.L. Sims. 1996. Mechanisms that Result in Large Herbivore Grazing Distribution Patterns. Journal of Range Management 49:386–400.

Bailey, D.W. 1999. Influence of Species, Breed and Type of Animal on Habitat Selection. In: K.L. Launchbaugh, K.D. Sanders, and J.C. Mosley (eds.) Grazing Behavior of Livestock and Wildlife, pp. 101-108. Idaho Forest, Wildlife and Range Experiment Station Bulletin #70. Moscow, ID.

Bailey, D.W. 2004. Management Strategies for Optimal Grazing Distribution and Use of Arid Rangelands. Journal of Animal Science 82(E. Suppl.):E147-E153.

Bartley, D.M. and G.A.E. Gall. 1991. Genetic Identification of Native Cutthroat Trout (Oncorhynchus clarki) and Introgressive Hybridization with Introduced Rainbow Trout (O. mykiss) in Streams Associated with the Alvord Basin, Oregon and Nevada. Copeia, Vol. 1991, No. 3., pp. 854-859.

Beck, J.L. and D.L. Mitchell. 2000. Influences of Livestock Grazing on Sage-Grouse Habitat. Wildlife Society Bulletin 28:993-1002.

Beckham, S.D. 1995. An Interior Empire: Historical Overview of the Columbia Basin. 150 pp.

Beckham, S.D. 1995. Donner and Blitzen River, Oregon: River Widths, Vegetative Environment, and Conditions Shaping its Condition, Malheur Lake to Headwaters. 83 pp.

Behnke, R.J. 1981. Systematic and Zoogeographical Interpretation of Great Basin Trouts. Pages 95-124 in R.J. Norman and D.L. Soltz, eds. Fishes in North American Deserts. Wiley Interscience, John Wiley & Sons. New York. 552 p.

Behnke, R.J. 1988. Phylogeny and Classification of Cutthroat Trout. American Fisheries Society Symposium 4:1-7.

Belsky, J., A. Matzke, and S. Uselman. 1997. Survey of Livestock Influences on Stream and Riparian Ecosystems in the Western United States. Oregon Natural Desert Association. 38 p.

Bjorn T.C. and D.W. Reiser, 1991. Habitat Requirements of Salmonids in Streams. Pages 83-138 in W.R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. Special Publication 19. American Fisheries Society. Bethesda, MD.

BLM. 1980. Wilderness Study Areas Final Intensive Inventory Decisions. Oregon/Washington State Office. Portland, OR.

BLM. 1981. Wilderness Study Report. Oregon/Washington State Office. Portland, OR.

BLM. 1983. Alvord Desert Management Plan. Burns District. Hines, OR.

BLM. 1984. 1984 Andrews FEIS. Burns District. Hines, OR.

BLM. 1985. Rangeland Monitoring: Trend Studies. Technical Reference 4400-4.

BLM. 1989. Oregon Wilderness Final Environmental Impact Statement. Oregon/Washington State Office. Portland, OR. 4 volumes.

BLM. 1990. Mickey Basin Research Natural Area Management Plan. Burns District. Hines, OR.

BLM. 1991. Wilderness Study Report for Oregon. Oregon/Washington State Office. Portland, OR.

BLM. 1994 Mickey Hot Springs Areas of Critical Environmental Concern Management Plan. Burns District. Hines, OR.

BLM. 1997. Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington. Oregon/Washington State Office. Portland, OR.

BLM. 1999. Sampling Vegetation Attributes. Interagency Technical Reference 1734-4.

BLM. 1999b. Utilization Studies and Residual Measurements. Interagency Technical Reference 1734-3.

BLM. 2001. Biological Soil Crusts: Ecology and Management. Technical Reference 1730-2.

BLM. 2004. A Framework for Incorporating the Aquatic and Riparian Habitat Component of the Interior Columbia Basin Strategy into BLM and Forest Service Plan Revisions.

BLM. 2005. Andrews Management Unit Resource Management Plan and Record of Decision. Burns District. Hines, OR.

BLM. 2005. Steens Mountain Cooperative Management and Protection Area Resource Management Plan and Record of Decision. Burns District. Hines, OR.

BLM. 2006. Grazing Management Processes and Strategies for Riparian-Wetland Areas. Technical Reference 1737-20.

BLM. 2008. National Environmental Policy Act Handbook. Handbook H-1790-1.

BLM. 2010. Chalk Hills Allotment Management Plan. Burns District. Hines, OR.

BLM. 2010. Vegetation Treatments Using Herbicides on BLM Lands in Oregon. Final Environmental Impact Statement. Oregon/Washington State Office. Portland, OR.

BLM. 2010. Wild Horses and Burros Management Handbook. Handbook H-4700-1.

BLM. 2011. Bighorn Basin Resource Management Plan Revision Project DEIS. Wind River/Bighorn Basin District. Wyoming.

BLM. 2011. Cluster Allotment Management Plan. Burns District. Hines, OR.

BLM. 2011. Cottonwood Creek Allotment Management Plan. Burns District. Hines, OR.

BLM. 2011. Riparian Area Management: Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation. Technical Reference 1737-23. 155 pp.

BLM. 2012. BLM Manual 6330-Management of BLM Wilderness Study Areas.

BLM. 2012. Holloway Emergency Stabilization and Rehabilitation (ESR) EA. Burns District. Hines, OR.

BLM. 2012. Miller Homestead ESR EA. Burns District. Hines, OR.

BLM. 2012. The Oregon/Washington National Landscape Conservation System 3-year Strategy: Fiscal Years 2013-2015. Oregon / Washington BLM State Office. Portland, OR.

BLM. 2013. Billings-Pompeys Pillar Nat'l Monument PRMP / FEIS. Eastern Montana/Dakotas District. Billings, MT.

BLM. 2013. Buffalo RMP DEIS. High Plains District Office. Buffalo, WY.

BLM. 2013. Miles City RMP FEIS, Vol. 1. Eastern Montana/Dakotas District. Miles City, MT.

BLM. 2013. South Dakota RMP DEIS. Eastern Montana/Dakotas District. Belle Fourche, SD.

BLM. 2013. Water Rights Manual 7250.

BLM. 2014. Buzzard ESR EA. Burns District. Hines, OR.

BLM. 2014. Jarbidge RMP/Final EIS. Twin Falls District. Twin Falls, ID.

BLM. 2014. South Steens Allotment Management Plan. Burns District. Hines, OR.

BLM. 2015. Oregon Greater Sage-grouse Proposed Resource Management Plan Amendment and Final Environmental Impact Statement. Oregon/Washington State Office. Portland, OR.

BLM. 2015b. BLM Manual 9113-Roads.

BLM. 2015c. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

BLM. 2015d. Integrated Invasive Plant Management for the Burns District Revised EA (DOI-BLM-OR-B000-2011-0041-EA). Burns District. Hines, OR.

BLM. 2015e. Riparian Area Management: Functioning Condition Assessment for Lotic Areas. Technical Reference 1737-15. National Operations Center, Denver, CO.

BLM. 2017. AIM National Aquatic Monitoring Framework, Field Protocol for Wadeable Lotic Systems. Technical Reference 1735-2.

BLM. 2021. BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands (Public). 31 pp.

BLM. 2021. Livestock Grazing on the Alvord and Mann Lake Allotments Biological Assessment. Burns District. Hines, OR.

Bock, C.E., J.H. Bock, L. Kennedy, and Z.F. Jones. 2007. Spread of Non-Native Grasses into Grazed Versus Ungrazed Desert Grasslands. Journal of Arid Environments, 71(2): 229-235.

Booysen, P.DeV., N.M. Tainton, and J.D. Scott. 1963. Shoot–Apex Development in Grasses and its Importance in Grassland Management. Herbage Abstracts 33:209–213.

Bovey, R.W., D. Letourneau, and L.C. Erickson. 1961. The Chemical Composition of Medusahead and Downy Brome. Weeds 9:307-311.

Bowker, M. 2007. Biological Soil Crust Rehabilitation in Theory and Practice: An Underexploited Opportunity. Restoration Ecology 15: 13-23.

Boyte, S.P., B.K. Wylie, and D.J. Major. 2016. Cheatgrass Percent Cover Change: Comparing Recent Estimates to Climate Change-Driven Predictions in the Northern Great Basin. Rangeland Ecology and Management 69(4):265-279.

Braccia, A. and J.R. Voshell, Jr. 2006. Benthic Macroinvertebrate Fauna in Small Streams Used by Cattle in the Blue Ridge Mountains, Virginia. Northeastern Naturalist 13(2):269-286.

Bradley, B.A., C.A. Curtis, E.J. Fusco, J.T. Abatzoglou, J.K. Balch, S. Dadashi, and M. Taunmu. 2018. Cheatgrass (Bromus tectorum) Distribution in the Intermountain Western United States and its Relationship to Fire Frequency, Seasonality, and Ignitions. Biological Invasions 20:1493-1506.

Braun, C.E. 1998. Sage Grouse Declines in Western North America: What are the Problems? Transactions of Western Association of Fish and Wildlife Agencies 78: 139-156.

Caldwell, M.M., T.J. Dean, R.S. Nowak, R.S. Dzurec, and J.H. Richards. 1983. Bunchgrass Architecture, Light Interception, and Water-Use Efficiency: Assessment by Fiber Optic Points Quadrats and Gas Exchange. Oecologia 59:178–184.

Caldwell, M.M. 1984. Plant Requirements for Prudent Grazing. In: National Research Council & National Academy of Sciences, Developing Strategies for Rangeland Management. pp. 117-152. Westview Press: Boulder, CO.

Caldwell, M.M., J.H. Richards, J.H. Manwaring, and D.M. Eissenstat. 1987. Rapid Shifts in Phosphate Acquisition Show Direct Competition Between Neighboring Plants. Nature 327:615–616.

Calhoun, A.J. 1942. The Biology of the Black-Spotted Trout (Salmo clarki henshawi) (Gill and Jordan) in Two Sierra Nevada Lakes. Ph.D. dissertation. Stanford University, Palo Alto, California.

Castellano, M.J., and T.J. Valone. 2007. Livestock, Soil Compaction and Water Infiltration Rate: Evaluating a Potential Desertification Recovery Mechanism. Journal of Arid Environments 71(1):97-108.

CDC. 2022. Bti. Accessed on 1/7/2022. Accessed at: https://www.cdc.gov/mosquitoes/mosquito-control/community/bti.html.

Chambers, J. and C. D'Antonio. 2006. Using Ecological Theory to Manage or Restore Ecosystems Affected by Invasive Plant Species.

Chambers, J.C., Beck, J.L., Campbell, S., Carlson, J., Christiansen, T.J., Clause, K.J., Dinkins, J.B., Doherty, K.E., Griffin, K.A., Havlina, D.W., Henke, K.F., Hennig, J.D., Kurth, L.L., Maestas, J.D., Manning, M., Mayer, K.E., Mealor, B.A., McCarthy, C., Perea, M.A., and D.A. Pyke. 2016a. Using Resilience and Resistance Concepts to Manage Threats to Sagebrush Ecosystems, Gunnison Sage-Grouse, and Greater Sage-Grouse in their Eastern Range: A Strategic Multi-Scale Approach. General Technical Report RMRS-GTR-356. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 143 p.

Chambers, J.C., Germino, M.J., Belnap, J., Brown, C.S., Schupp, E.W., and S.B. St. Clair. 2016. Plant community resistance to invasion by Bromus species: The roles of community attributes, Bromus interactions with plant communities, and Bromus traits [Chapter 10]. In: Germino, Matthew J.; Chambers, Jeanne C.; Brown, Cynthia S, eds. 2016. Exotic Brome-Grasses in Arid and Semiarid Ecosystems of the Western US: Causes, Consequences, and Management Implications. Springer: Series on Environmental Management. p. 275-303.

Chaney, E., W. Elmore, and W.S. Platts. 1990. Livestock Grazing on Western Riparian Areas. Report prepared for U.S. Environmental Protection Agency by Northwest Resource Information Center, Inc., Eagle, Idaho. 45 p.

Clark, K.L., M. Gallagher, W.E. Heilman, N. Skowronski, E. Mueller, and A. Simeoni. 2017. Relationships Between Firing Pattern, Fuel Consumption, and Turbulence and Energy Exchange During Prescribed Fires. In: Proceedings for the 5th International Fire Behavior and Fuels Conference; 2016 April 11-15; Portland, OR. Missoula, MT: International Association of Wildland Fire. Pp. 144-149.

Clary, W.P. and B.F. Webster. 1989. Managing Grazing of Riparian Areas in the Intermountain Region. General Technical Report INT-263, U.S. Dept. of Agriculture, USFS, Intermountain Research Station, Ogden, Utah. 11 p.

Clayburn, L. 2021. Personal Communication with Prior Indian Creek Area Permittee (Gillette Ranches) Employee. Burns BLM. Hines, OR.

Cleary, J.G., 1976, Geothermal Investigation of the Alvord Valley, Southeast Oregon, Graduate Student Theses, Dissertations, & Professional Papers. 2442.

Coates, P.S., Casazza, M.L., Blomberg, E.J., Gardner, S.C., Espinosa, S.P., Yee, J.L., Wiechman, L. and B.J. Halstead. 2013. Evaluating Greater Sage-Grouse Seasonal Space Use Relative to Leks: Implications for Surface Use Designations in Sagebrush Ecosystems. Journal of Wildlife Management, 77, 1598– 1609.

Coates, P. and D. Munoz. 2019. Feral Horses Disrupt Greater Sage-Grouse Lekking Activity in the Great Basin. In G.R. Gallagher and J.B. Armstrong (eds.). The Eighteenth Wildlife Damage Management Conference. p. 41. Berry College: Mount Berry, GA.

Coffin, P.D. and W.F. Cowan. 1995. Lahontan Cutthroat Trout (*Oncorynchus clarki henshawi*) recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

Concostrina-Zubiri, L., E. Huber-Sannwald, I. Martinez, J. L. Flores Flores, J. A. Reyes-Aguero, A. Escudero, and J. Belnap. 2014. Biological Soil Crusts Across Disturbance—Recovery Scenarios: Effects of Grazing Regime on Community Dynamics. Ecological Applications, 1863-1877.

Cook, C. 1966. Factors Affecting Utilization of Mountain Slopes by Cattle. Journal of Range Management 19:200-204.

Cope, O.B. (ed.). 1979. Proceedings of the Forum - Grazing and Riparian/Stream Ecosystems. Trout Unlimited. 94 p.

Coughenour, M.B. 1991. Spatial Components of Plant-Herbivore Interactions in Pastoral, Ranching, and Native Ungulate Ecosystems. Journal of Range Management 44(6):530-542.

Coulloudon, B., K. Eshelman, J. Gianola, N. Habich, L. Hughes, C. Johnson, M. Pellant, P. Podborny, A. Rasmussen, B. Robles, P. Shaver, J. Spehar, and J. Willoughby. 1999. Sampling Vegetation Attributes, Technical Reference 1734-4, Bureau of Land Management. Denver, Colorado.

Courtois, D.R., B.L. Perryman, and H.S. Hussein. 2004. Vegetation Change After 65 Years of Grazing and Grazing Exclusion. Journal of Range Management 57:574–582.

Cowan, W. 1982. Annual Fisheries Management Report FY-82'. Summit Lake Indian Reservation, Humboldt County, Nevada. Unpublished Report. Summit Lake Paiute Tribe, Winnemucca, Nevada. 31 pp.

Cowan, W. 1983. Annual Fisheries Management Report FY-83'. Summit Lake Indian Reservation, Humboldt County, Nevada. Unpublished Report. Summit Lake Paiute Tribe, Winnemucca, Nevada. 37 pp.

Cowley, E.R. 2002. Guidelines for Establishing Allowable Levels of Streambank Alteration. Bureau of Land Management. Idaho State Office.

Cox, J.R., Martin-R, M.H., Ibarra-F, F.A., Fourie, J.H., Rethman, N.F.G., and Wilcox, D.G., 1988. The Influence of Climate and Soils on the Distribution of Four African Grasses. Journal of Range Management 41:127-139.

Crawford, J.A., R.A. Olson, N.E. West, J.C. Mosley, M.A. Schroeder, T.D. Whitson, R.F. Miller, M.A. Gregg, and C.S. Boyd. 2004. Ecology and Management of Sage-Grouse and Sage-Grouse Habitat. Journal of Range Management 57:2-19.

Daddy, F., M.J. Trlica, and C.D. Bonham. 1988. Vegetation and Soil Water Differences Among Big Sagebrush Communities with Different Grazing Histories. The Southwestern Naturalist 33(4):413-424.

Daubenmire, R. F. 1940. Plant Succession Due to Overgrazing in the Agropyron Bunchgrass Prairie of Southeastern Washington. Ecology 21:55–64.

Davies, K.W., J.D. Bates, and R.F. Miller. 2007. Short-Term Effects of Burning Wyoming Big Sagebrush Steppe in Southeast Oregon. Rangeland Ecology and Management 60:515–522.

Davies, K.W. 2008. Medusahead Dispersal and Establishment in Sagebrush Steppe Plant Communities. Rangeland Ecology and Management 61:110–115.

Davies K.W. and T.J. Svejcar. 2008. Comparison of Medusahead-Invaded and Noninvaded Wyoming Big Sagebrush Steppe in Southeastern Oregon. Rangeland Ecology and Management 61:623–629.

Davies, K.W., T.J. Svejcar, and J.D. Bates. 2009. Interaction of Historical and Nonhistorical Disturbances Maintains Native Plant Communities. Ecological Applications 19(6):1536–1545.

Davies, K.W. and J.D. Bates. 2010a. Native Perennial Forb Variation Between Mountain Big Sagebrush and Wyoming Big Sagebrush Plant Communities. Environmental Management 46:452–458.

Davies, K.W. and J.D. Bates. 2010b. Vegetation Characteristics of Mountain and Wyoming Big Sagebrush Plant Communities in the Northern Great Basin. Rangeland Ecology and Management 63:461–466.

Davies, K.W., J.D. Bates, T.J. Svejcar, and C.S. Boyd. 2010. Effects of Long-Term Livestock Grazing on Fuel Characteristics in Rangelands: An Example from the Sagebrush Steppe. Rangeland Ecology and Management 63(6):662-669.

Davies, K.W., C.S. Boyd, J.L. Beck, J.D. Bates, T.J. Svejcar, and M.A. Gregg. 2011. Saving the Sagebrush Sea: An Ecosystem Conservation Plan for Big Sagebrush Plant Communities. Biological Conservation 144:2573-2584.

Davies, K.W. and A.M. Nafus. 2013. Exotic Annual Grass Invasion Alters Fuel Amounts, Continuity and Moisture Content. International Journal of Wildland Fire 22:353-358.

Davies, K.W., A.M. Nafus, and M.D. Masden. 2013. Medusahead Invasion Along Unimproved Roads, Animal Trails, and Random Transects. Western North American Naturalist 73(1):54-59.

Davies, K.W., M. Vavra, B. Schultz, and N. Rimbey. 2014. Implications of Longer Term Rest from Grazing in Sagebrush Steppe. Journal of Rangeland Applications 1:14-34.

Davies K.W. and D.D. Johnson. 2015. Limiting medusahead Invasion and Impacts in the Great Basin. Great Basin Factsheet 2:3.

Davies, K.W., C.S. Boyd, J.D. Bates, and A. Hulet. 2015. Dormant Season Grazing May Decrease Wildfire Probability by Increasing Fuel Moisture and Reducing Fuel Amount and Continuity. International Journal of Wildland Fire 24:849–856.

Davies, K.W., C.S. Boyd, J.D. Bates, and A. Hulet. 2016. Winter Grazing Can Reduce Wildfire Size, Intensity and Behaviour in a Shrub-Grassland. International Journal of Wildland Fire 25: 191-199.

Davies K.W., J.D. Bates, C.S. Boyd, and T.J. Svejcar. 2016. Prefire Grazing by Cattle Increases Postfire Resistance to Exotic Annual Grass (*Bromus tectorum*) invasion and dominance for Decades. Ecology and Evolution 6:3356–3366.

Davies, K.W., A.M. Nafus, C.S. Boyd, A. Hulet, and J.D. Bates. 2016. Effects of Using Winter Grazing as a Fuel Treatment on Wyoming Big Sagebrush Plant Communities. Rangeland Ecology and Management 69(3), 179-184.

Davies, K.W., A. Gearhart, C.S. Boyd, and J.D. Bates. 2017. Fall and Spring Grazing Influence Fire Ignitability and Initial Spread in Shrub Steppe Communities. International Journal of Wildland Fire 26:485–490.

Davies, K.W. C.S. Boyd, J.D. Bates. 2018. Eighty Years of Grazing by Cattle Modifies Sagebrush and Bunchgrass Structure. Rangeland Ecology and Management 71: 275-280.

Davies, K.W., J.D. Bates, C.S. Boyd. 2020. Response of Planted Sagebrush Seedlings to Cattle Grazing Applied to Decrease Fire Probability. Rangeland Ecology and Management 73: 629-635.

Davies, K.W. and C.S. Boyd. 2020. Grazing Is Not Binomial (i.e., Grazed or Not Grazed): A Reply to Herman. BioScience 70(1):6–7.

Davies, K.W., J.D. Bates, B. Perryman, and S. Arispe. 2021a. Fall-Winter Grazing after Fire in Annual Grass – Invaded Sagebrush Steppe Reduced Annuals and Increased a Native Bunchgrass. Rangeland Ecology and Management 77:1-8.

Davies, K.W., J.D. Bates, C.S. Boyd, R. O'Connor, and S. Copeland. 2021b. Dormant Season Moderate Grazing Prefire Maintains Diversity and Reduces Exotic Annual Grass Response Postfire in Imperiled *Artemisia* Steppe. Rangeland Ecology and Management 79:91-99.

DeRamus, H.A., T.C. Clement, D.D. Giampola, and P.C. Dickison. 2003. Methane Emissions of Beef Cattle on Forages: Efficiency of Grazing Management Systems. Journal of Environmental Quality 32:269-277.

Derner, J.D. and G.E. Schuman. 2007. Carbon Sequestration and Rangelands: A Synthesis of Land Management and Precipitation Effects. Journal of Soil and Water Conservation 62(2):77.

Diamond, J.M., C.A. Call, and N. Devoe. 2009. Effects of Targeted Cattle Grazing on Fire Behavior of Cheatgrass dominated Rangeland in the Northern great Basin, USA. International Journal of Wildland Fire 18: 944-950.

Dickerson, B.R., and G.L. Vinyard. 1999b. Effects of High Chronic Temperatures and Diel Temperature Cycles on the Survival and Growth of Lahontan Cutthroat Trout. Transactions of the American Fisheries Society 128:516-521.

Doherty, M. K. 2007. Mosquito Populations in the Powder River Basin, Wyoming: A Comparison of Natural, Agricultural and Effluent Coal-Bed Natural Gas Aquatic Habitats. Thesis. Montana State University, Bozeman, Montana, USA.

Dunham, J.B., M.E. Rahn, R.E. Schroeter, and S.W. Breck. 2000. Diets of Sympatric Lahontan Cutthroat Trout and Nonnative Brook Trout: Implications for Species Interactions. Western North American Naturalist 60:304-310.

Eckert Jr., R.E. and J.S. Spencer. 1986. Vegetation Response on Allotments Grazed Under Rest-Rotation Management. Journal of Range Management 39(2):166-174.

Eckert Jr., R.E. and J.S. Spencer. 1987. Growth and Reproduction of Grasses Heavily Grazed Under Rest-Rotation Management. Journal of Range Management 40(2):156-159.

Eldridge, D. and R. Greene. 1994. Microbiotic Soil Crusts: A Review of their Roles in Soil and Ecological Processes in the Rangelands of Australia. Australian Journal of Soil Research 32(3):389-415.

Elmore, W. 1992. Riparian Responses to Grazing Practices. In: R.J. Naiman (ed.). Watershed Management. New York, NY: Springer Verlag:442-457.

Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998. Measuring and Monitoring Plant Populations. BLM Technical Reference 1730-1.

EPA. 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2007. U.S. EPA, Washington, D.C.

EPA. 2021. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019. U.S. EPA, Washington, D.C.

EPA. 2022. Bti for Mosquito Control. Accessed 1/7/2022. Accessed from: https://www.epa.gov/mosquitocontrol/bti-mosquito-control.

Evans, J., and Geisler, T.M. 2001. Geologic Field-Trip Guide to Steens Mountain Loop Road, Harney County, Oregon.

FAO/UNEP (Food and Agriculture Organization of the United Nations/United Nations Environment Programme). 1981. Conservation of the Genetic Resources of Fish: Problems and Recommendations. Report of Expert Consultation on the Genetic Resources of Fish. Rome 9-13 June 1980. FAO Fisheries Technical Paper Number 217.

Finnerty, D. W. and D. L. Klingman. 1962. Life Cycles and Control Studies of Some Weed Bromegrasses. Weeds 10:40–47.

Follett, R.F., J.M. Kimble, and R. Lal. 2001. The Potential of U.S. Grazing Lands to Sequester Soil Carbon. Chapter 16 in R.F. Follett, J.M. Kimble, and R. Lal (eds.). The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect. CRC Press LLC: Boca Raton, Florida.

Fondell, T., and I.J. Ball. 2005. Density and Success of Bird Nests Relative to Grazing on Western Montana Grassland. Biological Conservation 117(2):203–213.

France, K.A., Ganskopp, D.C. and C.S. Boyd. 2008. Interspace/Undercanopy Foraging Patterns of Beef Cattle in Sagebrush Habitats. Rangeland Ecology and Management 61:389-393.

Francis, C.D., C.P. Ortega, and A. Cruz. 2009. Noise Pollution Changes Avian Communities and Species Interactions. Current Biology 19:1414-1419.

Frischknecht, N.C. and L.E. Harris. 1968. Grazing Intensities and Systems on Crested Wheatgrass in Central Utah: Response of Vegetation and Cattle. Washington, DC: U.S. Forest Service. p. 47.

Fuhlendorf, S.D., D.M. Engle, J. Kerby, and R. Hamilton. 2009. Pyric Herbivory: Rewilding Landscapes through the Recoupling of Fire and Grazing. Conservation Biology 23(3):588–598.

Galat, D.L., G. Post, T.J. Keefe, and G.R. Bouck. 1983. Histological Changes in Gill, Kidney, and Liver of Lahontan Cutthroat Trout (*Salmo clarki henshaw,*) Living in Lakes of Different Salinity Alkalinity. Unpublished Report. Bureau of Indian Affairs, Branch of Rights Protection, Phoenix Area Office, Phoenix, Arizona.

Ganskopp, D., Vavra, M., 1987. Slope Use by Cattle, Feral Horses, Deer, and Bighorn Sheep. Northwest Science 61:74–81.

Ganskopp, D., R. Angelí, and J. Rose. 1992. Response of Cattle to Cured Reproductive Stems in a Caespitose Grass. Journal of Range Management 45:4

Ganskopp, D. 2001. Manipulating Cattle Distribution with Salt and Water in Large Arid-Land Pastures: A GPS/GIS Assessment. Applied Animal Science Behavior 73:251-262.

Ganskopp, D. and D. Bohnert. 2004. Wolfy Forage: Its Effect on Cattle Distribution and Diet Quality. Agricultural Experiment Station, Oregon State University Special Report 1052:10–16.

Ganskopp, D.C., and D.W. Bohnert. 2005. Does Wolfy Forage Affect Cattle Distribution in Rangeland Pastures? In: Research Progress Report 2005. Eastern Oregon Agricultural Experiment Station: Burns, OR. p. 66-67.

Gary, H.L., S.R. Johnson, and S.L. Ponce. 1983. Cattle Grazing Impact on Surface Water Quality in a Colorado Front Range Stream. Journal of Soil and Water Conservation 1983:124-128.

George, M.R. 1992. Ecology and Management of Medusahead. University of California Range Science Report 23:1–3.

George, M., D. Bailey, M. Borman, D. Ganskopp, G. Surber, and N. Harris. 2007. Factors and Practices that Influence Livestock Distribution. University of California Agriculture and Natural Resources Communication Services, ANR Publication 8217, Oakland, CA, 20 pp.

Gerstung, E.R. 1986. Fisheries Management Plan for Lahontan Cutthroat Trout (*Salmo clarki henshawi*) in California and Western Nevada Waters. Inland Fisheries Administrative Report No. 86. Federal Aid Project F33-R-11. California Department of Fish and Game, Sacramento, California.

Gillen R.L, W.C. Krueger, and R.F. Miller. 1984. Cattle Distribution on Mountain Rangeland in Northeast Oregon. Journal of Range Management 37(6):549-553.

Goddard, L.B., A.E. Roth, W.K. Reisen, and T.W. Scott. 2003. Vertical Transmission of West Nile Virus by Three California Culex (Diptera: Culicidae) Species. Journal of Medical Entomology 40(6): 743-746.

Gregory, J.S. and B.L. Gamett. 2009. Cattle Trampling of Simulated Bull Trout Redds. North American Journal of Fisheries Management 29: 361.

Gresswell, R.E., B.A. Barton, and J.L. Kershner (eds.). 1989. Practical Approaches to Riparian Resource Management: An Educational Workshop. May 8 -11, 1989, Billings, Montana. USDI Bureau of Land Management: BLM-MT-PT-89-001-4351. 193 p.

Guthery, F.S. and R.L. Bingham. 1996. A Theoretical Basis for Study and Management of Trampling by Cattle. Journal of Range Management, 49(3):264-269.

Hagen, C.A. 2011. Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat. Oregon Department of Fish and Wildlife, Salem, USA.

Hansen, D.J., W.K. Ostler, and D.B. Hall. 1999. The Transition From Mojave Desert to Great Basin Desert on the Nevada Test Site. In: E.D. McArthur, W.K. Ostler, and C.L. Wambolt, Compilers. Proceedings: Shrubland Ecotones. Proceedings RMRS-P11. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT. Pp.148-158.

Hartnett, D.C. 1989. Density and growth Stage-Dependent Responses to Defoliation in Two Rhizomatous Grasses. Oecologia 80(3):414-420.

Harney County. 2019. Harney County Weed Classification. Accessed from: https://www.co.harney.or.us/PDF_Files/Weed/2020/Harney%20County%20Noxious%20Weed%20List%202019.pdf.

Harris, G.A. 1965. Medusahead Competition. In: Proceedings of the Cheatgrass Symposium, Vale, Oregon. Portland, OR: Bureau of Land Management. Pp. 66-69.

Harrison, M.L., Mahony, N.A., Robinson, P., Newbury, A. and Green, D.J. 2011. Nest-Site Selection and Productivity of Vesper Sparrows Breeding in Grazed Habitats. Journal of Field Ornithology 82:140-149.

Hedrick, D.W. 1967. Managing Crested Wheatgrass for Early Spring Use. Journal of Range Management 20:53–54.

Heitschmidt, R. and J. Stuth. 1991. Grazing Management: An Ecological Perspective. Timber Press. 259 pages.

Hempy-Mayer, K., and D.A. Pyke. 2008. Defoliation Effects on Bromus Tectorum Seed Production: Implications for Grazing. Rangeland Ecology and Management, 61(1):116-123.

Herbel, C.H. and A.B. Nelson. 1966. Activities of Hereford and Santa Gertrudis Cattle on a Southern New Mexico Range. Journal of Range Management 19(4):173-176.

Hillel, D. 1998. Environmental Soil Physics. Academic Press. San Diego.

Hilty, J.H., D.J. Eldridge, R. Rosentreter, M.C. Wicklow-Howard, and M. Pellant. 2004. Recovery of Biological Soil Crusts Following Wildfire in Idaho. Rangeland Ecology and Management 57:89-96.

Hironaka, M. 1961. The Relative Rate of Root Development of Cheatgrass and Medusahead. Journal of Range Management 14:263–267.

Holechek, J.L. 1988. An Approach for Setting the Stocking Rate. Rangelands 10(1):10-14.

Holechek, J.L., R.D. Pieper, and C.H. Herbel. 1998. Range Management: Principles and Practices. Prentice-Hall: Upper Saddle River, NJ.

Holechek, J., R.D. Peiper, and C.H. Herbel. 2004. Range Management: Principles and Practices. 5th ed. Prentice Hall: Upper Saddle River, NJ. 587 p.

Holechek, J.L., R.D. Pieper, and C.H. Herbel. 2011. Range Management. Principles and practices, 6th ed. Pearson Prentice Hall: Upper Saddle River, NJ. 456 p.

Hull Jr., A.C. and J.F. Pehanec. 1947. Cheatgrass a Challenge to Range Research. Journal of Forestry 45:555-564.

Hyder, D.N., and W.A. Sawyer. 1951. Rotation-Deferred Grazing as Compared to Season-Long Grazing on Sagebrush-Bunchgrass Range in Southeastern Oregon. Journal of Range Management 4(1):30-34.

Hyder, D.N. and F.A. Sneva. 1963. Morphological and Physiological Factors Affecting the Grazing Management of Crested Wheatgrass. Crop Science 3:267–271.

IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

IPCC, 2019: Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V.]

Jacobs S., and C. Corrarino. 2015. Survey of Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) in East Slope Steens Mountain Streams. Work For Free Consulting Service, Parts Unknown.

Jansen, V., A.C.E. Traynor, J.W. Karl, N. Lepak, and J. Sprinkle. 2021. Monitoring Grazing Use: Strategies for Leveraging Technology and Adapting to Variability. Rangelands https://doi.org/10.1016/j.rala.2021.07.005.

Johnson, K.A. and D.E. Johnson. 1995. Methane Emissions From Cattle. Journal of Animal Science 73(8):2483-2492.

Johnson, D.D., and K.W. Davies. 2012. Medusahead Management in Sagebrush Steppe Rangelands: Prevention, Control, and Revegetation. Rangelands 34(1):32-38.

Johnson, D.D. and R. Sharp. 2012. Pace 180° and Repeat Photography: Monitoring Methods for Documenting Vegetation Trend in Sagebrush Rangelands. BEEF091. In: R. Cooke (ed.). Oregon State University Beef Cattle Library. Oregon State University: Corvallis, OR.

Johnson, D.D., M. Cahill, C. Boyd, V. Schroeder, L. Foster, A. Sitz, J. Kerby, T.J. Svejcar, and J. Cupples. 2019. Threat Based Management in the Northern Great Basin: A Manager's Guide. PNW 722, September 2019.

Johnson, R. R., C. D. Ziebell, D. R. Patton, P. F. Folliet, and R. H. Hamre (Tech. Coordinators). 1985. Riparian Ecosystem and Their Management: Reconciling Conflicting Uses; First North America Riparian Conference; April 16-18. Tucson, Arizona. USDA Forest Service Gen. Tech. Rpt. Rm-120. 523 p.

Jones, M.O. et al. 2018. Innovation in rangeland monitoring: annual, 30m, plant functional type percent cover maps for US rangelands, 1984–2017.

Kauffman, J.B. and W.C. Krueger. 1984. Livestock Impacts on Riparian Ecosystems and Streamside Management Implications - A Review. Journal of Range Management 37(5):430-438.

Keyser, A.J., G.E. Hill, and E.C. Soehren. 1998. Effects of Forest Fragment Size, Nest Density, and Proximity to Edge on the Risk of Predation to Ground-Nesting Passerine Birds. Conservation Biology 12(5):986–994.

Kinch, G. 1989. Riparian Area Management: Grazing Management in Riparian Areas. U.S. Bureau of Land Management, Denver, Colorado. Tech. Ref. 737-4. 44 p.

Klebenow, D.A. 1981. Livestock Grazing Interactions with Sage Grouse. Proceedings of the Wildlife Livestock Relationship Symposium.113-123pp.

Knapp, S.T., 1996. Cheatgrass (*Bromus tectorum* L.) Dominance in the Great Basin Desert: History, Persistence, and Influences to Human Activities. Global Environmental Change 6:37-52.

Knick, S., Dobkin, D., Rotenberry, J., Schroeder, M., Vander Haegen, M., and C. Van Riper. 2003. Teetering on the Edge or too Late? Conservation and Research Issues for Avifauna of Sagebrush Habitats. The Condor. 105. 611-634.

Koch, D.L., J.J. Cooper, E.L. Lider, R.L. Jacobson, and R.J. Spencer. 1979. Investigations of Walker Lake, Nevada: Dynamic Ecological Relationships. Desert Research Center, University of Nevada, Reno. 191 pp.

Koerth, B.H., W.M. Webb, F. . Bryant, and F.S. Guthery. 1983. Cattle Trampling of Simulated Ground Nests Under Short Duration and Continuous Grazing. Journal of Range Management 36:385-386.

Koontz, S.R. 2021. In The Cattle Markets. Department of Agricultural and Resource Economics, Colorado State University.

Lalman, David. 2004. Supplementing Beef Cows. Oklahoma Cooperative Extension Service ANSI-3010. Accessed September 2021: https://shareok.org/bitstream/handle/11244/50025/oksd_ansi_3010_2004-06.pdf?sequence=1

Lande, R. and G.F. Barrowclough. 1987. Effective Population Size, Genetic Variation, and Their Use In Population Management. Pages 87-1 23 in M.E. Soul~, editor. Viable Populations for Conservation. Cambridge University Press, New York, New York.

Launchbaugh, K. and L. Howery. 2005. Understanding Landscape Use Patterns of Livestock as a Consequence of Foraging Behavior. Rangeland Ecology and Management 58:99-108.

Laycock, W.A. and P.W. Conrad. 1981. Responses of Vegetation and Cattle to Various Systems of Grazing on Seeded and Native Mountain Rangelands in Eastern Utah. Journal of Range Management 34:52–58.

Lea, T.N. 1968. Ecology of the Lahontan Cutthroat Trout, *Salmo clarki henshawi*, in Independence Lake, California. M.S. Thesis. University of California, Berkeley, California.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats "Stronghold Watersheds and Unroaded Areas" In T.M. Quigley and S.J. Arbelbide eds "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III." U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen. Tech. Rep. PNW-GTR-405.

Lehrer, W.P. and E.W. Tisdale. 1956. Effect of sheep and rabbit digestion on the viability of some range plant seeds. Journal of Range Management 9(3):118-122.

Lewin, P.A., J.D. Wulfhorst, N.R. Rimbey, and K.S. Jensen. 2019. Implications of Declining Grazing Permits on Public Land: An Integrated Social and Economic Impact Analysis. Western Economics Forum, Spring 2019, Volume 17, Issue 1.

Lysne, C., and M. Pellant. 2004. Establishment of Aerially Seeded Big Sagebrush Following Southern Idaho Wildfires. Boise, ID, USA: US Department of the Interior, Bureau of Land Management, Idaho State Office. Technical Bulletin

2004-01. 14 p.

Mack, R.N. and D.A. Pyke. 1984. The Demography of *Bromus tectorum*: The Role of Microclimate, Grazing and Disease. Journal of Ecology 72:731–748.

Manier, D.J. and N.T. Hobbs. 2006. Large Herbivores Influence the Composition and Diversity of Shrub-Steppe Communities in the Rocky Mountains, USA. Oecologia 146:641–651.

McGuire, D. 2021. Common Beef Breeds of Oregon. Oregon State University Beef Cattle Library. BEEF105. Accessed September 2021: http://osu-wams-blogs-uploads.s3.amazonaws.com/blogs.dir/2753/files/2016/09/Common-Beef-Breeds-of-Oregon.pdf

McIver, J.D. and M.L. McInnis. 2007. Cattle Grazing Effects on Macroinvertebrates in an Oregon Mountain Stream. Rangeland Ecology and Management 60:293-303.

McNaughton, S.J. 1993. Grasses and Grazers, Science and Management. Ecological Applications 3(1):17-20.

Meays, C.L., A.S. Laliberte, and P.S. Doescher. 2000. Defoliation Response of Bluebunch Wheatgrass and Crested Wheatgrass: Why We Cannot Graze These Two Species in the Same Manner. Rangelands 22:16–18.

Meehan, W.R. and W.S. Platts. 1978. Livestock Grazing and the Aquatic Environment. Journal of Soil and Water Conservation 1978:274-278.

Menke, J. (ed.). 1977. Symposium on livestock interactions with wildlife, fish and the environment. Sparks, Nevada. USDA Forest Service Pacific Southwest Forest and Range Experiment Station. Berkeley, California.

Milchunas, D.G., O.E Sala, and W. Lauenroth. 1988. A Generalized Model of the Effects of Grazing by Large Herbivores on Grassland Community Structure. The American Naturalist. 132. 87-106.

Milchunas, D.G. 2006. Responses of Plant Communities to Grazing in the Southwestern United States. General Technical Report RMRS-GTR-169. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 126 p.

Miller, R.F. 1983. Habitat Use of Feral Horses and Cattle in Wyoming's Red Desert. Journal of Range Management 36(2):195-199.

Miller, R.F., T. Svejcar, and N.E. West. 1994. Implications of Livestock Grazing in the Intermountain Sagebrush Region: Plant Composition, p. 101-146. In: M. Vavra, W.A. Laycock, and R.D. Pieper (eds.) Ecological Implications of Livestock Herbivory in the West. Soc. For Range Manage. Denver, Colorado.

Miller, R.F. and J.A. Rose. 1999. Fire History and Western Juniper Encroachment in Sagebrush Steppe. Journal of Range Management 52(6):550-559.

Miller, R.F., J.D. Bates, A.J. Svejcar, F.B. Pierson Jr., and L.E. Eddleman. 2005. Biology, Ecology, and Management of Western Juniper (*Juniperus occidentalis*) (Bulletin No. 152). Oregon State University Agricultural Experiment Station: Corvallis, OR.

Mosley, J.C. 1996. Prescribed Sheep Grazing to Suppress Cheatgrass: A Review. Sheep and Goat Research Journal 12:74–81.

Moyle, P.B. 2002. Inland Fishes of California. University of California Press. Berkeley, California. 502 pp.

Moynahan, B.J., M.S. Lindberg, J.J. Rotella, and J.W. Thomas. 2007. Factors Affecting Nest Survival of Greater Sage-Grouse in North-Central Montana. Journal of Wildlife Management 71:1773-1783.

Mueggler, W.F. 1965. Cattle Distribution on Steep Slopes. Journal of Range Management 18(5):255-257.

Mueggler, W.F. 1975. Rate and Pattern of Vigor Recovery in Idaho Fescue and bluebunch Wheatgrass. Journal of Range Management 28(3):198-204.

Muscha, J. and A. Hild. 2006. Biological Crusts in Grazed or Ungrazed Wyoming Sagebrush Steppe. Journal of Arid Environments 67:195-207.

Naugle, D.E., C.L. Aldridge, B.L. Walker, T.E. Cornish, B.J. Moynahan, M.J. Holloran, K. Brown, G.D. Johnson, E.T. Schmidtmann, R.T. Mayer, C.Y. Kato, M.R. Matchett, T.J. Christiansen, W.E. Cook, T. Creekmore, R.D. Falise, E.T. Rinkes, and M.S. Boyce. 2004. West Nile virus—Pending Crisis for Greater Sage-Grouse. Ecology Letters 7(8):704–713.

Nielson, A.E. 1991. Trampling the Archaeological Record: An Experimental Study. American Antiquity 56(3):483-503.

O'Connor, R.C. and M.J. Germino. 2020. Comment on: Grazing Disturbance Promotes Exotic Annual Grasses by Degrading Soil Biocrust Communities. Ecological Applications 31(7):e02277.

Ohmart, R.D. and B.W. Anderson. 1982. North American Desert Riparian Ecosystems. P. 433-466. In: G. L. Bender, ed., Reference Handbook on the Deserts of North America. Greenwood Press, Westport, Connecticut.

ODEQ. 2003. Alvord Lake Subbasin Total Maximum Daily Load (TMDL) & Water Quality Management Plan (WQMP).

ODEQ. 2018/2020 Integrated Report. 2020. Accessed at: https://www.oregon.gov/deq/wq/Pages/epaApprovedIR.aspx.

ODFW. 2020. Oregon Greater Sage-Grouse Population Monitoring: 2020 Annual Report. Hines, OR.

ODFW. 2021. Conservation Opportunity Areas. Accessed January 3, 2022 at: https://oregonconservationstrategy.org /conservation-opportunity-areas/.

Oesterheld, M. and S.J. McNaughton. 1991. Effect of Stress and Time for Recovery on the Amount of Compensatory Growth after Grazing. Oecologia 85(3):305-313.

Paine, L., D.J. Undersander, D.W. Sample, G.A. Bartelt, and T.A. Schatteman. 1996. Cattle Trampling of Simulated Ground Nests in Rotationally Grazed Pastures. Journal of Range Management 49:294-300.

Patton, B.D., X. Dong, P.E. Nyren, and A. Nyren. 2007. Effects of Grazing Intensity, Precipitation, and Temperature on Forage Production. Rangeland Ecology and Management 60(6):656-665.

Peek, J.M. and P.D. Dalke. 1982. Wildlife-Livestock Relationships Symposium; Proceedings 10. (ed). April 20-22, 1982, Coeur d'Alene, Idaho. Univ. of Idaho Forest, Wildlife, and Range Experiment Station. Moscow, Idaho.

Pellant, M. 1990. The Cheatgrass-Wildfire Cycle--Are There Any Solutions? In: McArthur, E. Durant; Romney, Evan M.; Smith, Stanley D.; Tueller, Paul T., compilers. Proceedings-- Symposium on Cheatgrass Invasion, Shrub Die-Off, and Other Aspects of Shrub Biology and Management; 1989 April 5-7; Las Vegas, NV. General Technical Report INT-276. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 11-17.

Pellant, M. 1996. Cheatgrass: The Invader That Won the West. Interior Columbia Basin Ecosystem Management Project. BLM Idaho State Office. Boise, ID.

Perryman, B.L., B.W. Schultz, M. Burrows, T. Shenkoru, and J. Wilker. 2020. Fall-Grazing and Grazing-Exclusion Effects on Cheatgrass (*Bromus tectorum*) Seed Bank Assays in Nevada, United States. Rangeland Ecology and Management 73:343-347.

Peters, E.F. and S.C. Bunting. 1994. Fire Conditions Pre- and Post-Occurrence of Annual Grasses on the Snake River Plain. In: Monsen, S.B.; Kitchen, S.G., comps. Proceedings: Ecology and Management of Annual Rangelands. General Technical Report INT-313. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 31-36.

Picman, J. 1988. Experimental Study of Predation on Eggs of Ground-Nesting Birds: Effects of Habitat and Nest Distribution. Condor 90:124-131.

Pinehak, W.E., M.A. Smith, R.H. Hart, and J.W. Waggoner, Jr. 1991. Beef Cattle Grazing Distribution Patterns on Foothill Range. Journal of Range Management 44:267-275.

Platts, W.S. 1981. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America-Effects of Livestock Grazing. USDA Forest Service General Technical Report PNW-124. 25 p.

Pyke, D.A. 1986. Demographic Responses of *Bromus tectorum* and Seedlings of *Agropyron spicatum* to Grazing by Small Mammals: Occurrence and Severity of Grazing. Journal of Ecology 74:739–754.

Pyke, D.A. 1987. Demographic Response of *Bromus tectorum* and Seedlings of *Agropyron spicatum* to Grazing by Small Mammals: The Influence of Grazing Frequency and Plant Age. Journal of Ecology 75:825–835.

Pyke, D.A., Chambers, J.C., Pellant, M., Knick, S.T., Miller, R,F., Beck, J.L., Doescher, P.S., Schupp, E.W., Roundy, B.A., Brunson, M., and J.D McIver. 2015. Restoration Handbook for Sagebrush Steppe Ecosystems with Emphasis on Greater Sage-Grouse Habitat—Part 1. Concepts for Understanding and Applying Restoration: U.S. Geological Survey Circular 1416, 44 p.

Pyke, D.A., Chambers, J.C., Beck, J.L., Brooks, M.L., and B.A. Mealor. 2016. Land Uses, Fire, and Invasion: Exotic Annual Bromus and Human Dimensions [Chapter 11]. In: Germino, Matthew J.; Chambers, Jeanne C.; Brown, Cynthia S, eds. 2016. Exotic Brome-Grasses in Arid and Semiarid Ecosystems of the Western US: Causes, Consequences, and Management Implications. Springer: Series on Environmental Management. p. 307-336.

Pyke, D.A., Chambers, J.C., Pellant, M., Miller, R.F., Beck, J.L., Doescher, P.S., Roundy, B.A., Schupp, E.W., Knick, S.T., Brunson, M., and J.D. McIver. 2018. Restoration Handbook for Sagebrush Steppe Ecosystems with Emphasis on Greater Sage-Grouse Habitat—Part 3. Site Level Restoration Decisions (ver. 1.1, March 2018). U.S. Geological Survey Circular 1426, 62 p.

Rankel, G.L. 1976. Fishery Management Program, Summit Lake Indian Reservation, Humboldt County, Nevada. Special Report of the U.S. Fish and Wildlife Service, Division of Fishery Services, Reno, Nevada. 35 pp.

Ratliff, R.D., J.N. Reppert, and R.J. McConnen. 1972. Rest-Rotation Grazing at Harvey Valley: Range Health, Cattle Gains, Costs. Research Paper No. 77. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, US Department of Agriculture.

Reisner, M.D., Grace, J.B., Pyke, D.A. and P.S. Doescher. 2013. Conditions Favouring *Bromus tectorum* Dominance of Endangered Sagebrush Steppe Ecosystems. Journal of Appled Ecology 50:1039-1049.

Reisner, M.D., Doescher, P.S., and D.A Pyke. 2015. Stress-Gradient Hypothesis Explains Susceptibility to *Bromus tectorum* Invasion and Community Stability in North America's Semi-Arid *Artemisia tridentata wyomingensis* Ecosystems. Journal of Vegetation Science, 26(6):1212-1224.

Rice, B. and M. Westoby. 1978. Vegetative Responses of Some Great Basin Shrub Communities Protected Against Jackrabbits or Domestic Stock. Journal of Range Management 31(1):28–34.

Rickard, W.H. 1985. Experimental Cattle Grazing in a Relatively Undisturbed Shrub Steppe Community. Northwest Science 59:66–72.

Rimbey, N., L. Torell, and J. Tanaka. 2007. Why Grazing Permits Have Economic Value. Journal of Agricultural and Resource Economics. 32.

Robson, S.G., and E.R. Banta. 1995. Ground Water Atlas of the United States, Segment 2, Arizona, Colorado, New Mexico, Utah, Basin and Range Aquifers. U.S. Geological Survey Hydrologic Investigations Atlas 730-C, pg. C11.

Root, H.T., J.C. Brinda, and E.K. Dodson. 2017. Recovery of Biological Soil Crust Richness and Cover 12–16 Years After Wildfires in Idaho, USA. Biogeosciences 14:3957–3969.

Root, H.T., J.E.D. Miller, and R. Rosentreter. 2020. Grazing Disturbance Promotes Exotic Annual Grasses by Degrading Soil Biocrust Communities. Ecological Applications 30(1):e02016.

Rvder. R.A. 1980. Effects of Grazing on Bird Habitats. Pages 51-66 in R.M. DeCraff and G. Tilghman (compilers). Management of Western Forests and Grasslands for Nongame Birds. U.S.F.S. General Technical Report INT-86.

Sauer, J.R., D.K. Niven, J.E. Hines, D.J. Ziolkowski Jr., K.L. Pardieck, J.E. Fallon, and W.A. Link. 2017. The North American Breeding Bird Survey, Results and Analysis 1966-2015. Version 2.07.2017. USGS Patuxent Wildlife Research Center: Laurel, MD.

Saunders, W.C. and K.D. Fausch. 2009. A Field Test of Effects of Livestock Grazing Regimes on Invertebrate Food Webs that Support Trout in Central Rocky Mountain Streams. Department of Fish, Wildlife, and Conservation Biology Colorado State University Fort Collins, CO. September 2009.

Schmelzer, L., B. Perryman, B. Bruce, B. Schultz, K. McAdoo, G. McCuin, S. Swanson, J. Wilker, and K. Conley. 2014. CaseStudy: Reducing Cheatgrass (*Bromus tectorum)* Fuel Loads Using Fall Cattle Grazing. The Professional Animal Scientist 30: 270-278.

Schroeder, V. and D. Johnson. 2019. Bunchgrass Phenology: Using Growth Stages of Grasses as Adaptive Management Tools. Oregon State University Extension Service EM 9232.

Schuman, G.E., L.J. Ingram, P.D. Stahl, J.D. Derner, G.F. Vance, and J.A. Morgan. 2009. Influence of Management on Soil Organic Carbon Dynamics in Northern Mixed-Grass Rangeland. Chapter 11 in Soil Carbon Sequestration and the Greenhouse Effect. 2nd Edition. SSSA Special Publication 57. Madison, Wisconsin.

Sevon, M. 1988. Walker Lake Fisheries Management Plan. Nevada Department of Wildlife, Reno, Nevada. 79 pp.

Sharps, E., J. Smart, L.R. Mason, K. Jones, M.W. Skov, A. Garbutt, and J.G. Hiddink. 2017. Nest Trampling and Ground Nesting Birds: Quantifying Temporal and Spatial Overlap Between Cattle Activity and Breeding Redshank. Ecology and Evolution 28:6622–6633.

Sheley, R.L. and J. Krueger-Mangold. 2003. Principles for Restoring Invasive Plant-Infested Rangeland. Weed Science 51(2):260-265.

Sigler, W.F., W.T. Helm, P.A. Kucera, S. Vigg, and G.W. Workman. 1983. Life History of the Lahontan Cutthroat Trout, *Salmo clarki henshawi*, in Pyramid Lake, Nevada. Great Basin Naturalist 43:1-29.

Smith, B. S., R. Sheley and T. Svejcar. 2012. EBIPM Grazing Invasive Annual Grasses: The Green and Brown Guide.

Sneva, F.A., L.R. Rittenhouse, P.T. Tueller, and P. Reece. 1984. Changes in Protected and Grazed Sagebrush-Grass in Eastern Oregon, 1937 to 1974. Oregon Agricultural Experiment Station Bulletin 663:3-11.

Snyder, J. 2022. IPM in Schools: Mosquitos. PNW Pest Press, Issue 12 Spring. Oregon State University School IPM Program. Accessed on 1/7/2022. Accessed from http://osu-wams-blogs-uploads.s3.amazonaws.com/blogs.dir/2946/files/2017/07/Mosquito.pdf.

Society for Range Management. 1998. 4th Edition Glossary of Terms: https://globalrangelands.org/glossary.

Stewart, G. and A.E. Young. 1939. The Hazard of Basing Permanent Grazing Capacity on *Bromus tectorum*. Journal of the American Society of Agronomy 31(12):1002-1015.

Stewart, G. and A.C. Hull, Jr. 1949. Cheatgrass (*Bromus tectorum L.*) an Ecologic Intruder in Southern Idaho. Ecology 30:58-74.

Stuth, J.W. 1991. Foraging Behavior. In: R.K. Heitschmidt and J.W. Stuth (eds.). Grazing Management: An Ecological Perspective. Timber press: Portland, Oregon. Pp. 65–83.

Svejcar, T., and R. Tausch. 1991. Anaho Island, Nevada: A Relict Area Dominated by Annual Invader Species. Rangelands 13(5):233-236.

Tausch, R.J., R.S. Nowak, A.D. Bruner, and J. Smithson. 1994. Effects of Simulated Fall and Early Spring Grazing on Cheatgrass and Perennial Grass in Western Nevada. In: S. B. Monsen and S. G. Kitchen [EDS.]. Proceedings—Ecology and Management of Annual Rangelands. Ogden, UT, USA: US Department of Agriculture, Forest Service, General Technical Report INT-GTR-313. p.113–119.

Thurow, T.L., W.H. Blackburn, and C.A. Taylor, Jr. 1988. Infiltration and Interrill Erosion Responses to Selected Livestock Grazing Strategies, Edwards Plateau, Texas. Journal of Range Management 41:296–302.

Trlica, M.J. 2013. Grass Growth and Response to Grazing. Colorado State University Extension Fact Sheet Natural Resources Series Range: 6.108.

Trotter, P.C. 1987. Cutthroat, Native Trout of the West. Colorado Associated University Press. Boulder, Colorado. 219 pp.

Turnadge, C., Mallants, D., and L. Peeters. 2018. Overview of Aquitard and Geological Fault Simulation Approaches in Regional Scale Assessments of Coal Seam Gas Extraction Impacts. Prepared by the Commonwealth Scientific and Industrial Research Organization (CSIRO), Canberra.

Turner, R.B. 1963. Medusahead: A Threat to Oregon Rangeland. Special report 149. Agricultural Experiment Station. Oregon State University: Corvallis, OR.

Uden, D.R. 2021. Improving Landsat Predictions of Rangeland Fractional Cover with Multitask Learning and Uncertainty. Methods in Ecology and Evolution 12:841–849.

US Census of Agriculture. 2019. United States Summary and State Data Volume 1, Geographic Area Series, Part 51, AC-17-A-51. United States Department of Agriculture, Sonny Perdue, Secretary, National Agricultural Statistics Service Hubert Hamer, Administrator. Available at: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf.

USDA. 2014. Updated Interior Columbia Basin Strategy: A Strategy for Applying the Knowledge Gained by the Interior Columbia Basin Ecosystem Management Project to the Revision of Land Use Plans and Project Implementation. 28 pp.

USDA NRCS. 1997. Soil Survey of Harney County Area, Oregon. National Cooperative Soil Survey. 1513 pp.

USDA NRCS. 2008. Biology Technical Note: Wetlands, Mosquitoes, and West Nile Virus. Indiana, USA.

USDA SCS. 1973. National Soils Handbook. Soil Conservation Service: Washington, D.C., USA.

USFWS. 1977. Fisheries Management Plan - Summit Lake Indian Reservation. U.S. Fish and Wildlife Service, Reno, Nevada. 38 pp.

USFWS. 1995. Lahontan Cutthroat Trout, *Oncorhynchus clarki henshawi*, Recovery Plan. Portland, Oregon.

USFWS. 2004. East Steens Lahontan Cutthroat Trout Biological Opinion.

USFWS. 2019. Updated Goals and Objectives for the Conservation of Lahontan Cutthroat Trout. Portland, Oregon.

USFWS. 2022. Biological Opinion for Livestock Grazing on Alvord and Mann Lake Allotments, Burns District – Harney County, Oregon.

USGS. 2008. Memorandum to Fish and Wildlife Service Director. The Challenges of Linking Carbon Emissions, Atmospheric Greenhouse Gas Concentrations, Global Warming, and Consequential Impacts.

Valentine, K.A. 1947. Distance From Water as a Factor in Grazing Capacity of Rangeland. Journal of Forestry 45(10):749-754.

Vallentine, J.F. 2001. Grazing Management, 2nd addition. Academic Press: San Diego.

Vallentine, J. F. and A.R. Stevens. 1994. Use of Livestock to Control Cheatgrass –A Review. In: S. B. Monsen and S. G. Kitchen [EDS.]. Proceedings—Ecology and Management of Annual Rangelands. Ogden, UT, USA: U.S.F.S. General Technical Report INT-GTR-313. p.202–206.

Van Lanen, N., Green, A., Gorman, T., Quattrini, L., and D. Pavlacky, Jr. 2017. Evaluating Efficacy of Fence Markers in Reducing Greater Sage-Grouse Collisions with Fencing. Biological Conservation 213:70-83.

Vavra, M. 2005. Livestock Grazing and Wildlife: Developing Compatibilities. Rangelands 58.

Vavra, M., T. DelCurto, N. Rimbey, and R. Kay. 2014. Ecological Impacts of Season of Use on Sagebrush-Steppe Grasslands. Journal of Rangeland Applications, 1, In Press.

West, N.E., F.D. Provenza, P.S. Johnson, and M.K. Owens. 1984. Vegetation Change After 13 Years of Livestock Grazing Exclusion on Sagebrush Semidesert in West Central Utah. Journal of Range Management 37(3):262–264.

Williams, R.N. 1991. Genetic Analysis and Taxonomic Status of Cutthroat Trout from Willow Creek and Whitehorse Creek in Southeast Oregon. BSU Evolutionary Genetics Lab Report 91-3. Boise, Id. 15 pp.

Williamson, M.A., E. Fleishman, R.C. Mac Nally, J.C. Chambers, B.A. Bradley, D.S. Dobkin, D.I. Board, F.A. Fogarty, N. Horning, M. Leu, and M. Wohlfeil Zillig. 2020. Fire, Livestock Grazing, Topography, and Precipitation Affect Occurrence and Prevalence of Cheatgrass (*Bromus tectorum*) in the Central Great Basin, USA. Biological Invasions 22:663–680.

Young, J.A. 1992. Ecology and Management of Medusahead (*Taeniatherum caput-medusae ssp. asperum* Melderis). Great Basin Naturalist 52:245-252.

Young, J.A. and F.L. Allen. 1997. Cheatgrass and Range Science: 1930-1950. Journal of Range Management 50:530-535.

Young, K.E., M.A. Bowker, S.C. Reed, M.C. Duniway, and J. Belnap. 2019. Temporal and Abiotic Fluctuations may be Preventing Successful Rehabilitation of Soil-Stabilizing Biocrust Communities. Ecological Applications 29(5):e01908.

Zimdahl, R. 1999. Biology and Management of Noxious Rangeland Weeds. R.L. Sheley and J.K. Petroff (eds.). Oregon State University Press: Corvallis, Oregon.

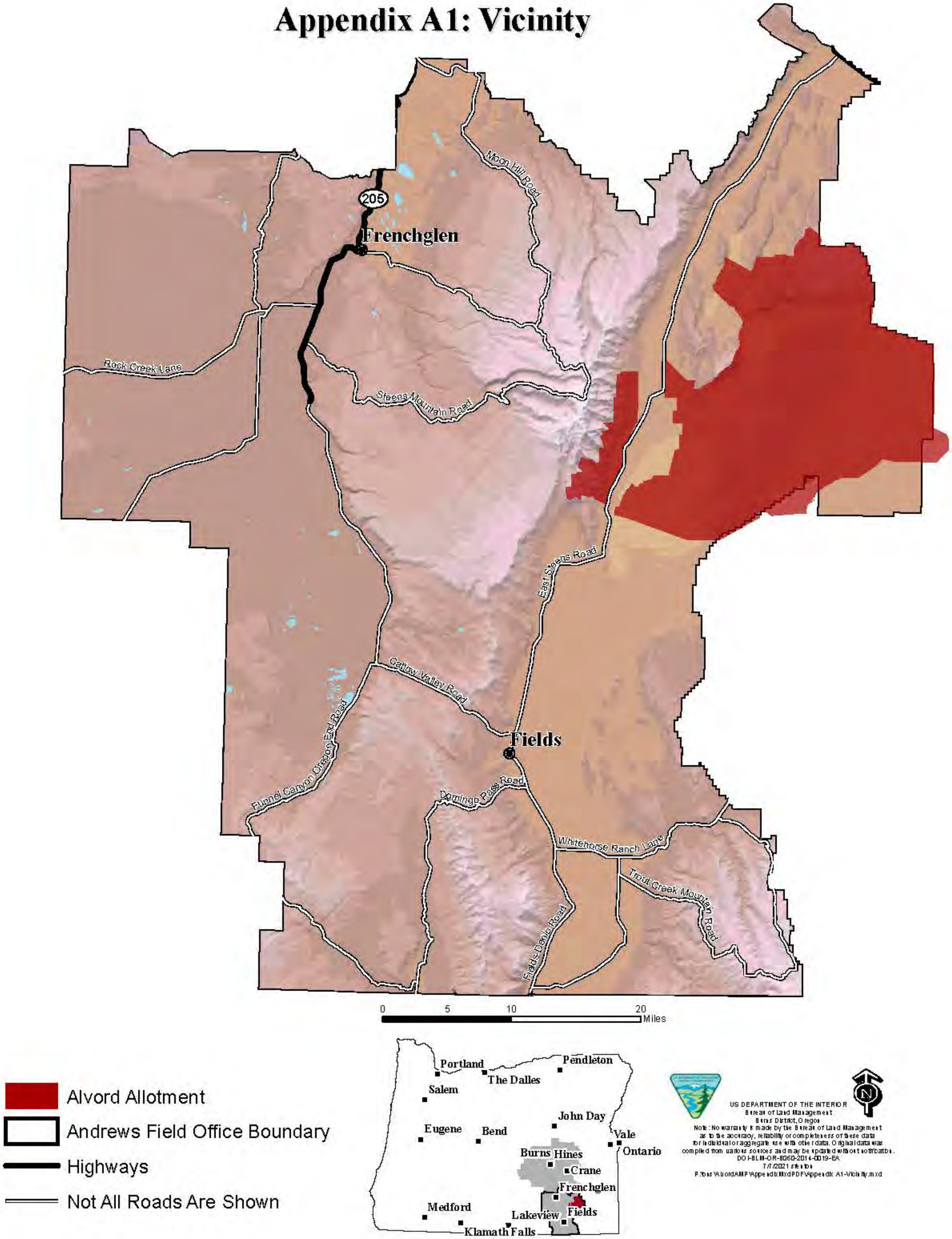
Zoellick, B.W. 2004. Density and Biomass of Redband Trout Relative to Stream Shading and Temperature in Southwestern Idaho. Western North American Naturalist 64(1):18-26.

6 APPENDIX A: MAPS

A1 - Vicinity
A2 - Land Status
A3 - Existing Range Improvements
A4 - Proposed Pastures
A5 - Alternative B Proposed Range Improvements
A6 - BLM Existing Late Season Reliable Water Use Area - Desert Pasture
A7 - BLM Existing Late Season Reliable Water + Proposed Water Developments for Reinstatement of Suspended AUMs Use Area - Desert Pasture
A8 - BLM Existing Late Season Reliable Water + All Proposed Water Developments Use Area - Desert Pasture

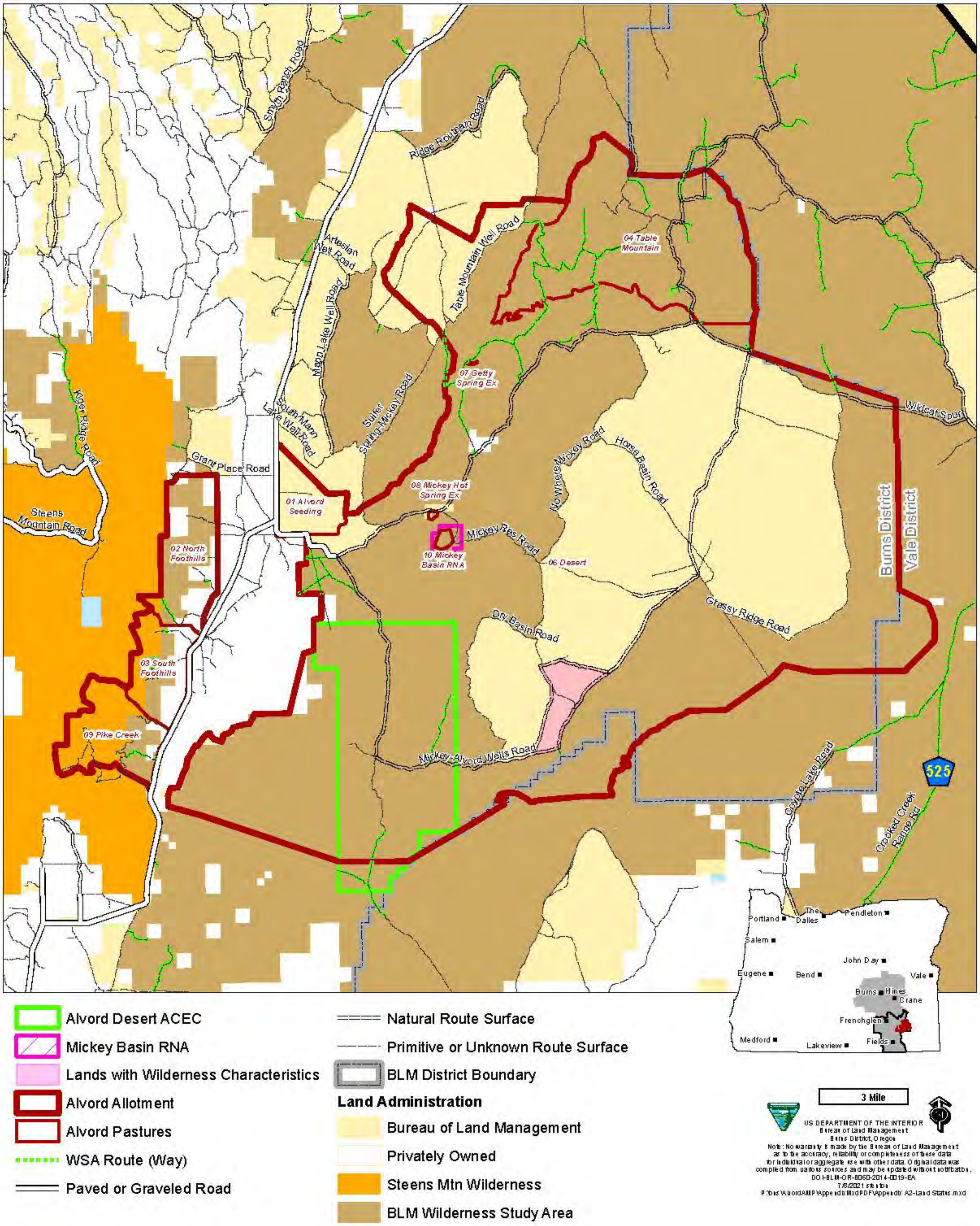
Alvord AMP EA

Appendix A1: Vicinity

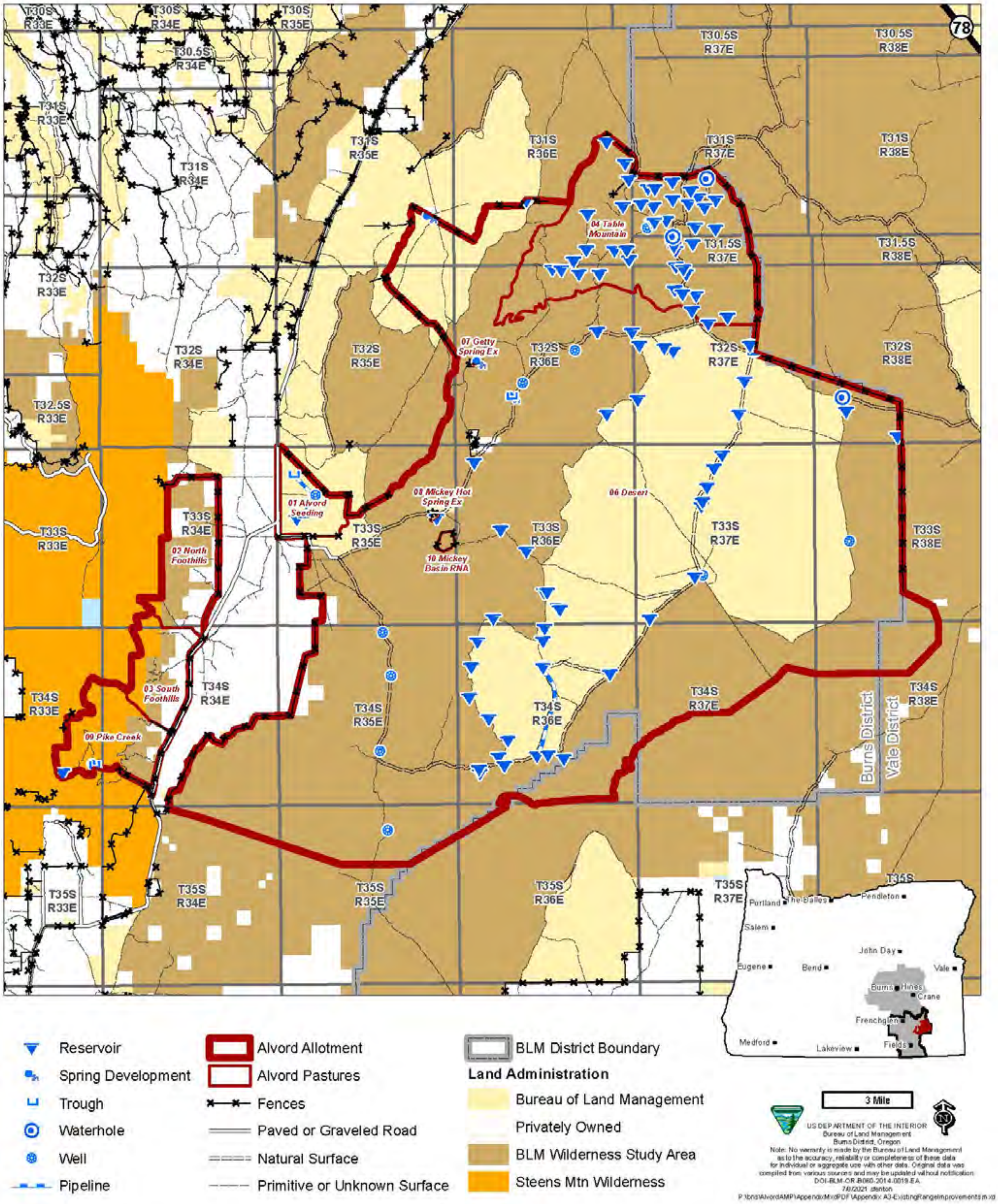


Alvord AMP EA

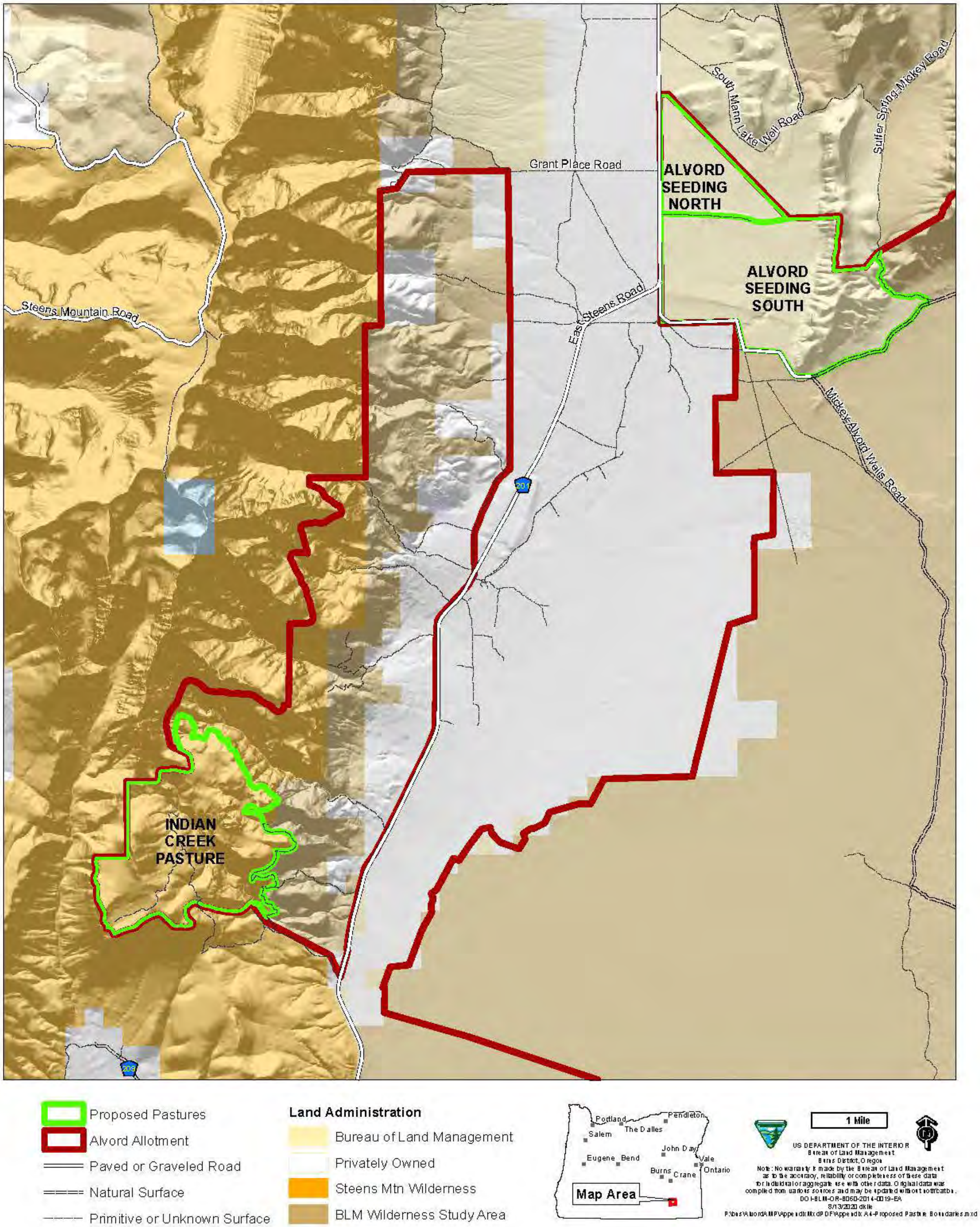
Appendix A2: Land Status and Special Management Areas



Appendix A3: Existing Range Improvements

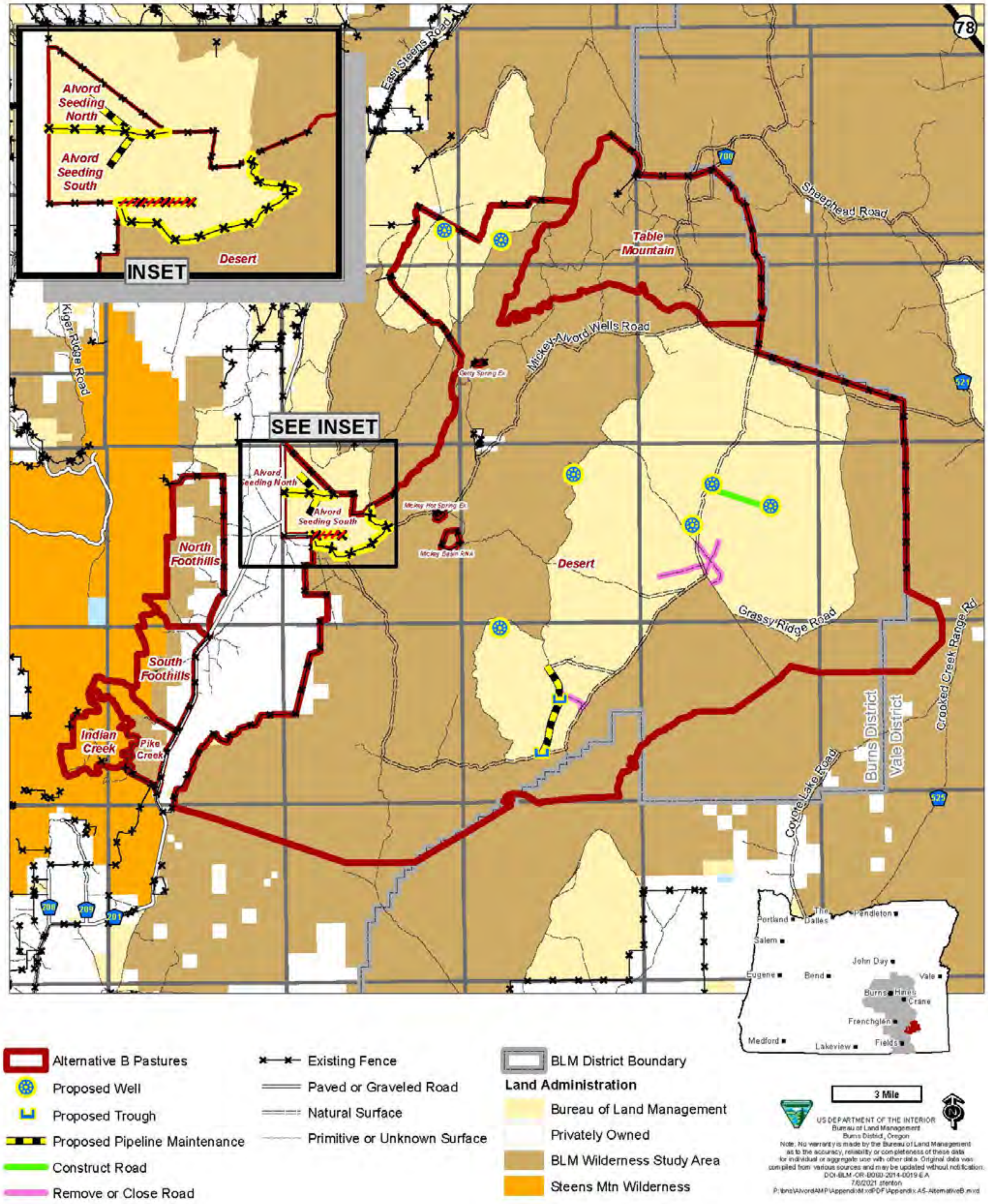


Appendix A4: Proposed Pasture Boundaries



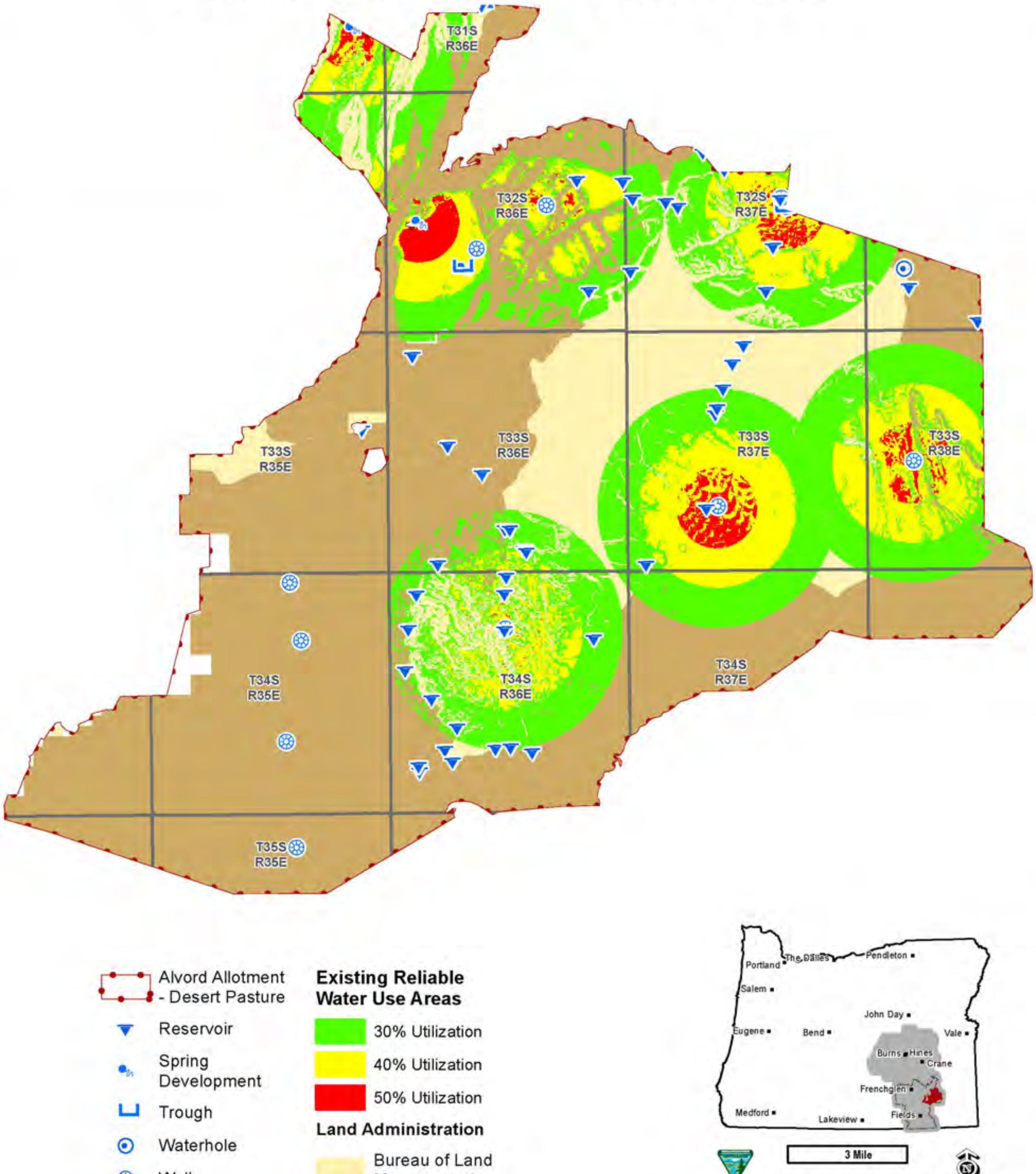
Alvord AMP EA

Appendix A5: Alternative B



Alvord AMP EA

Appendix A6: BLM Existing Late Season Reliable Water Use Area - Desert Pasture



US DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Burns District, Oregon
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.
DOI-BLM-OR-B060-2014-0019-EA
2/3/2022 atoelle
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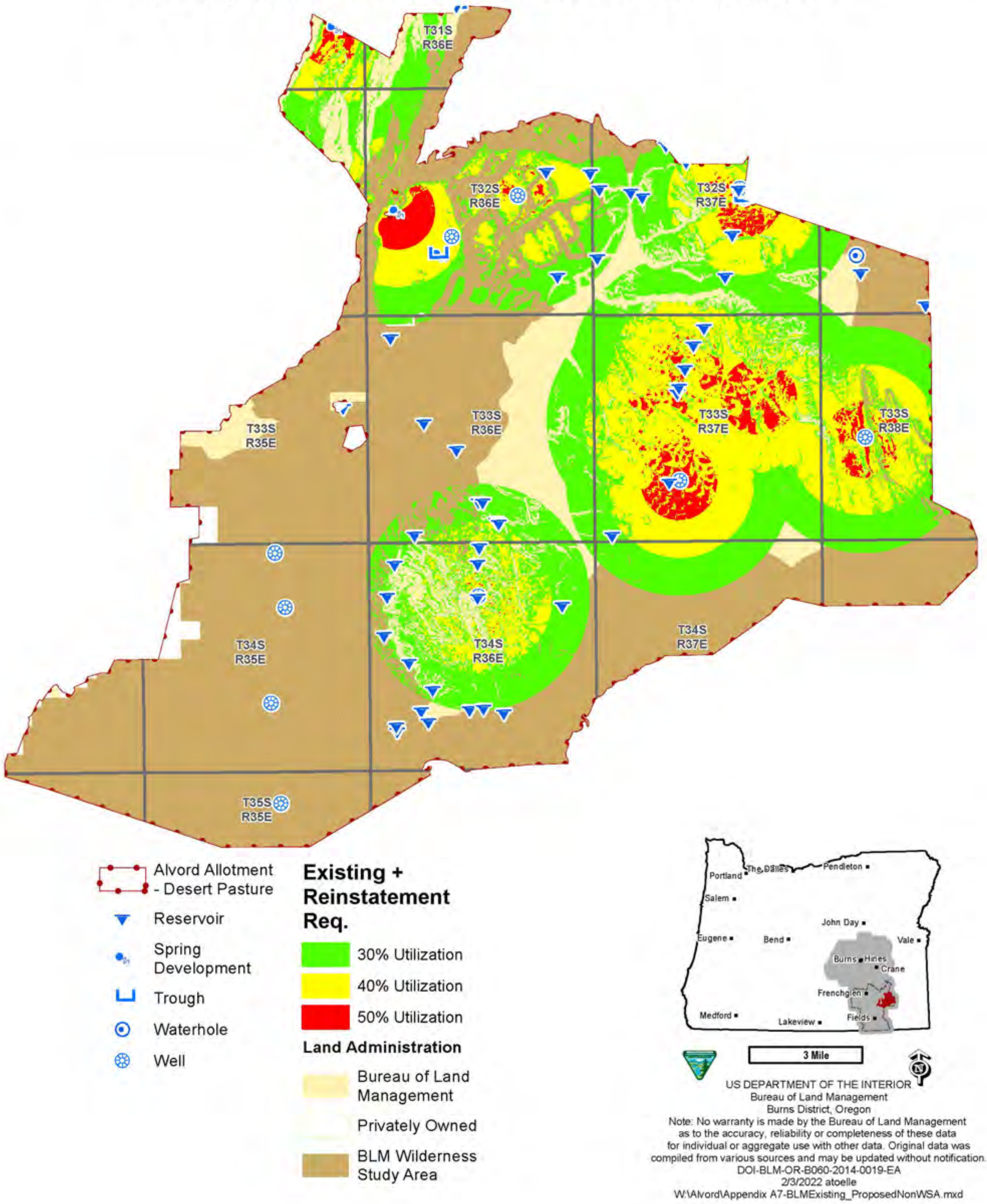
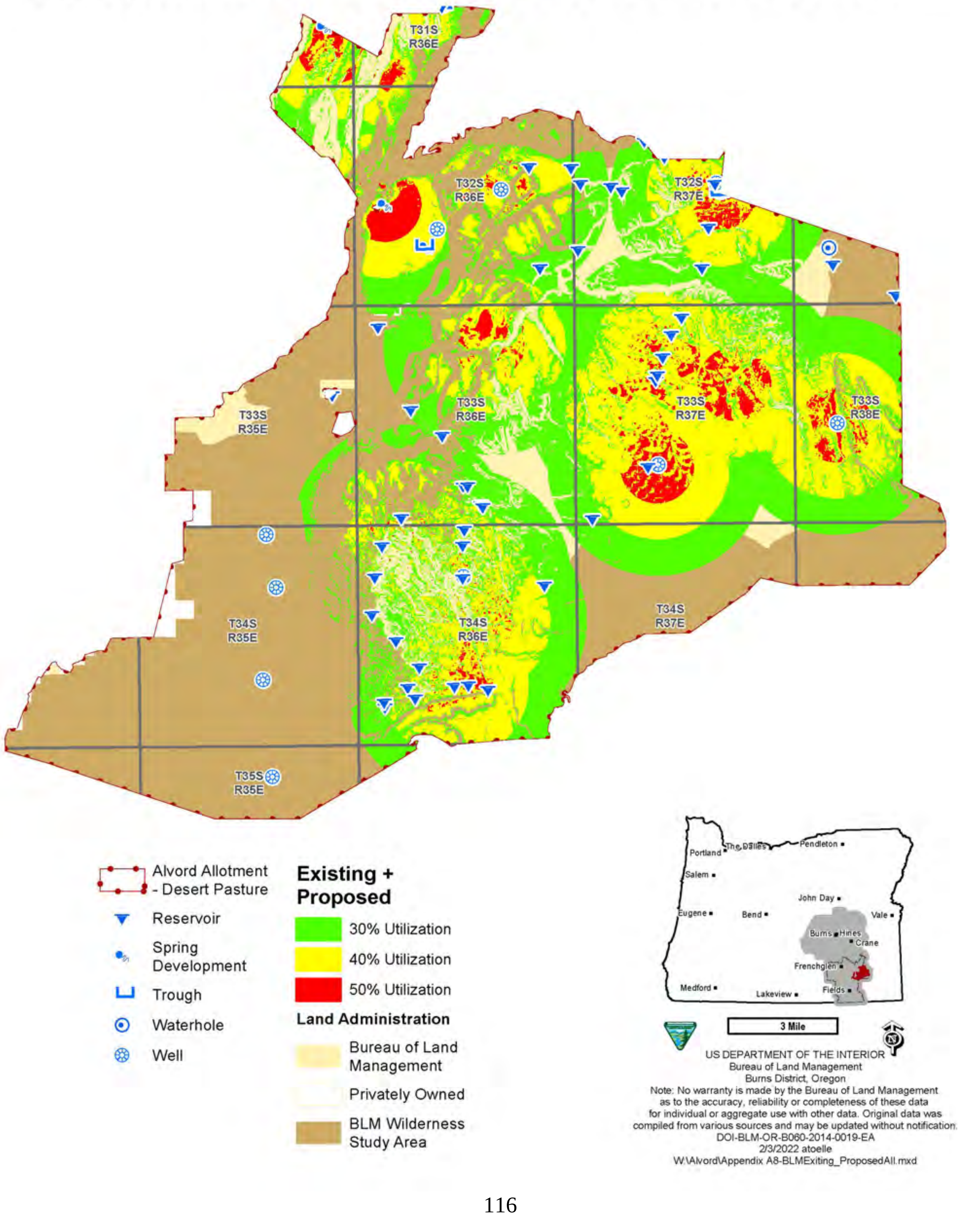
Appendix A7: BLM Existing Late Season Reliable Water + Proposed Water Developments for Reinstatement of Suspended AUMs Use Area - Desert Pasture



Appendix A8: BLM Existing Late Season Reliable Water + All Proposed Water Developments Use Area - Desert Pasture



7 APPENDIX B: RESOURCE OBJECTIVES

The following management objectives are from the August 2005 Andrews Management Unit (AMU) RMP/ROD and Steens Mountain CMPA RMP/ROD, as amended by the 2015 Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment (GRSG ARMPA)/ROD. These are the most relevant resource objectives for the Alvord Allotment. For a complete list of resource objectives see the specified RMP/ROD.

- Comply with State and Federal requirements to protect public waters. Protect all designated beneficial uses by preventing or limiting nonpoint source pollution; maintain or improve existing water quality and quantity through implementation of Best Management Practices (BMPs). Manage impaired waters on public lands listed under Section 303(d) of the Clean Water Act to restore beneficial uses and to improve water quality so that listing is no longer warranted (Water Resources, AMU RMP-17/CMPA RMP-18).

- Manage mineral soil to limit accelerated erosion on critical sites, protect soils characteristics on noncritical sites, and maintain or improve existing infiltration and permeability rates (Soils and Biological Soil Crusts, AMU RMP-21/CMPA RMP-22).

- Goal - Manage vegetation to achieve and maintain healthy watersheds (Vegetation, AMU RMP-24/ CMPA RMP-23).

- Achieve or maintain a rating of PFC for perennial and intermittent flowing and standing water bodies relative to site capability, site potential, and BLM management jurisdictions. Maintain, restore, or improve riparian/wetland vegetation communities relative to ecological status, site potential and capability, or site-specific management objectives. Manage riparian/wetland areas to maintain, restore, or improve soil moisture content and retention of alluvial ground water to augment base flow conditions during warm summer months (Riparian and Wetlands, AMU/CMPA RMP-24).

- Maintain or restore native vegetation communities through sound landscape management practices. Manage desirable nonnative seedings to meet resource objectives. Rehabilitate plant communities that do not have the potential to meet the desired range of conditions through management. Increase species and structural diversity at the plant community and landscape levels in the big sagebrush communities. Provide multiple successional stages within the landscape (Rangelands, AMU/CMPA 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, AMU RMP-30/CMPA RMP-31).

- Treat noxious weeds and inventory for new infestations using the most effective means available, as outlined in the Integrated Invasive Plant Management for the Burns District Revised EA/Decision Record (Noxious Weeds, AMU RMP-31/CMPA RMP-32).

- Maintain, restore, or improve habitat. Manage forage production to support wildlife population levels identified by the ODFW (Fish and Wildlife, AMU/CMPA RMP-33).

- Manage special status plant species and their habitats so management actions do not contribute to their decline or listing as T&E. 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 SSS. Maintain, restore, or improve bighorn sheep habitat and allow for maintenance or further expansion of bighorn sheep populations as defined by the ODFW in Oregon’s Bighorn Sheep Management Plan (SSS, AMU RMP-34/CMPA RMP-35).

- Use protective measures to safeguard significant cultural sites (Cultural Resources, AMU RMP-40/ CMPA RMP-41).

- Protect, maintain, improve, or restore visual resource values by managing all public land in accordance with the VRM system (Visual Resources, AMU RMP-43/CMPA RMP-45).

- 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, AMU RMP-44/CMPA RMP-46).

- Maintain/adjust AMLs and yearlong forage allocations for each HMA. Maintain a thriving natural ecological balance within HMAs. Maintain/improve year-round water sources to sustain wild horse herds (Wild Horses and Burros, AMU/CMPA RMP-50).

- Provide for a sustained level of livestock grazing in the AMU/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 (United States Department of the Interior (USDI) 1997). (Grazing Management, AMU RMP-54/CMPA RMP-53).

- Implement management actions across the AMU/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, AMU RMP-58/CMPA RMP-57).

- Retain and manage existing ACECs if they meet relevance and importance criteria and require special management or protection (AMU RMP-69/CMPA RMP-68).

- Manage existing WSAs so as not to impair their suitability for preservation as wilderness (Wilderness Study Areas and Parcels with Wilderness Characteristics, AMU RMP-74/CMPA RMP-80).

- Manage parcels with wilderness characteristics to protect those characteristics (Wilderness Study Areas and Parcels with Wilderness Characteristics, AMU RMP-75/CMPA RMP-81).

The following management objectives, specific to the Alvord Allotment, are from the AMU/Steens CMPA RMP/ROD, Appendix J - Allotment Management Summaries, J-17, as amended by the 2015 Oregon GRSG ARMPA/ROD:

- Improve the ecological condition of upland vegetation communities.
- Maintain the ecological condition of upland vegetation communities.
- Maintain/improve the condition of riparian vegetation communities.
- Potential range improvements include: Reservoir (3 each), pipelines (3 miles), fences (4 miles), prescribed burning (2,000 acres), and brush control (2,000 acres).

The following goals, objectives, and MDs are from the GRSG ARMPA.

- Conserve, enhance, and restore the sagebrush ecosystem upon which GRSG populations depend in an effort to maintain and/or increase their abundance and distribution, in cooperation with other conservation partners (GRSG ARMPA, Goal SSS 1, p. 2-3).

- Manage land resource uses in GRSG habitat to meet the desired conditions described in Table 2-2, Habitat Objectives for GRSG. Use the desired conditions to evaluate management actions that are proposed in GRSG 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 (GRSG ARMPA, 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 GRSG. 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) (GRSG ARMPA, MD SSS-9, p. 2-7).

- Anthropogenic disturbances or activities disruptive to GRSG (including scheduled maintenance activities) shall not occur in seasonal GRSG habitats unless the project plan and NEPA document demonstrate the project will not impair the life-cycle or behavioral needs of GRSG populations. Seasonal avoidance periods vary by GRSG 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 GRSG (GRSG ARMPA, MD SSS-11, p.2-9).

- Identify GRSG habitat outside of PHMA that can function as connecting habitat. Consider the habitat connectivity map developed by The Nature Conservancy and BLM for Oregon (Jones and Schindel, 2015). When conducting analysis for project level NEPA, include GRSG habitat and populations in adjoining states within 4 miles of leks in Oregon (MD SSS-12, p.2-9).

- All authorized actions in GRSG habitat are subject to RDFs and BMPs in Appendix C of the GRSG 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 (GRSG 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 (GRSG ARMPA, MD SSS-13, p. 2-9).

- Use integrated vegetation management to control, suppress, and eradicate invasive plant species per BLM Handbook H-1740-2. Apply ecologically based invasive plant management principles in developing responses to invasive plant species (GRSG ARMPA, MD VEG 3, p. 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 (GRSG ARMPA, 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 (GRSG ARMPA, 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) (GRSG ARMPA, 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 ROW.
    - Create defensible space within 0.5 mile of human residences (GRSG ARMPA, 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 (GRSG ARMPA, MD VEG 12, p. 2-13).

- Allowable methods for vegetation treatment include mechanical, biological (including targeted grazing), chemical, or wildland fire or combinations of these general treatment categories (GRSG ARMPA, MD VEG 14, p.2-13).

- Create mosaics of varying sagebrush density using spot treatments within the treatment area. Sagebrush density shall be equivalent to Classes 1 through 4 in cool-moist sagebrush and Classes 1 through 3 in warm-dry sagebrush (see Table 2-4). Maximum stand-replacement patch size shall not exceed 25 acres and total stand-replacement patches shall not exceed 15 percent of the treatment block. See Required Design Features for additional details (GRSG ARMPA, MD VEG 15).

- Allowable methods of invasive plant control include mechanical, chemical, biological (including targeted grazing, biocides, and bio-controls), or prescribed fire or combinations of these methods. Treat areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species (GRSG ARMPA, MD VEG 21, p. 2-14).

- Manage livestock grazing to maintain or improve GRSG habitat by achieving Standards for Rangeland Health (GRSG ARMPA, Objective LG 1, p. 2-17).

- When livestock management practices are determined to not be compatible with meeting or making progress towards achievable habitat objectives following appropriate consultation, cooperat[ion,] and coordination, implement changes in grazing management through grazing authorization modifications, or allotment management plan implementation. Potential modifications include, but are not limited to, changes in:

    1) Season or timing of use;
    2) Numbers of livestock;

3) Distribution of livestock use;
4) Duration and/or level of use;
5) Locations of bed grounds, sheep camps, trail routes, and the like;
6) Extended rest or temporary closure from grazing through BLM administrative actions;
7) Make allotment unavailable to grazing;
8) Kind of livestock (e.g., cattle, sheep, horses, or goats) (Briske et al. 2011); and
9) Grazing schedules (including rest or deferment).

When SRH 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. (GRSG ARMPA, 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 (GRSG ARMPA, 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 (GRSG ARMPA, MD LG 5, p. 2-20).

- Authorize new, relocate, or modify existing range improvements that use seeps or springs at a water source to enhance their year-round functionality. Install or retrofit wildlife escape ramps in all livestock water troughs or water storage facilities. Maintain, enhance, or reestablish riparian areas in PHMA and GHMA (GRSG ARMPA, MD LG 7, p. 2-20).

- Design new and maintain existing water projects to avoid standing pools of shallow water that would spread West Nile Virus (GRSG ARMPA, MD LG 8, p. 2-20).

- Remove, modify, or mark fences identified as high risk for collisions, generally within 1.2 miles of occupied or pending leks (GRSG ARMPA, MD LG 9, 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 (GRSG ARMPA, MD LG 10, p. 2-20).

- The NEPA analysis for renewals and modifications of livestock grazing permits/leases that include lands within 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 (GRSG ARMPA, MD LG 13, p. 2-20).

- When conducting NEPA analysis for wild horse/burro management activities, water developments, or other rangeland improvements for wild horses, address the direct and indirect effects on GRSG populations and habitat. Implement any water developments or rangeland improvements using the criteria identified for domestic livestock (GRSG ARMPA, MD Wild Horse & Burro (WHB) 8, p. 2-22).

- In PHMA, design any new and modify existing structural WHB improvements to conserve, enhance, or restore GRSG habitat (GRSG ARMPA, MD WHB 11, p. 2-22).

- Manage all ACECs and RNAs for the values for which they were designated, per district resource management plans, following existing management actions, and consistent with proposed actions for PHMA and GHMA (GRSG ARMPA, Objective SD 2, p. 2-33).

8 APPENDIX C: ISSUES CONSIDERED BUT NOT FULLY ANALYZED

The BLM considered several other issues during development of the EA but did not analyze them in detail. These issues are summarized in Appendix C: Issues Considered but Eliminated from Detailed Analys Additional details are in the EA record.

- *ACECs/RNAs:* There are four ACECs and RNAs within the Alvord Allotment. The Alvord Desert ACEC (20,391 acres) is located in the foothills and dunes east of the Alvord Desert. It was designated to protect a diversity of landforms and plant communities, including sand dunes, bare playa, playa margins, big sagebrush, greasewood, saltgrass, spiny hopsage, shadscale, and bud sage. The Mickey Hot Springs ACEC (42 acres) is located about 6 miles northeast of the Alvord Desert. It was designated to protect the hot springs complex which contains about 50 active and inactive vents, including a mud pot, hot pools, cool pools, and a geyser. The area also has safety concerns. The Mickey Basin RNA (374 acres) is located about 6 miles northeast of the Alvord Desert. It was designed to protect a plant community containing winterfat and Nuttal's saltbrush on ash soils. The Big Alvord Creek RNA (169 acres) is located on the east face of Steens Mountain in the upper drainage of Big Alvord Creek. Only a small portion of the RNA is within the Alvord Allotment. It was designated to protect a first to third order stream with a high gradient reach in a sagebrush zone, a big sagebrush/ bluebunch wheatgrass plant community, and a black cottonwood riparian community.

  None of the alternatives would have an effect on the management or health of the special management Areas. No new developments would be allowed within the ACECs or RNA. Mickey Hot Springs is a fenced area that excludes livestock in order to protect the geothermal fragility of the chemical crusts as well as prevent mortality of livestock which could potentially fall within the boiling hot springs, as has occurred in the past before the fencing. Mickey Basin RNA is fenced to exclude livestock and therefore no developments or changes in grazing would have an effect on this RNA. No new developments are allowed in the Alvord Desert ACEC. The ACEC is sandy and devoid of vegetation palatable to livestock. Without water developments to attract livestock to the area, the fragile dune systems are rarely visited or used by livestock. The proposed actions are in consistent with the management of the Alvord Desert (1983) and Mickey Hot Springs Areas of Critical Environmental Concern (1994), and Mickey Basin Research Natural Area (1990).

- *Biological Soil Crusts (BSC):* In rangelands, BSCs can be viewed from functional, structural, and compositional perspectives. They function as living mulch by retaining soil moisture and discouraging annual weed growth. They reduce wind and water erosion, fix atmospheric nitrogen, and contribute to soil organic matter (Eldridge and Greene 1994). Biological soil crusts in North America are diverse and are most evident in arid and semi-arid ecoregions (BLM TR-1730-2, 2001). Total crust cover is inversely related to vascular plant cover, as less plant cover results in more surface available for colonization and growth of crustal organisms. Thus, when all crust types are combined (cyanobacterial, moss, lichen), cover is greatest at lower elevation inland sites (less than 1,000 m; 3,280 feet) compared to mid-elevation sites (1,000 to 2,500 m; 3,280 to 8,202 feet) (Hansen et al. 1999). However, relative lichen and moss cover increases with elevation and effective precipitation until vascular plant cover precludes their growth. The elevation of the project area ranges from 4,000 to 7,500 feet, making it mid-elevation for BSCs. In the great basin, when present, BSCs such as soil lichens are located in the interspaces while mosses are more commonly found under shrubs or trees (BLM TR-1730-2 2001).

Biological soil crusts form in open spaces between plants and can help stabilize soil and fix carbon and nitrogen. BSCs are slow growing, and how BSCs interact with other environmental factors is not well understood due to complex interactions that are difficult to separate in scientific studies. This results in limited success of practices to conserve and restore BSCs (Bowker 2007, Young et al. 2019). BSCs can be damaged by hoof action from livestock grazing (as well as native wildlife and wild horses), wildfire, drill seeding, and off-trail recreation activities like hiking, horseback riding, mountain biking, and motorized use, all of which have occurred to some degree in the project area. Livestock and wild horses grazing, and associated hoof impact, can result in patchy disturbance to BSCs, with different levels of intensity, depending upon factors such as water and supplement placement, fence placement, and livestock forage preference; vegetation composition and fuel loading can also result in fire patchiness (Fuhlendorf et al. 2009, Clark et al. 2017). This disturbance would only occur in areas where BSCs are currently present.

Specific identification of BSCs at the species level is often not practical for fieldwork. The use of some basic morphological groups simplifies the situation. Morphological groups are also useful because they are representative of the ecological function of the organisms (BLM TR-1730-2 2001, p. 6). Using a classification scheme proposed in 1994 we can divide microbiota such as biological soil crusts into three groups based on their physical location in relation to the soil: hypermorphic (above ground), perimorphic (at ground) and cryptomorphic (below ground). The morphological groups are: 1. Cyanobacteria - Perimorphic/cryptomorphic, 2. Algae - Perimorphic/cryptomorphic, 3. Micro-fungi - Cryptomorphic/perimorphic, 4. Short moss (under10mm) – Hypermorphic, 5. Tall moss (over 10mm) – Hypermorphic, 6. Liverwort – Hypermorphic, 7. Crustose lichen – Perimorphic, 8. Gelatinous lichen – Perimorphic, 9. Squamulose lichen – Perimorphic, 10. Foliose lichen – Perimorphic, and 11. Fruticose lichen – Perimorphic.

Morphological groups 4, 5, 7, 8, and 9 are likely the dominant groups represented in the project area. Depending on precipitation amounts and microsites, groups 6, 10, and 11 may also be well represented where the site-specific conditions required for their growth exist. Morphological groups 1, 2, and 3 are difficult to discern in the field as they require specialized tools that are not easily useable in the field. Soil surface microtopography and aggregate stability are important contributions from BSCs as they increase the residence time of moisture and reduce erosional processes. The influence of BSCs on infiltration rates and hydraulic conductivity varies greatly; generally speaking, infiltration rates increase in pinnacled crusts and decrease in flat crust microtopography. The northern Great Basin has a rolling BSC microtopography and the infiltration rates are probably intermediate compared to flat or pinnacled crustal systems. Factors influencing distribution of BSCs (BLM TR-1730-2, 2001) include, but are not limited to elevation, soils and topography, percent rock cover, timing of precipitation, and disturbance.

In many areas of this allotment, range assessments found few areas of existing BSC. Historical disturbance including historic improper grazing and cultivation, as well as historic seeding of crested wheatgrass, and fire likely reduced BSC. Some research has found that the high cover of seeded grasses can also suppress soil crusts (BLM TR-1730-2 2001, p. 18). In addition, Davies and Bates (2010b) found that BSC do not appear to constitute a large portion of cover in either mountain or Wyoming big sagebrush plant communities in the northern Great Basin. In the western portion of the allotment, large frequent fires, historically occurring every 30-100 years likely impacted BSCs in these areas. Root and others (2017) found that fire resulted in a decrease in abundance of BSCs that could last decades. Hilty and others (2004) also found that the cover and composition of BSCs within the sagebrush steppe are reduced through fire. Muscha and Hild (2006) studied BSCs in grazed and ungrazed Wyoming sagebrush steppe and found mosses decreased with grazing, but there was no difference in lichens inside the exclosures (32-45 years of no grazing) versus outside. 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. Root and others (2020) found that where livestock reduced BSCs, more annual grasses were found. However, O’Connor and Germino (2020) found that Root and others’ (2020) conclusion neglected to consider the effects of wildfire on the study plots in recent decades. Concostrina-Zubiri et al. (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. Loss has been shown to occur with increased stocking rates; however, most livestock travel two-three miles from any water source with the majority of their use located around water sources. While over-grazing can impact BSC, over-grazing (higher than the 50 percent limit) is localized around water developments and average utilization across a pasture must remain below the 50 percent utilization threshold on native perennial grasses. This would be expected to minimize potential loss of diversity.

Grazing management in the Alvord AMP EA is designed to prevent over-grazing by applying utilization thresholds and responses (EA section 2.1.4). The inclusion of target utilization levels for key forage plant species of "no more than 50 percent utilization on key native upland perennial species and 60 percent utilization on desirable nonnative species, such as crested wheatgrass (AMU/Steens CMPA RMPs 2005, p. 54)" would limit negative effects of hoof action while matching the prescription for positive effects related to fire. The fundamentals of rangeland health stated in 43 CFR 4180 include the goal to ensure watersheds are in, or are making significant progress toward, properly functioning physical condition. Currently, the allotment is meeting S&Gs and where they aren't, livestock are not a causal factor. The target utilization levels indicated here have been in place since at least 2005 when they were authorized under the Andrews/Steens RMPs/RODs. The 1984 Andrews FEIS limited livestock grazing at 60 percent on all grass species. Lack of erosion and healthy vegetative communities show that soil processes are functioning correctly (AMU/Steens CMPA, RMP-23); this is supported by the data collected for the 2017 S&G assessment.

There are a total of 118 water developments (wells, troughs, dugouts, reservoirs) within the Alvord allotment, 62 of those are located within in the Desert Pasture. Three of the existing wells in the Desert Pasture, are within the Alvord Desert ACEC and are no longer utilized. In addition, many of developments within the allotment, especially in the Table Mountain and Desert Pastures, are dependent on precipitation and are typically dry when livestock are turned out, especially in the fall and winter. This means that at many of these developments are not used by livestock during the annual grazing period. Therefore, disturbance estimates below are expected to be an over-estimate.

Within the Alvord Allotment, the current areas with high disturbance[57] associated with water developments is approximately 495.6 acres (4.2 acres/development[58]); this is approximately 0.22 percent of the BLM-managed acres within the allotment. Within the Desert Pasture 260.4 acres show high disturbance around water developments which equals approximately 0.13 percent of the BLM-managed acres within the pasture. Adding 9 new troughs (two proposed troughs would replace existing ones located in the seedings which are assumed to be 100 percent disturbed for BSCs due to prior drill seeding) and 2 miles of new road would add approximately 42.7 new acres of disturbance to the Desert Pasture and the allotment (9 troughs x 4.2 acres=37.8 acres trough disturbance; 12-foot-wide road + two 4-foot berms or ditches=20-foot wide disturbance x 2 miles (10,560 feet) = 4.9 acres road disturbance). With proposed developments, disturbance from additional water developments could potentially increase total allotment disturbance due to water developments to 0.24 percent, and within the Desert Pasture it would increase to 0.16 percent.

Additionally, livestock create trails leading to and from the water developments where soils are compacted and BSCs are lost. Trails are generally heaviest nearer the water development and taper out farther away. A one-mile trail, approximately 36-inches[59] wide would be approximately 0.36 acres of potential disturbance and loss of BSCs. If you estimate 20 miles of trails per water development (7.2 acres), there is currently 849.6 acres of highly disturbed areas associated with trails within the allotment. This is equal to 0.37 percent of BLM-managed land within the allotment. If you just consider the Desert Pasture, there is approximately 446.4 acres of disturbance; 0.24 percent of BLM-managed land. Construction of 9 new water developments would increase the potential area of heavy disturbance to BSCs caused by potential new trails by 64.8 acres. This would equate to an increase in

[57] Defined in this situation as areas where shrubs have been removed. These areas are expected to have minimal to no BSCs present.
[58] This number was determined by estimating the area around reliable year-long water in the Alvord Desert Allotment where shrubs appear to have been removed, using 2017 OSIP 1-foot imagery in GIS, and averaging them. Range of areas around the 12 reliable water sources was 0.6 – 16.3 acres.
[59] Most livestock trails are closer to 18 inches wide. However, by assuming this larger width, the calculation would consider the worst-case scenario.

disturbance on BLM-managed land within the allotment to 0.41 percent total and 0.27 percent total in the Desert Pasture. As livestock would use existing trails, it is unlikely 20-miles of new trails would be created; therefore, the BLM believes this number is an overestimate.

All potential loss due to livestock grazing is localized and does not impact the pasture or allotment as a whole. Water hauling would not increase impacts above what has occurred previously since water would only be hauled to existing disturbed areas. However, since BSCs are not present on every inch of the allotment, the calculations above are expected to be overestimates, and the increased loss of BSCs from any alternative would be less than 1 percent.

The construction and removal of fencing would not have a noticeable impact on BSCs, other than the short-term impacts by livestock adjusting to new boundaries. Loss of BSCs is at the site where the t-post enters the ground, which is approximately 2-inches square, which would be negligible at the pasture and allotment scale. Short-term impacts, less than five years, could be associated with fencing as livestock trail along the fences, figuring out the new pasture boundaries within the Alvord Seeding Pasture. Once livestock determine their trailing routes, the initial routes that are not used regularly would revert to natural conditions as vegetation regrows.

The pipeline maintenance would cause temporary impacts to any BSCs present in the previously disturbed area; however, reserving the topsoil for reapplication over the disturbed ground, and seeding with desirable plant species, BSCs would recover within 3-5 years, specifically cyanobacteria and mosses.

Actions proposed in this EA that could negatively affect BSCs are hoof action from livestock grazing, and actions associated with construction and removal of fences. However, grazing that reduces fine fuels would reduce fire probability and severity, which would protect BSCs from damage associated with fire and would positively affect BSCs. Therefore, the effects of alternatives on BSCs are not analyzed in detail in this EA. For these reasons, none of the alternatives would have a significant effect on this BSC issue and, therefore, this issue will not be analyzed in detail.

- *Cultural Resources:* Nearly 19,000 acres of the Alvord Allotment have been adequately inventoried for cultural resources. Much of the inventory was done in the mid-1970s for geothermal leases and, later, water developments, reservoir clean-outs, and seeding maintenance. The allotment has been the scene of at least 1,000 acres of archaeological research survey. The Alvord Allotment is rich in prehistoric sites, especially the southwestern third near Alvord Desert and the northern section in the vicinity of Mickey Hot Springs. The probability for finding important prehistoric sites, especially in the southwest and northernmost portion of the allotment, is high. Very little evidence of historic (post-1826) use has been found in the allotment. Thirty prehistoric sites have been recorded in the Alvord Allotment, which include stone debris from stone tool making and grinding stones, the remains of a fire hearth, arrow and/or spear points, evidence of campsites, and circular rock alignments of the size that suggests wikiup foundations. Noted impacts to sites in the Alvord Allotment are as follows: erosion (14 sites, 47%), no impacts (11 sites, 37%), vandalism (4 sites, 13%), grazing (3 sites, 10%), road construction/use (2 sites, 6%), unknown (2 sites, 6%) and range land drilling (1 site, 3%). A majority of the sites in the allotment have not been revisited by cultural staff since they were recorded in the late 1970s. It is possible that other impacts have occurred at these sites in the intervening 30+ years.

  Alvord Allotment has been grazed for up to 130 years. In former times, prior to the Taylor Grazing Act of 1935, grazing on public lands was essentially uncontrolled. Even as late as the early 1960s, grazing levels were considerably higher than current levels because grazing management had not been developed to the degree it is today. Cultural resource sites were affected more intensely and to a greater depth in the past than under the more refined, controlled grazing management of today’s practices.

  For cultural resource sites located within livestock congregation areas (such as livestock watering locations), there could be effects to cultural resources. Based on field observations by BLM cultural resources staff, the estimated average grazing effect on cultural resource sites has occurred in the top 12 inches of sediment. These effects are plant pedestalling, hoof shear, and surface scuffing. The deepest disturbance is seen in congregation areas where concentrated hoof shear is most common. Generalized grazing, where light hoof shear and scuffing are the most common effects, has produced light (2 inches) to moderate (6 inches) damage. The conclusion of these observations is most sites have sustained a certain amount of grazing effects over the years.

Possible effects are continued soil churning up to 12 inches deep, lateral and vertical movement of cultural materials, and artifact breakage. Water developments are the improvements that have the most impact on cultural resources. The exact area impacted by livestock in congregation areas is dependent on water availability, type of resource, suitability of loitering ground (shade, salt/mineral availability, etc.), and season of use but areas of up to 5 acres around each congregation site are expected to experience impacts (based on professional observation). Wild horse impacts would be similar to livestock impacts but would cover a distance further from water. At this time, approximately 550 acres have experienced livestock impacts.

Spreading grazing impacts more evenly over the allotment is not expected to increase the effects on cultural resources, except where new congregation areas would arise. New congregation areas could arise due to new well and water trough placement, and fence and road construction. Cultural clearances prior to construction would minimize the potential of sites being affected. In addition, utilization in any pasture would be limited to 50 percent on native key species, and 60 percent on crested wheatgrass as allowable in the AMU/Steens CMPA Proposed RMP. The Andrews/Steens CMPA RMP FEIS, on page 4-141, determined that livestock grazing effects would be minimized under the utilization levels described above. Any new effects to cultural material at these sites would be insignificant because the site integrity has already been lost. Development of new range improvements would follow general project design elements found in Section 2 that would require survey prior to construction and avoidance of any sites, preventing new damage from occurring. Therefore, cultural resources are not analyzed further in this EA.

- *Environmental Justice*: Harney County has a lower proportion of Hispanic/Latino residents, 5 percent, compared to 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 (LUP Handbook, Appendix 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 to be an environmental justice population due to its low-income status and proportion of Native Americans. Given that the alternatives would authorize between 0 and 9,247 AUMs out of a total of 175,227 AUMs authorized by the Burns District in 2018 (BLM Facts OR/WA 2018), there would not be environmental justice impacts at the county scale. The issue is therefore not analyzed in detail.

- *Geology and Minerals:* The allotment is comprised of two main geologic terrains. Most of the allotment is underlain by the Miocene-aged Steens Basalt part of the larger Columbia River Basalt Group deposited approximately 17 million years ago. This unit dominates the Steens Mountains. The far north and south area of the allotment have minor exposures of younger Miocene-age basaltic and andesitic lava flows related to Basin and Range extension (Evans and Geisler 2001). The allotment contains a large area of high geothermal potential and high uranium potential. However, both potential resources are completely inside the mineral withdrawal area. Concerning mineral resources, the withdrawal includes, but is not limited to, geothermal potential, diatomite, uranium, gold, and porphyry deposits. Material from the Steens Mountains Basalt is sometimes desired for road material, and sand and gravel can be found within the allotment. However, the occurrences in the allotment are relatively inaccessible by road and limited in exposure; this makes them unlikely for development. Sand and gravel are prevalent and, currently, sufficiently developed for demand. The Mosquito Creek Mineral Material Site (OROR 032811) is the closest material/aggregate site to the allotment; it is located at the intersection of the East Steens Road and the Mickey-Alvord Wells Road. It is a sand and gravel material site developed open to public use as a community pit and managed according to CFR 3600 regulations. All Federal mineral interests are monitored for possible mineral trespass and unauthorized use. Trespass occurs when use is unauthorized, or development of federally administered materials occurs without appropriate approval. Table 28 breaks down the allotment by Federal mineral estate and identifies areas open to location, leasing, and saleable mineral use. Most of the allotment is within the Steens Mineral Withdrawal Area and WSAs. These designations remove the area from location, entry, patent, mineral and geothermal leasing, and from mineral material sales. There are no valid existing rights and no pre-established saleable mineral resources in the allotment located within the mineral withdrawal area.

Table 28: Alvord Allotment Federal Mineral Status

SALABLE	ACRES	PERCENTAGE OF ALLOTMENT
Open w/ Conditional Surface Use	5,201	2%
Closed	218,707	98%
Locatable		
Open	5,169	2%
Open in WSA	86,723	39%
Withdrawn	132,015	59%
Leasable		
Open w/ Conditional Surface Use	5,169	2%
Closed	218,739	98%

Much of the private lands within the allotment have federally reserved minerals; this is common with lands patented under the Stock Raising Homestead Act and property obtained through land exchanges. These Federal minerals within the withdrawal area are closed to location, leasing, and mineral material sales.

No issues or concerns to minerals and geology are found within the Alvord Allotment. Very limited portions are currently open to development, but livestock grazing would not negatively impact or be impacted by the minerals or resource development in these units.

This resource would not be impacted by range improvements, livestock congregation areas, and other ground disturbing activities. This allotment has low mineral activity and potential, combined with low market demand, and the majority of the allotment is not considered open use (Andrews/Steens RMP/ROD 2005, RMP-49 and Appendix I). For these reasons, the activities proposed in each alternative would not have a measurable effect on mineral development.

- *Greenhouse Gas Emissions and Climate Change:* The Burns District has considered greenhouse gas emissions and climate change in several AMPs (Cluster AMP 2011, p. 6; Cottonwood Creek AMP 2011, p. 9; Chalk Hills AMP 2010, p. 8, and South Steens AMP 2014), and all have concluded the emissions were far below the Environmental Protection Agency's (EPA) reporting threshold of 25,000 metric tons (EPA 2009, 2021, p. ES-2). The BLM has completed two regional environmental impact statements (EISs) that summarized the science regarding climatic trends, predictive modelling study results, and sources of uncertainty in the Pacific Northwest (BLM 2010, 2015). These analyses are hereby incorporated by reference in their entirety. One summary states that the climate in Oregon in future decades is predicted to generally be warmer, but not significantly wetter (BLM 2010, p. 169). The other summary states that annual precipitation is expected to change little, but summers should become drier and all other seasons possibly wetter (BLM 2015, p. 3-169). While such modelling efforts may help predict future climatic conditions, the validity of the results cannot be tested in real time.

  Livestock grazing results in methane emissions as a result of ruminant digestion. Methane emission rates from cattle vary widely and depend on many variables (Johnson and Johnson 1995, DeRamus et al. 2003). Estimates for grazing cattle typically range from 80–101 kilograms of methane per year per animal (EPA 2009) or 6.7-9.2 kilograms of methane per month. For this analysis, the BLM provided April Laytem, Research Soil Chemist with the USDA-Agricultural Research Service Northwest Irrigation and Soils Research Lab and a contributing author to the 2019 Intergovernmental Panel on Climate Change (IPCC) Report, the following assumptions:

- Calculating emissions based on the proposed action (Alternative B) would provide the highest estimate since proposed livestock use in this alternative is the highest (up to total 9,247 AUMs).
- Under proposed grazing the longest potential season of use would be 365 days based on the proposed grazing authorization mandatory terms and conditions (grazing yearlong is not the proposed grazing management under any alternative for any pasture) would result in 770 cows being the highest possible number of livestock. However, assumptions for calculations are based on anticipated seasons of use following the proposed grazing management rotations in EA Section 2.3.
- Table 29 breaks assumptions out by management scenario as it relates to timing of life stage of the cattle and forage. Table 30 provides general assumptions about livestock.
- Bodyweights and nitrogen excretion are based on N excretion data for cattle in the 2019 IPCC refinement.
- Used default intake values from the 2019 IPCC Report.
- For enteric methane used the simplified Tier 2 calculation in the IPCC 2019 Report.
- For manure methane used default values from IPCC 2019 for volatile solids excretion and the updated emission factors.
- For nitrous oxide calculated the direct N_2O emissions and an estimate for indirect N20 emissions are more difficult to calculate and they are much less than the direct emissions.
- Emissions were calculated and then converted to CO_2 equivalent using the IPCC GWPs in the 2nd assessment report.

Table 29: Emission Calculation Assumptions

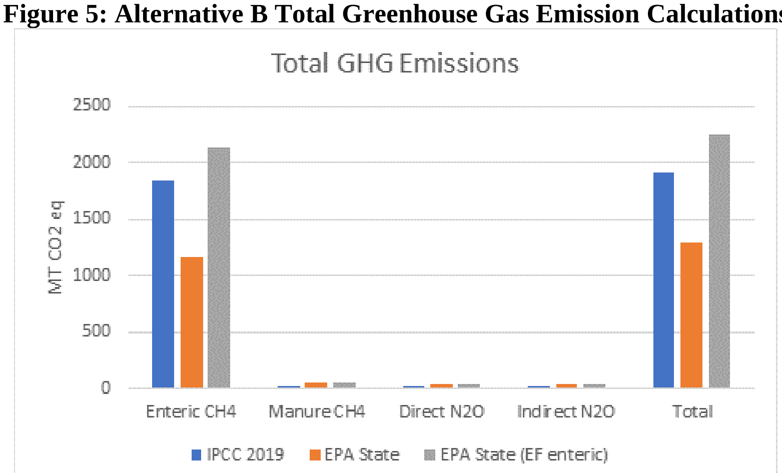
Pasture	Livestock Number	Begin Date	End Date	Days	AUMs	Life Stage Information	Forage Quality
Desert	1,254	11/16	2/28	104	4,328	Cows are Pregnant	Sagebrush Rangeland. Low Quality, Forage is Dormant
Desert	1,254	3/01	3/31	30	1,278	Cows are in Process of Calving	Sagebrush Rangeland. Low Quality, Forage is Dormant
Desert (reinstated)	379	11/16	2/28	104	1,296	Cows are Pregnant	Sagebrush Rangeland. Low Quality, Forage is Dormant
Desert (reinstated)	379	3/01	3/31	30	374	Cows are in Process of Calving	Sagebrush Rangeland. Low Quality, Forage is Dormant
Foothills and Table Mtn.	698	4/15	6/14	60	1,400	Cows have Calved	Sagebrush Rangeland. Low, Dryland Forage is Growing
Indian Creek (suspended)	110	7/1	8/31	61	221	Cows have Calved	Sagebrush Rangeland. Low, Dryland Forage is Maturing or Dormant
Alvord Seeding	47	11/16	6/29	225	349	Cows without Calves and Pregnant, then Calved Around March.	Crested Wheatgrass Seeding. Low, Forage Dormant through Growing Season (Approx. 4/1-6/29)

Table 30: General Livestock Assumptions

Input	Assumed Values	Source
Weight of Livestock	1,000 lbs.	Per 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. (Society for Range Management Glossary, 4th Edition 1998)
Dry Matter Intake / Day	26 lbs. DMI/Day	Based on definition above. This equates to 2.6% of body weight consumed per day. Generous assumption when compared in this article cited by IPCC (Lalman 2004).
Weight gain	Near Maintenance, Assuming 0	Angell 1990.
Supplementation	Varies by Operator, Assuming 0	Possibly protein supplementation during late fall / winter use using protein tubs (cooked or pressed molasses tubs), amounts vary.
Quality of Forage	Low – Dryland Pasture	These are largely low elevation sagebrush rangelands 12" precipitation per year or less. Livestock while on the allotment do not have access to flood meadows, irrigated or improved pasture. They are not authorized to feed supplemental hay or alfalfa while on the allotment. Assume 10% crude protein, which is likely an overestimate.
Breed Base	English (Red or Black Angus/Hereford Base)	District-wide observation. Continental breeds may be used to produce terminal cross calves for marketing purposes, but the cattle are generally English (McGuire 2021).

Calculations were completed for the proposed action using formulas from the 2019 IPCC Report, EPA State, and EPA State with EF enteric, and the results of the calculations are summarized in Figure 5. The highest estimated of emissions for the proposed action are less than 2,500 metric tons of CO_2 equivalent, which is way below the reporting threshold of 25,000 metric tons of carbon dioxide equivalent for several industrial and agricultural sectors (40 CFR 98.2).

Figure 5: Alternative B Total Greenhouse Gas Emission Calculations



In 2019, U.S. emissions of methane from livestock totaled approximately 178.6 million metric tons of carbon dioxide equivalents per year (EPA 2021, p. ES-16), and 2019 U.S. emissions of all greenhouse gases totaled approximately 6,58.3 billion metric tons of carbon dioxide equivalents (EPA 2021, p. ES-4). Emissions from livestock grazing in the Alvord Allotment would represent 0.0014 percent of the annual U.S. methane emissions from livestock, and 0.000000038 percent of the annual U.S. emissions of all greenhouse gasses.

Even with non-renewable grazing, which would be limited by a 50 percent utilization threshold on natives and a 60 percent utilization threshold on desirable non-natives, the emission from any alternative is so small as to be negligible. Emissions from grazing under any grazing alternative within this document would be so small the incremental contribution to national emissions would not be measurable at the level of precision of national emissions and would not merit reporting under the EPA rule on mandatory reporting of greenhouse gases, which presents a reporting threshold of 25,000 metric tons of carbon dioxide equivalent for several industrial and agricultural sectors (40 CFR 98.2).

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). 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 above-ground vegetation to root biomass (Derner and Schuman 2007). Overall, changes in rangeland carbon storage as a result of changes in grazing practices are likely to be small and difficult to predict, especially where a rangeland health assessment has determined that the Standards for Rangeland Health Standards and Guidelines for Livestock Grazing Management are being achieved or livestock are not a causal factor where they are not achieved. The USGS, in a May 14, 2008, memorandum to the USFWS, summarized the latest science on greenhouse gas emissions and concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. For these reasons, none of the alternatives would have a significant measurable effect on greenhouse gas emissions and climate change; therefore, this issue will not be analyzed in detail.

- *Lands and Realty:* Alternatives analyzed do not include improvements on private lands, therefore, there is no effect on lands and realty.

- *Noxious and Invasive Weeds*: The discussion below does not address medusahead rye, which is covered along with invasive annual grasses in issues fully analyzed in Section 3 of this EA. Inventory and treatment of noxious and invasive weeds is an ongoing process on BLM Burns District managed lands. The Harney County Weed Classification (Harney County 2019) classifies weeds into three categories, with "A" being the highest priority and "C" being the lowest priority. The Alvord Allotment has documented[60] occurrences of "C" class weeds, specifically white top (*Cardaria draba*), bull thistle (*Cirsium vulgare*), halogeton (*Halogeton* spp.), and medusahead rye (*Taeniatherum caput-medusae*). Class "B" weeds present within the allotment include spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*) and puncture vine (*Tribulus terrestris*). Other species of weeds that have been documented include Scotch thistle (*Onopordum acanthium* L.) and cheatgrass (*Bromus tectorum*). In many cases these weeds have been treated and controlled, and sites continue to be monitored. Sites that are not controlled would continue receiving appropriate treatment and/or monitoring. Our database currently lists 87 known noxious weed sites totaling 95.7 acres in the Alvord Allotment. There have been 9 different noxious weed species documented in the allotment. The numbers and acreages associated with each are displayed in Table 31.

  An extensive weed inventory was conducted in 1999 in the North Foothills #2, South Foothills #3, and Pike Creek #9 pastures. The Table Mountain #4 and Desert #6 pastures are looked at regularly. There are currently very few known infestations in the latter two pastures. Control treatments would be ongoing on known infestations. Continued introductions of weeds are likely in areas bordering the county road. Annual monitoring occurs in order to keep newly established weeds from spreading.

[60] Documented means these species have been documented within the allotment at one point in time, not that the species is still present.

Table 31: Noxious Weed Distribution

Noxious Weed Species	Number of Sites	Acres
Bull thistle	35	13.8
Canada thistle	8	11.9
Scotch thistle	31	55.5
Diffuse knapweed	2	0.6
Spotted knapweed	3	1
Halogeton	1	10.2
White top	1	0.02
Puncturevine	2	0.1
Totals	***87***	***95.7***

Monitoring 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 EA Decision Record (2015). Areas where cattle congregate and areas with new ground disturbance are priorities for monitoring and treatment. The noxious weeds in the allotment require continued monitoring and treatment. They are inventoried periodically by BLM and Harney County Strategic Weed Attack Team.

Any ground-disturbing activities, including livestock use, have the potential to create opportunities for noxious weed establishment and spread. Productive, healthy plant communities reduce opportunities for noxious weed introduction and spread. The effects of livestock on the landscape may be positive or negative, depending on the livestock and weed species, the origin of the livestock prior to trailing through the area, and whether livestock grazed on weed species prior to entry. Some weed seeds can pass through the digestive tract of animals in 3–5 days and remain viable. Since this allotment and adjacent private lands are not particularly weedy at this time, any actions taken to prevent new weed introductions into the area would be beneficial. When livestock are present in the allotment, ranch and BLM personnel familiar with weeds would also regularly be in the allotment. Having additional monitoring personnel in the area would increase the opportunity to observe, and eventually treat, noxious weed infestations that may begin in the area related to reasonable access uses, or have been introduced by recreational uses, or via native birds and mammals. Treatment of weed infestations in wilderness areas is constrained by wilderness rules, and, frequently, more expensive and more time-consuming measures to reduce motorized and mechanized effects on wilderness qualities are used.

The new ground-disturbing activities proposed in this EA have potential to create opportunities for noxious weed establishment and spread. Therefore, there is a risk of new weed introductions. This risk would directly correlate to the numbers and types of ground-disturbing activities. Following PDEs listed in Section 2.3.4.7 would reduce opportunities for introduction of new weeds. Maintaining a productive, healthy plant community would reduce opportunities for noxious weed introduction and spread (Sheley and Krueger-Mangold 2003). A community that is better able to tolerate fire would be less susceptible to weed invasion (Chambers and D'Antonio 2006). This means that while weed seeds may be spread around, if the site is in good condition with a healthy perennial grass understory, it is less likely that these seeds would be able to establish after germinating.

Livestock can serve as a vector for noxious weeds, spreading them and introducing them to new areas. Alternatives with higher levels of AUMs (whether active or NR use) or a longer season of use would increase the potential for spread of noxious weeds. This would be due to the presence of either more animals grazing within the area that can act as vectors or animals being present over a longer period, which may result in livestock being present when noxious weeds are dispersing seeds. The duration and level of intensity of livestock grazing, if left without prescribed use levels, can contribute to conditions that would favor weed establishment, such as disturbed soils. Additionally, if livestock are in the area longer, the permittee would make more visits to the area, also serving as a potential weed vector. The longer livestock are in the area, the more likely they are to be present when noxious weed seeds are mature and ready for dispersal. With more visits to the area, however, permittees also frequently see and report noxious weeds to the BLM for inventory and treatment.

Another action that could increase the spread of weeds is the range developments proposed. These can cause ground disturbance and create opportunities for noxious weed establishment and spread. Concentrated grazing at new and existing troughs can result in above average utilization, resulting in disturbed areas that could affect the health of plant communities, creating opportunities for new weed introductions and spread. While some disturbed areas currently exist, authorizing grazing above currently authorized active use and non-renewable AUMs could result in an increase in size of existing disturbed areas. This could result in a negative impact to vegetation from trampling or heavier utilization, which can open up niches for noxious weeds to become established. However, utilization would still be limited by the utilization thresholds set in the 2005 AMU/Steens CMPA RMPs.

Long-term effects from range improvements would promote a healthy landscape, which would reduce the spread and introduction of noxious weeds. The proposed grazing management plans would also reduce the risk of large-scale wildfire, which creates large, disturbed areas for noxious weeds to become easily established and or spread easily.

While these actions have the potential to increase noxious weed spread, it is unlikely they would have a measurable effect, due to adoption of required PDEs, limits on livestock utilization levels, the overall health of the perennial understory, and ongoing monitoring and treatment of noxious weeds that would occur regardless of alternative selected. Livestock grazing, including any NR use, would still be restricted by the utilization levels analyzed in the AMU/Steens CMPA RMPs (a maximum utilization threshold of 50 percent on native key species and 60 percent on desirable non-native species). These limits would help preserve the plant community's ability to resist the invasion and spread of weeds.

Other factors also have the potential to affect weed spread, including recreational visitors, wildlife, wind, and water. Visitors to Alvord Desert travel the road network and camp in many areas within and adjacent to the allotment. Hikers spread out across trails and cross country, often in areas not frequently monitored for weeds. Wildlife also use trails and travel across the landscape. Each visit into the area creates potential opportunity for new weed introductions or spread of existing noxious weeds, especially in areas that have limited understories. New 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 can be viable onsite for over 25 years, depending on the species. Seeds are windborne and can travel miles; they can also be dispersed by water (Zimdahl 1999).

As stated above, because of design features of the alternatives, utilization limits, and ongoing noxious weed monitoring and treatment, there would not be a measurable difference between alternatives in how livestock grazing, and rangeland developments, affect noxious weeds. For these reasons, none of the alternatives would have a significant measurable effect and, therefore, noxious weeds (other than medusahead) will not be analyzed in detail.

- *Recreation:* Recreational activities are common and varied within and near the project area. The Alvord Desert dry lakebed, adjacent to the Alvord Allotment, has become particularly popular in recent years. Activities include, but are not limited to, sightseeing, camping, OHV riding, bicycling, hiking, land sailing, photography, stargazing, wildlife viewing, and flying of fixed wing aircraft. The area also serves as host for special recreational events including, but not limited to, weddings, land speed record attempts, glider plane flying, concerts, motorcycle rallies, and birding tours. Recreational use has been trending upward, with a significant increase in recent years. Recent data from 2020 shows approximately 24 daily vehicle visits (TRAFx Datanet). This data is in addition to any recreationists accessing the playa from privately-managed roads. This data is included for context. Recreational activity on the Alvord playa occurs near, but not within the project area. Recreational use is also common at nearby Mickey Hot Springs. Activities include hiking, photography, and sightseeing. Recent data shows an average of 1,639 annual road users (vehicles) between 2017 and 2019 (TRAFx Datanet).

Dispersed recreational activities such as hunting, hiking, and camping are the most common within the project area. Pike Creek trail is a popular hiking trail within the project area. Recent data shows an average of 1,781 annual trail users between 2016 and 2018 (TRAFx Datanet).

Livestock grazing has the potential to conflict with recreational use, however, this potential already exists in the area within and around the Alvord Allotment. Surface disturbance and feces may make camping and other recreational use areas undesirable. Livestock may damage trail tread, presenting some safety concerns for hikers and stock users. Livestock may compete with recreational stock for limited forage. Livestock may compete with recreationists and stock for limited water. Livestock grazing may interfere with the overall recreational experience and may displace visitors. It is worth noting that in some cases, recreationists view the presence of cattle as adding to their experience.

Any alternative with grazing has potential for conflict along Pike Creek trail and amongst dispersed recreational activity. However, grazing activity has occurred in these areas for decades, so effects to recreation would remain unchanged. None of the proposed alternatives affect public recreational access. There would be no measurable difference to the resource between the grazing alternatives. Removal of grazing would eliminate the general potential for conflict but may also decrease from the experience of some recreationists. However, a full analysis of the differences between the grazing and no grazing alternatives would not help the authorized officer make a reasoned choice between alternatives as no actions proposed in this EA would modify the ability for recreation to occur or substantially change the experience of those recreating

- *Soils:* There are five soil associations found within the Alvord Allotment: Atlow-Tumtum-Deppy, Baconcamp-Clamp-Rock outcrop, Felcher-Skedaddle, Raz-Brace-Anawalt, and Spangenburg-Enko-Catlow. Additionally, throughout the allotment there are several salt desert playas, including portions of the Alvord Desert. Below are the general descriptions of the five soil associations including their associated vegetation.

  The Atlow-Tumtum-Deppy soil association is a well-drained, shallow association that formed in old alluvium, residuum, and colluvium. This association is found at elevations from 3,400 to 5,300 feet on high lake terraces and low hills with slopes of 2–50 percent. Soil texture ranges from very gravelly loam to very cobbly, ashy loam with moderately slow permeability with a high-saturated hydraulic conductivity that can make this series susceptible to water erosion. Native vegetation associated with this soil series includes black sagebrush (*Artemisia nova)*, bottlebrush squirreltail (*Elymus elymoides)*, Indian ricegrass (*Achnatherum hymenoides)*, Thurber's needlegrass (*Achnatherum thurberianum)*, Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), spiny hopsage (*Grayia spinosa)*, shadscale saltbush (*Atriplex confertifolia)*, bud sagebrush (*Artemisia spinescens*) and sand dropseed (*Sporobolus cryptandrus).*

  The Baconcamp-Clamp-Rock outcrop association includes very cobbly loam to loamy textures and consists of very shallow to moderately deep, well-drained soils with 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.

  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. Texture 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.

  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.

The Spangenburg-Enko-Catlow association consists of very deep, well-drained and moderately well-drained soils that formed in lacustrine sediments and deposits and alluvium derived from volcanic rocks and is generally found on lake terraces and alluvial fans and swales. Textures range from silty clay loam to very stony loams and can be found on slopes of 0–30 percent at elevations of 4,200 to 5,500 feet. There is a high potential for wind erosion. Dominant vegetation for this soil association includes Basin big sagebrush (*Artemisia tridentata tridentata*), Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), beardless wildrye (*Leymus triticoides),* bluebunch wheatgrass (*Pseudoroegneria spicata),* Thurber needlegrass (*Achnatherum thurberianum),* basin wildrye (*Leymus cinereus),* Indian ricegrass (*Achnatherum hymenoides),* and needle-and-thread grass (*Hesperostipa comata).*

Range developments can affect soils primarily by direct disturbance during construction or installation. Maintenance of developments can also affect soils, for example re-defining a waterhole. Use of developments can also affect soils, such as soil disturbance from livestock grazing that is concentrated around waterholes, troughs, and corrals.

Currently, there are a total of 118 water developments within the Alvord Allotment. Livestock tend to congregate around water developments creating areas where soils are compacted, and vegetation is removed. The acreage associated with this permanent compaction varies by water development type (trough, reservoir, waterhole) with the average area of high disturbance[61] being 4.2 acres per development[62]. Adding 9 new troughs (two proposed troughs would replace existing ones located in the Alvord Seeding #1 Pasture) and 2 miles of new road would add approximately 42.7 new acres of disturbance to the Desert Pasture and the allotment (9 troughs x 4.2 acres=37.8 acres trough disturbance; 12-foot-wide road + two 4-foot berms or ditches=20-foot wide disturbance x 2 miles (10,560 feet) = 4.9 acres road disturbance).

Additionally, livestock create trails leading to and from the water developments where soils are compacted. Trails are generally heaviest nearer the water development and taper out farther away. A one-mile trail, approximately 36 inches[63] wide would be approximately 0.36 acres of potential disturbance. With an estimate of 20 miles of trails per water development (7.2 acres), an additional 64.8 acres of trail disturbance would be associated with each water development. Total disturbance would be estimated at 107.5 acres, which would be less than 0.5 percent of the allotment. All compaction is localized and does not impact the pastures or allotment as a whole. The construction and removal of fencing would not have a noticeable impact on soils, including the short-term impacts by livestock adjusting to new boundaries. As livestock trail along newly constructed or relocated fences, they would compact soils. Once livestock determine new trailing routes based on the changes to fencing, the initial routes that are not used would revert back to natural conditions as vegetation regrows. Fence construction 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. Soil compaction would occur at the sight where the t-post enters the ground, which is approximately 2-inches square and would be negligible on the landscape.

Pipeline maintenance would cause small and temporary impacts to soils; however, reserving the topsoil for reapplication over the disturbed ground, and seeding with desirable plant species (if needed), would accelerate vegetation regrowth to prevent erosion. Perennial grass would be expected to revegetate the disturbed area within three years.

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

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[61] Defined in this situation as areas where shrubs have been removed. These areas are expected to have minimal to no BSCs present.
[62] This number was determined by estimating the area around reliable year-long water in the Alvord Desert Allotment where shrubs appear to have been removed, using 2017 OSIP 1-foot imagery in GIS, and averaging them. Range of areas around the 12 reliable water sources was 0.6 – 16.3 acres.
[63] Most livestock trails are closer to 18 inches wide. However, by assuming this larger width, the calculation would consider the worst-case scenario.

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 (Thurow 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 project design elements in all grazing alternatives limit annual utilization on native grass to 50 percent 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 (Holecheck et al. 2011).

The S&Gs completed on the allotment in 2017 found upland soils were largely supporting deep-rooted perennial vegetation, exhibiting infiltration and appropriate permeability rates, and storing available moisture. There were no signs of rills, gullies, or water flow patterns.

Wildfire can leave areas bare of vegetation down to mineral soil if a fire burns extremely hot; however, depending on the intensity and duration of the fire, there can be areas left unburned as well. Impacts due to wildfire vary depending on conditions. The specific contribution of these activities to current soil condition and cover is not discernable from other historic disturbances. Continued grazing in a manner similar to what has occurred in the past would not result in any new, beneficial, or adverse impacts to soils. Any actions that would result in livestock being better distributed across the allotment, such as with new water developments, would result in more uniform grazing of vegetation, potentially reducing the effects and size of wildfires. If a fire burns fast through an area, impacts to soils are minimized; however, the slower and hotter a fire burns, the more the potential to remove the biotic components from the top layer of soils is increased. Wildfire opens the landscape up to the establishment and spread of noxious and invasive weed species, with invasive annual grasses being the most devastating.

None of the alternatives would impair soil function at the watershed scale. There would be no potentially significant effects on soil function; therefore, a full analysis would not help the authorized officer make a reasoned choice between alternatives.

- *SSS – Flora:* The BLM has conducted surveys for botanical resources, such as SSS plants, including those on BLM lists as well as those designated as threatened or endangered in Oregon. There are five BLM special status plant species located within the Alvord Allotment. Two species and their associated habitats, *Chaetadelpha wheeleri* (Wheeler's skeletonweed) and *Abronia turbinata* (transmontane sand verbena), are located within the Alvord Desert ACEC and would not be impacted by any of the action alternatives due to no available (or proposed) water resources in the area, which would increase livestock grazing in the area. *Achnatherum speciosum* (desert needlegrass) and *Chaenactis xantiana* (fleshcolor pincushion) and their associated habitat are located within the Desert #6 Pasture near the Alvord Seeding. These sites are also located away from any existing or proposed water resources, which limits the amount of livestock use within the vicinity of these species. While this species is located near the proposed fence line, a survey of this area prior to fence construction would allow the fence to be relocated slightly to avoid any occurrence of these species. Surveys would occur at all sites prior to implementation to ensure any SSS are avoided as described in under PDEs in Section 2 of the EA. Because of this, there would be no significant effects to these species as a result of any of the alternatives. Any sites found would be avoided per PDEs. Therefore, the BLM does not expect the actions would an effect on SSS - flora.

- *Wild Horses:* The Desert #6 and Table Mountain #4 pastures of Alvord Allotment lie within the Coyote Lakes-Alvord-Tule Springs Wild Horse HMA. To maintain a thriving natural ecological balance, the four essential habitat components of forage, water, cover, and space must be present within the HMA in sufficient amounts to sustain healthy wild horse populations within Appropriate Management Level (H-4700-1 2010). Under Actions Common to Alternatives A-C, there is a provision to open interior HMA gates when livestock are not present to allow horses to move to areas of available habitat. *Utilization levels* are limited to 50 percent or less by all grazing animals. These provisions would apply even when suspended use and NR AUMs were authorized and therefore each alternative would continue to provide adequate forage for wild horses within AML. Pipeline or Ancient Lake wells would be used for wild horses during the summer and fall months when livestock are not present and when water is a major limiting factor in the Desert #6 Pasture. Pipeline or Ancient Lake wells could provide water in water limited years in a reasonable location for the main summer wild horse use area along the ridgeline that runs north to south and lies east of Mickey Basin and Alvord Desert. The availability of all water sources during emergencies situations (e.g., severe drought) would be important for wild horse survival. All alternatives would continue to provide all four essential habitat components for wild horses managed within AML. Alternative B and would provide additional water sources for wild horses to utilize while Alternative D (No Grazing) would do so without potential for conflict with livestock grazing. In addition, Alternative C would reduce potential conflict for forage as suspended use would be terminated and no NR AUMs would be authorized. However, utilization limits would minimize this conflict under all alternatives. For these reasons, a full analysis of the effects on wild horses would not help the authorized officer make a reasoned choice between alternatives.

- *Wildlife:* The BLM completed wildlife surveys, habitat inventory and assessment, literature searches, and other research to determine which wildlife have habitat and are likely or not likely to be present in the project area. A summary of this is presented in Appendix F: Wildlife Habitat Table. Where wildlife habitat is not likely, it is not considered an issue to consider in detail in the EA. Where wildlife habitat is likely and it would be affected by the alternatives, it is considered in detail in the EA. There are no known Federal threatened or endangered wildlife species or designated critical habitat within the Alvord Allotment.

9 APPENDIX D: GRAZING TREATMENT DESCRIPTIONS

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 will 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 will allow for use prior to April 1, but generally not after April 30, and will depend on climate.

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. The pastures currently under the "graze" treatment will generally experience some other treatment the following year so as not to repeat graze treatments.

Defer - (Approximately July 1 to October 15) - Grazing during this treatment will not begin until after most plants have reached seed ripe and have stored adequate carbohydrate reserves. This treatment will assist in meeting the objectives by providing all plants an opportunity to complete their lifecycles and produce the maximum amount of cover and forage.

Winter - Grazing during this treatment will occur when most plant species are dormant. Most plants will have completed their lifecycles and stored maximum carbohydrates for the next growing season.

Rest - This treatment provides the plants a full year of growth in the absence of grazing. They are allowed to store maximum carbohydrate reserves, set seed, and provide carryover herbage for the following year's turnout.

These dates are approximations based on general plant phenology. Year-to-year variation in phenology will occur based on climatological phenology.

10 APPENDIX E: SUMMARY OF TREND ANALYSIS BY PASTURE

Table 32:Summary of Trend Analysis by Pasture

Plot	Type	Pasture	Nested Frequency Trend	Pace 180º Photo	Pace 180º Trend
6012-01	P[64]	Desert # 6	N/A	Up	Up
6012-02	P	Desert # 6	N/A	Up	Up
6012-03	P	Desert # 6	N/A	Static/up	Up
6012-10	NF/P	Desert # 6	Up	Static/up	Up
6012-11	NF/P	Desert # 6	Static	Up	Up
6012-12	NF/P	Desert # 6	Static	Up	Up
6012-13	NF/P	Desert # 6	Static	Up	Up
6012-14	NF/P	Desert # 6	Up	Up	Up
6012-15	NF/P	Desert # 6	Static	Static	Static
6012-16	NF/P	Desert # 6	Static	Up	Static
6012-17	NF/P	Desert # 6	Up	Static	Static
6012-18	NF/P	Desert # 6	Static	Static	Static
6012-19	NF/P	Desert # 6	Static	Static	Up
6012-20	NF/P	Desert # 6	Up	Static	Up
6012-21	NF/P	Desert # 6	Up	Static	Static
6012-22	NF/P	Desert # 6	Up	Up	Up
6012-23	P	Desert # 6	N/A	Static	Static
6012-27	P	Alvord Seeding	N/A	Up	Up
6012-28	P	Alvord Seeding	N/A	Static	Up
6012-30	P	Table Mtn	N/A	Up	Up
6012-31	P	Table Mtn	N/A	Up	Up
6012-32	P	Table Mtn	N/A	Static	Up
6012-33	P	Table Mtn	N/A	Up	Up

11 APPENDIX F: WILDLIFE HABITAT TABLE

The following table includes seventeen SSS identified within the 2015 Final State Director's Special Status Species List (IM OR-2015-028) to have either been documented as occurring or suspected to occur on the Burns BLM District (Table 33). In the absence of observational or survey data needed to verify presence or absence, habitats within the Alvord Allotment were evaluated for potential occurrence of SSS, and occupancy is assumed if habitat is available within the allotment that could reasonably support the species over time.

Table 33: Burns District BLM SSS - Wildlife

Species and Designation	Observed in EA Area	Likely to be in EA Area	Further Consideration Needed	Reason for Inclusion or Elimination for Further Analysis
Avian				
GRSG (*Centrocercus urophasianus*)	No	Yes	Yes	GRSG habitat is present within the Alvord Allotment and a known population occurs there.

[64] Plot type "P" is Pace 180º, plot type "NF/P" is nested frequency and Pace 180º.

Species and Designation	Observed in EA Area	Likely to be in EA Area	Further Consideration Needed	Reason for Inclusion or Elimination for Further Analysis
American peregrine falcon (*Falco peregrinus*)	Yes	Yes	No	While no nest sites have been confirmed, credible observations of peregrine falcons have been reported during the breeding season and nesting habitat is present where prominent cliff bands are present such as the east slope of the Steens and tall rock rims along the east side of the Alvord playa. Proposed grazing changes would not affect peregrine falcons. Increased water availability resulting from proposed infrastructure would be beneficial to prey and would therefore be beneficial. No further analysis will be carried forward.
Bald eagle (*Haliaeetus leucocephalus*)	No	No	No	No suitable nesting habitat is present in the project area due to distance to large water bodies and trees of adequate size to support nest structures. Atypical foraging habitat is present.
Black-necked stilt (*Himantopus mexicanus*)	Yes	Yes	No	As proposed, the proposed actions maintain current grazing utilization level not to exceed 50 percent 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 (*Dolichonyx oryzivorus*)	Yes	Yes	No	Occurs in areas of contiguous shrubs with abundant grass and forb understory within the evaluation area. The proposed grazing would maintain current utilization level not to exceed 50 percent 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 (*Leucophaeus pipixcan*)	No	No	No	No suitable habitat is present in the project area due to a lack of marshes and lakes within or adjacent to the Alvord Allotment.
Black rosy finch (*Leucosticte atrata*)	No	Yes	No	Habitat, including rocky areas and cliffs as well as sagebrush steppe, is present within the allotment. Proposed grazing changes would either have no effect or improve foraging habitat over time.
Lewis' Woodpecker (*Melanerpes lewis*)	No	No	No	No open pine woodland habitats are present within the Alvord Allotment.
Snowy egret (*Egretta thula*)	Yes	Yes	No	Limited habitat is available where water sources containing adequate forage species such as frogs, aquatic insects, and crustaceans are present and occurs adjacent to willow or other dense deciduous cover. As snowy egrets are associated with riparian, marsh, and tree habitats occurring next to water, proposed grazing of perennial and annual grasses is not expected to impact this species. For this reason, no measurable impacts to snowy egrets or their habitat are expected and further evaluations for this species are not carried forward in this analysis.
Western snowy plover (*Charadrius alexandrinus nivosus*)	Yes	Yes	No	Playa habitat is available and a snow plover population is known to occur within the Alvord Allotment. As cattle do not utilize the playa where snowy plovers occur and no infrastructure would be placed in these areas, no further analysis will be carried forward.
White-headed woodpecker (*Picoides albolarvatus*)	No	No	No	No open ponderosa pine or other woodland habitats are present within the Alvord Allotment.

Species and Designation	Observed in EA Area	Likely to be in EA Area	Further Consideration Needed	Reason for Inclusion or Elimination for Further Analysis
Yellow-billed cuckoo (*Coccyzus americanus*)	Yes	Yes	No	Habitat is available within the Alvord Allotment and yellow-billed cuckoo observations have been documented. Proposed grazing changes and infrastructure would have no effect to this species, therefore, no further analysis will be carried forward.
Reptiles and Amphibians				
Columbia spotted frog (*Rana luteiventris*)	No	No	No	No habitat is available within the Alvord Allotment due to the lack of permanent bodies of water or streams.
Mammals				
Gray wolf (*Canis lupis*)	No	No	No	No known populations of wolves have been documented in the area. Transient wolves may travel through the area on occasion, but no known wolf packs have been established in the area and desert conditions within the allotment provide limited habitat for wolves. For these reasons, no further analysis will be carried forward.
Canada lynx (*Lynx canadensis*)	No	No	No	No habitat is available within the Alvord Allotment due to the lack of boreal coniferous forest.
Pallid bat (*Antrozous pallidus*)	No	Yes	No	Livestock grazing, proposed range developments, and maintenance would have no effect on bat hibernacula or roosting and breeding habitats. Proposed grazing changes that incorporate growing season rest periods would likely improve foraging habitat over time. For these reasons, further analysis will not be carried forward.
Townsend's big-eared bat (*Corynorhinus townsendii*)	No	Yes	No	Livestock grazing as proposed would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis will not be carried forward.
Spotted bat (*Euderma maculatum*)	No	Yes	No	Livestock grazing as proposed would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis will not be carried forward.
Fringed myotis (*Myotis thysanodes*)	No	Yes	No	Livestock grazing as proposed would have no effect on bat hibernacula or roosting and breeding habitats. For this reason, further analysis will not be carried forward.
Wolverine (*Gulo gulo*)	No	No	No	No montane boreal habitat is present in the Alvord Allotment.
Pygmy rabbit (*Brachylagus idahoensis*)	No	Yes	No	Where proposed cattle infrastructure improvements occur in areas with potential pygmy rabbit habitat, pygmy rabbit surveys have been conducted and no pygmy rabbits were located. An additional survey will be conducted prior to construction activities. Should pygmy rabbits be present, proposed infrastructure will be moved away from any existing colony.
Kit fox (*Vulpes macrotis*)	No	Yes	No	Kit fox habitat is present within the allotment; however, the proposed grazing changes would not affect kit fox habitat. Proposed infrastructure to increase the availability of water throughout the allotment would be beneficial for kit foxes.
Insects				
Western bumblebee (*Bombus occidentalis*)	No	No	No	No habitat occurs for Western bumblebees nor are they likely to be present within the Alvord Allotment. For these reasons, further analysis for western bumblebees will not be carried forward in this document.

12 APPENDIX G: BLM RESPONSE TO PUBLIC COMMENTS[65]

Comment 1: WWP is concerned that current livestock management and stocking rates are having impacts beyond what the area can sustain.

Response 1: Refer to EA Table 4: Alvord Allotment Standards Determination, which summarizes conditions on the ground against the five Oregon and Washington Standards for Rangeland Health that look at watershed function in the uplands and riparian areas, ecological processes, water quality, and wildlife (native, threatened, or endangered, and locally important species). As shown in EA Table 4, all Standards are achieved, or if not achieved, livestock are not a causal factor. This shows that current grazing management is sustainable. Standards and Guidelines would continue to be assessed and updated in the future to ensure livestock grazing continues to be at a sustainable level within the allotment. Annual monitoring would occur to help ensure grazing is sustainable between Standard and Guideline assessments and determinations.

Comment 2: Any release of suspended AUMs must be thoroughly and carefully considered.

Response 2: The EA covers a wide range of alternatives relating to the reinstatement of suspended AUMs. See EA Section 2.3.2 Reinstatement of Suspended use AUMs to Active use, EA section 2.4 Termination of Suspended AUMs, EA Section 2.6.1 Enclosing Non-WSA Portion of the Desert #6 Pasture and Reinstating All Suspended AUMs, and EA Section 2.6.2 Reinstatement of All Suspended AUMs within both WSA Designated and Non-WSA Designated BLM-managed Lands. Careful and thorough analysis of alternatives that are fully analyzed is completed in EA Section 3.

Comment 3: If BLM does authorize the release of suspended AUMs, it must make the case that increasing stocking rates will somehow alleviate/mitigate compounding damages to the resource.

Response 3: The Taylor Grazing Act (48 Stat. 1269) and The Federal Land Policy and Management Act of 1976, as amended, both authorize livestock grazing on publics lands. In addition, to protect and manage the long-term ecological integrity, while promoting viable and sustainable grazing operations, are both purposes of the Steens Act [Steens Act, Section 1 (b) (11) (12)]. While these acts promote sustainable livestock grazing, they do not limit livestock grazing to only those instances where it alleviates or mitigates resource damage. The grazing management proposed is analyzed in the EA, Section 3, to ensure all environmental consequences are identified. The BLM is also required under 43 CFR 4180 to take appropriate action to ensure 1) watersheds are in, or are making significant progress toward, properly functioning physical condition; 2) ecological processes are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities; 3) water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives; and 4) habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species, or that livestock is not a causal factor in not attaining these standards. Only in instances where livestock are a causal factor in not achieving standards is a change in management required to improve conditions up to achieving the standard. Any grazing that is authorized would continue to ensure Standards and Guidelines are met and livestock grazing maintains or improves long-term ecological conditions and does not degrade ecological conditions. Benefits of livestock grazing, such as removal of fine fuels, are discussed in detail in the EA Section 3.1 Grazing Management/ Rangelands/ Vegetation/ Invasive Annual Grasses.

Comment 4: BLM must also consider the growing use of the area as a recreation destination and consider how grazing management impacts the quality of the user experience.

Response 4: Recreation is considered but not fully analyzed (EA Appendix C) as no actions proposed in this EA would modify the ability for recreation to occur or substantially change the experience of those recreating. Additional clarification was provided in Appendix C.

[65] All citations included in this Appendix can be found in the Alvord AMP EA Section 5.

Comment 5: The 2017 Rangeland Health Assessment and Determination documents were not provided with the release of this EA. Why were these documents not provided to the public?

Response 5: These documents are not automatically uploaded but are provided upon request. As requested, these documents were uploaded to ePlanning on September 2, 2021.

Comment 6: Please provide the 2004 Lahontan cutthroat trout Biological Opinion that was referenced in the EA.

Response 6: These documents are not automatically uploaded but are provided upon request. As requested, these documents were uploaded to ePlanning on September 15, 2021.

Comment 7: In light of the historic drought and changing climatic conditions, BLM must consider impacts to forage production with updated information. Conditions have changed drastically across southeastern Oregon since 2017 and relying on data from over four years ago can, unfortunately, no longer be used as a reliable baseline. Have forage utilization models been produced and updated since 2017? Have more recent forage surveys been conducted?

Response 7: In 2017 the Alvord allotment carrying capacity and individual pastures were assessed under three precipitation intervals. These three intervals; normal, unfavorable, and favorable correspond to the changes in forage production pounds/acre due to soil site potential defined by the Harney County Soils Survey and yearly differences in precipitation. Normal refers to average precipitation, unfavorable refers to below average precipitation, and favorable refers to above average precipitation. The baseline considered changes in precipitation amounts including unfavorable (droughty) years. Regardless of the forage production on the Alvord Allotment year to year, the allowable utilization levels remain the same to prompt exiting a pasture or allotment earlier than scheduled to ensure rangeland resources are protected even during drier years or years where production is lower. In addition, Standards for Rangeland Health are evaluated periodically and must continue to be achieved. If monitoring, including Indicators of Rangeland Health, shows that permitted grazing in combination with annual climatic conditions is having a long-term negative impact on ecological condition, then grazing would be adjusted as appropriate to ensure Standards continue to be achieved.

Comment 8: The Andrews 2005 RMP is outdated, and forage allocation calculations were done during a relatively wet period in history. These numbers no longer apply and reflect the reality on the ground.

Response 8: Forage allocations were made through the adjudication process, which occurred in 1965 for the Alvord Allotment. At that time, the BLM assigned AUMs based on the best available data. Overtime, AUMs have been adjusted in response to long-term conditions to ensure livestock grazing is sustainable, ecological conditions are maintained or improved, and Standards and Guidelines are achieved. Therefore, the allocations made in the 2005 Andrews RMP are not based on any one year of forage availability, but on the history of the allotment and still apply. The BLM would continue to ensure allocations are at a sustainable level, with ecological conditions being maintained or improved, and Standards and Guidelines achieved.

Comment 9: Forage allocation of 50% is demonstrably too high. BLM must reference the latest best available science.

Response 9: As noted in the EA Section 2.1 the AMU/Steens CMPA RMPs (p. 54) designated utilization levels for native key forage plant species at no more than 50 percent utilization. This AMP has adopted the 50 percent utilization threshold for grazing management and the EA (section 3.1.1.1 Vegetation Response to Livestock Grazing) utilizes the best available science to support that level of use. Full references are included in the references section of the EA.

Comment 10: Utilization specifications must flow from the ARMPAs.

Response 10: While Table 2-2 in the 2015 GRSG ARMPA provides desired characteristics for GRSG habitat, nothing in the ARMPA specifies blanket utilization limits for livestock grazing. The utilization specification within the Alvord AMP

EA and the proposed action are consistent with direction in the 2005 Andrews and Steens CMPA RMPs/RODs as amended by the 2015 GRSG ARMPA.

Comment 11: It is wholly unacceptable to assume that the forthcoming USFWS Biological Opinion will not identify livestock grazing as a contributing factor to the local warming of waters on the allotment just because it did not do so in 2004...WWP knows of no instance where the presence of cattle along streams has not contributed to the warming of waters and negatively impacted water quality to the detriment of salmonids, calling the results of the original assessment and determination into question.

Response 11: The 2004 BO gave a determination of likely to adversely affect but "not likely to jeopardize the continued existence" of LCT (EA Section 3.2.1). While grazing has not largely changed in these areas since 2004, the proposed AMP changes would include additional monitoring thresholds and clear responses, as well as additional proposed terms and conditions on the grazing permit. The BLM coordinated with the USFWS throughout 2021 on the BLM Biological Assessment (BA; Finalized 12/1/2021). The Alvord AMP addresses potential effects of livestock grazing on LCT in EA Section 3.2 and the EA has been updated with information from the Final BA. At the time the Alvord AMP EA was released for public comment, the BLM made the assumption that the USFWS determination would be similar to the 2004 BO determination based on coordination on the BA. The BLMs intent is to update the EA upon a final USFWS determination. While the BLM has not yet received a Letter of Concurrence or new BO from the USFWS, once received the BLM would conduct any additional compliance, implementation, and effectiveness monitoring, and would modify grazing, in any ways that may be required, as a condition of consultation with USFWS on all three pastures containing streams with LCT, to ensure full compliance with the USFWS determination.

Comment 12: Under NEPA, whether an action is “significant” is evaluated on the basis of both context and intensity. Here, the project area lies within the Steens Mountain Cooperative Management and Protection Area (“CMPA”)—an area recognized nationally for its ecological values—as well as the Steens Mountain Wilderness, multiple Areas of Critical Environmental Concern, Wilderness Study Areas (“WSA”), citizen-proposed wilderness areas, agency-recognized roadless areas, and seasonal habitat and Climate Change Considerations Areas for GRSG. The effects of the proposed project on these critical ecological and other special management areas would have both long- and short-term implications for wilderness values and roadless areas, the sagebrush steppe ecosystem, GRSG, and other birds, small mammals, bats, and wildlife species. The Bureau must thoroughly analyze these potential significant impacts in an EIS.

Response 12: The presence of special management areas and habitats does not automatically mean the effects of a proposed action would be significant and therefore require analysis through an EIS. In the draft Finding of No Significant Impact (FONSI), based upon a review of the environmental assessment for the Alvord AMP and the supporting documents, the BLM authorized officer determined "that Alternative B (proposed action) is not a major Federal action and would not significantly impact the quality of the human environment" (Alvord AMP EA FONSI Page 1). The FONSI also found that the effects of Alternative B "would not exceed those effects already analyzed in the final environmental impact statement (FEIS) prepared in 2004 for the Andrews Management Unit (AMU) and Steens Mountain Cooperative Management and Protection Area (CMPA) Resource Management Plans (RMP), or in the FEIS prepared in 2015 for the Oregon GRSG Approved RMP Amendment to those RMPs" (Alvord AMP EA FONSI Page 1). The BLM authorized officer, in reaching these conclusions, considered the potentially affected environment and the degree of the effects of the alternatives (40 CFR 1501.3(b)). The BLM considered, analyzed, and disclosed the affected area and its resources, including grazing management, rangelands, vegetation and invasive annual grasses (EA Section 3.1); fisheries, riparian, and water quality resources (EA Section 3.2); migratory birds, wildlife and GRSG (EA Section 3.3); social and economic values (EA Section 3.4); visual resource management (EA Section 3.5); wilderness, WSAs, and lands with wilderness characteristics (EA Section 3.6); and transportation and roads (EA Section 3.7). The BLM considered the short- and long-term effects, potential beneficial and adverse effects, effects on public health and safety, and effects that would violate Federal, State, Tribal, or local laws protecting the environment (40 CFR 1501.3(b)). As noted above, the BLM determined that, under this analysis, there would be no significant effects and the effects would not exceed those already described in the Environmental Impact Statements the BLM has already prepared. The BLM has therefore appropriately concluded that we are not required to prepare an Environmental Impact Statement for the Alvord AMP.

Comment 13: The Alvord AMP EA preferred alternative is "highly controversial." Effects are controversial "when substantial questions are raised as to whether a project may cause a significant degradation of some human environmental factor or there is a substantial dispute about the size, nature, or effect of the major federal action." Nat'l Parks & Conservation Ass'n v. Babbitt, 241 F.3d 722, 736 (9th Cir. 2001) (internal modifications omitted). "A substantial dispute exists when evidence, raised prior to the preparation of an EIS or [Finding of No Significant Impact], casts serious doubt upon the reasonableness of an agency's conclusions." Id. (internal citation omitted).

Response 13: The BLM has appropriately determined that preparation of an EIS is not necessary. The determination of whether or not to prepare an EIS rests on whether the proposed major federal action will have a significant effect on the quality of the human environment (42 U.S.C. 4332(2)(C)). Controversy is a "substantial dispute about the size, nature, or effect", and not mere opposition to a proposed project (Blue Mountain Biodiversity Project v. Blackwood, 161 F.3d 1208, 1212 (9th Cir. 1998)). The comment letter appears to claim there is controversy over the following effects of the proposed action: whether range developments are necessary and will improve the ecology of the area and wilderness values; whether increased grazing will improve ecological conditions of the area by decreasing cheatgrass and decreasing the wildfire threat; and whether increased grazing will improve the long-term ecological integrity and conditions within the allotment and naturalness of "wilderness quality lands". The BLM analyzed and disclosed the potential effects of the alternatives on these resources (EA Sections 3.1 and 3.6) and has responded to several comments related to these topics, including addressing citations provided by the commenter. Please refer to EA Sections 3.1 and 3.6 as well as comments 3, 14, 15, 16, 17, 21, 23, 24, 26, 27, 28, 29, 31, 36, 37, 40, 41, 42, 43, 45, 46, and 47 for BLM responses to these issues and why literature referenced by the commenter does not represent a substantial dispute about the size, nature, or effect of the proposed project/action.

Although differences of opinions may exist, they do not meet the bar of being highly controversial. Controversy, in the context of the 2019 Council on Environmental Quality regulations 40 CFR 1508.27(b), means disagreement about the nature of the effects, not expressions of opposition to the proposed action or preference among the alternatives. No unique or appreciable scientific controversy has been identified specifically related to the effects of the proposed action or alternatives (or no action alternative). The BLM has therefore appropriately determined that preparation of an EIS is not necessary.

Comment 14: The Bureau is proposing to reinstate 1,892 suspended AUMs and to prop up those additional AUMs through a series of infrastructure projects, including building a new road, installing multiple new wells and fences, and reconstructing abandoned pipelines. The Bureau fails to justify why these actions are necessary, other than stating that the project's need is to "respond to external request[s]" and to "improve grazing management practices so they are conducted in the most ecologically sound manner" EA at 7.

Response 14: Livestock grazing is considered one of the multiple uses designated for public lands through the Taylor Grazing Act, Federal Land Policy and Management Act, and the Steens Act, among others. The EA (Section 1.2 Purpose of and Need for Action) explains the need to continue to improve grazing management practices and related activities and how this need is consistent with "BLM's need to manage livestock grazing in the most ecologically sound manner in conformance with the Standards for Rangeland Health and Guidelines for Livestock Grazing Management." The BLM has direction to manage grazing in a way that ensures sustainability and maintains or improves ecological conditions. Rationale for infrastructure is explained in EA Sections 2.3.2 Reinstating Suspended Use, 2.3.3.1 Livestock Grazing Management New Pasture Establishment, and multiple sections in 2.3.4 Proposed Range Improvements. These proposed infrastructure projects would help better manage livestock. They would increase the amount of available forage to livestock and wild horses, decrease the pressure on areas currently used by livestock, improve plant health due to reduction of vegetation accumulation, and reduce fine fuel loading which in turn reduces risk of catastrophic wildfire. The environmental consequences of these developments are described in Section 3 of the EA, with Section 3.1 specifically addressing effects to vegetation.

Comment 15: The Bureau never articulates how reinstating 1,892 AUMs—including within Steens Mountain Wilderness and unrecognized citizen-inventoried wilderness areas that have never been reviewed under current Department of the

Interior wilderness policy—and building new roads, wells, and other infrastructure, would improve the ecology of the area and wilderness values and other associated public land resources.

Response 15: Within the Alvord AMP EA, there is only one permanent development that is proposed within an existing WSA. While the previous version of the EA was unclear, this is where the end of the of an existing pipeline (proposed for pipeline maintenance) is proposed to drain into an existing reservoir just inside the WSA boundary (EA Section 2.3.4.5 Troughs). This is how the pipeline ended when it was originally constructed but has been unfunctional for a number of years. An alternative location for a water source at the end of the pipeline has also been proposed as a trough that would be located just outside of the WSA boundary (EA Section 2.3.4.5). The effects of this development on WSA, and the discussion of the effects of these developments are found in EA Section 3.6.2.4. While some proposed developments are within Lands with Wilderness Characteristics, these effects are also analyzed in EA Section 3.6.2.4. The 2005 Andrews RMP determined parcels with wilderness characteristics are not provided special management status (RMP-76). Parcels are to be managed according to RMP direction for surrounding non-WSA land. The protections afforded (e.g., the mineral withdrawal, prohibition on cross-county motorized/mechanized vehicle use, and adjacent ROW avoidance/exclusion areas) were considered as providing sufficient protection to meet the goal to manage parcels with wilderness characteristics to protect those characteristics (RMP-75). Other citizen proposed wilderness character units within the Alvord Allotment were analyzed in the 2005 Andrews RMP and were found not to have wilderness characteristics (RMP-75).

BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands was released in 2021. While this was after the 2005 Andrews RMP, the wilderness characteristics remain the same. As there have been no changes within the Alvord Allotment that would affect wilderness character in these areas since 2005, the BLM has determined that at this point an update to the inventory in this area is not currently necessary. Manual 6310 states "the preparation and maintenance of the inventory shall not, of itself, change or prevent change of the management or use of public lands." Therefore, the BLM can continue with proposed management independent of when this area was last inventoried, as the result of the inventory would not change management on the ground. While BLM Manual 6330 "Management of BLM Wilderness Study Areas" was released in 2012, this manual is specific to the management of lands already designated as a WSA, not proposed lands, and it does not change what constitutes wilderness character or how the BLM is required to analyze citizen proposed units with wilderness character. Therefore, the analysis of these units that occurred in 2005 remain valid. EA Sections 3.1 and 3.6 address the effects of reinstating suspended AUMs on vegetation and in Wilderness, WSAs, and Lands with Wilderness Character, respectively.

Comment 16: The preponderance of evidence in published scientific literature suggests the opposite, that livestock grazing results in and exacerbates the invasion and spread of weeds and other non-native species, disrupts natural fire regimes, destroys and fragments sagebrush habitat, and exacerbates the effects of climate change (Bock et al. 2007; Brooks et al. 2004; Chambers et al. 2016a; Chambers et al. 2016b; Knick et al. 2003; Milchunas et al. 1988; Milchunas 2006; Reisner et al. 2013; Pyke et al. 2015; Pyke et al. 2016; Reisner et al. 2015; Warren and Eldridge 2001; Williamson et al. 2019).

Response 16: The BLM has reviewed the citations provided by the commenter. Over half of the citations provided (Chambers et al. 2016a, Chambers et al. 2016b, Knick et al. 2003, Milchunas et al. 1988, Milchunas 2006, Pyke et al. 2015, Pyke et al. 2016) acknowledge the historical context of improper livestock grazing coupled with the introduction of invasive annual grasses, and the historical and continuing effects of historical overuse to native vegetation. The land use histories in the articles are very similar or match the history of this project area (EA Section 3.1.1). Furthermore, many of the citations acknowledge the difference between improper livestock grazing of the past (inappropriate and overgrazing are also terms used) and contemporary grazing where there are allowable use limits on vegetation such as utilization, as well as consideration for grazing rotations based on grass phenology (Chambers et al. 2016a, Pyke et al. 2015 and 2016). Both allowable use limits (utilization) and grass phenology driven rotations are proposed in the Alvord AMP grazing alternatives (EA Section 2.1.8, Table 7 and Table 9). Authors do acknowledge (themselves or by citing others) that historical damage has been done by improper grazing, and contributed to the effects claimed by the commenter, west wide, but on balance offer insights for managed grazing into the future. For example, Chambers et al. 2016a suggests "Proper management of livestock grazing can promote native perennial grass and forb growth and reproduction and maintain or enhance resilience to wildfires and resistance to invasive annual grasses"; Chambers et al. 2016b "Herbivores can have negative direct effects on Bromus (cheatgrass), but positive indirect effects through decreases in competitors. Management strategies can be improved through increased understanding of community resistance to exotic annual Bromus species"; Milchunas et al. 1988 cites a local to Harney County article that says "The invasion of exotics occurred only in areas around watering tanks that were heavily grazed and trampled. After 36 yrs. of moderate grazing and grazing-exclosure treatment in Artemisia-Agropyron (big sagebrush and bluebunch wheatgrass) habitat in eastern Oregon, species composition inside and outside the exclosures showed parallel temporal changes (Sneva et al. 1984)"; and Pyke et al. 2015 cites papers stating "Shifting to no livestock use may not provide desired outcomes, such as increases in perennial herbaceous components of the plant community, if state changes have occurred (West et al. 1984; Davies et al. 2009)." Collectively, where livestock grazing use amount is discussed, the citations define proper or appropriate grazing as light or moderate use, and use a range of percentages to demonstrate this, most were between 30- 50 percent, predominately collected by weight, for moderate utilization. Crawford et al. 2004 is a synthesis paper about the ecology and management of GRSG and their habitats. The paper defines and discusses livestock grazing utilization as moderate when 40-60 percent by weight has been utilized; use at that level is generally compatible with maintaining perennial grasses and forbs after the main growing season (Crawford et al. 2004). The article also classifies livestock grazing utilization by weight under 40 percent as light, over 60 percent as heavy, and over 80 percent as severe use (Crawford et al. 2004). As described in the article “proper use” by livestock combines utilization information as well as climate variables, forage species, and timing of livestock grazing to ensure desirable upland vegetation is maintained or improved (Crawford et al. 2004).

In Jansen et al. 2021, Figure 3 demonstrates that utilization readings using the Landscape Appearance 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 Alvord AMP and guiding Land Use Plan propose using Landscape Appearance as the predominant method for collecting livestock utilization data, based on Jansen et al. 2021 and professional judgement from Burns Range Management Specialists, this is a conservative measure of utilization when compared to a method collected by weight.

Another important component of proper grazing includes having rotations that allow for growing season rest on desirable bunchgrasses. Some references provided by the commenter (Reisner et al. 2013, Riesner et al. 2015, and Williamson et al. 2019) do not define livestock grazing use in a way that the agency can quantify or reasonably replicate but simply state results based on whether grazing has occurred or not, or mentioned if the study area had more or less grazing and if that resulted in more or less cheatgrass. These references are not helpful for BLM analysis of comparing livestock grazing between all the alternatives as the specific grazing management techniques are not identified and their relevancy to the proposed grazing identified. Livestock grazing is not binomial (i.e., it does not have only two outcomes). Davies and Boyd in 2020 do a good job of explaining this principle in the publication headlined with the same name. For this project area the effects of livestock grazing are influenced mainly by timing and intensity (measured by utilization) of grazing and both factors have been carefully considered using results of local science largely within the Great Basin (EA Section 3). The citations provided by the commenter that discuss vegetation dynamics in the Great Basin received the most careful review; the studies in the Southwest USA (Bock et al. 2007, and Milchunas 2006) were also reviewed. However, the forage grasses reference in these areas are different (warm season grasses vs. cool season grasses) and their response to livestock grazing use is different. When those facts are coupled with temperature regimes and weather patterns that are also considerably different than that of the project area, the information provided in those documents was determined too not be applicable.

Comment 17: The Department of the Interior includes the CMPA in its National Landscape Conservation System, the mission of which is “to conserve, protect, and restore these nationally significant landscapes that are recognized for their outstanding cultural, ecological, and scientific values.”

Response 17: The NLCS was created in June 2000 to conserve, protect, and restore special areas and unique resources. The Steens Mountain CMPA is a part of the NLCS, as are the WSAs within the Alvord Allotment. The Oregon/Washington National Landscape Conservation System 3-year Strategy: Fiscal Years 2013-2015 (September 14, 2012) identifies state level actions that include conserve, protect, and restore the values for which each NLCS unit was designated. The Steens Cooperative Management and Protection Act of 2000 designated the CMPA, and the Alvord AMP EA is in compliance with that document. The Alvord AMP EA ensures the CMPA continues to be conserved, protected, and restores the values for which it was designated, which include "(1) To maintain the cultural, economic, ecological, and social health of the Steens Mountain area in Harney County, Oregon" and "(11) To promote viable and sustainable grazing and recreation operations on private and public lands" (Steens Act 2000). The proposed action in the Alvord AMP EA is consistent with the Steens Act and the NLCS strategy. The Background information in the EA (Section 1.1) has been updated to identify which special designation areas have an NLCS designation and the NLCS strategy has been added to the Compliance with Other Laws, Regulations and Policies in EA Section 1.5.

Comment 18: The Bureau designated Alvord Desert and Mickey Hot Springs Areas of Critical Environmental Concern, and Mickey Basin Research Natural Area, areas 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.”

Response 18: The Alvord AMP EA is consistent with the management plans for the Alvord Desert (1983) and Mickey Hot Springs Areas of Critical Environmental Concern (1994), and Mickey Basin Research Natural Area (1990). These areas are addressed in the Alvord AMP Appendix C. Both Mickey Basin RNA and Mickey Hot Springs ACEC are fenced as no graze areas. The Alvord Desert ACEC does not have water developments or natural water sources that would draw livestock into the area, therefore, impacts to these areas by livestock are not expected.

Comment 19: The ODFW has also identified the Alvord Lake Basin Conservation Opportunity Area, encompassing important alkaline wetland habitats, riparian/wetland vegetation communities, and fish and wildlife habitats.

Response 19: The ODFW website for Conservation Opportunity Areas (COAs) states, "COAs were developed to guide voluntary conservation actions in Oregon. Land use or other activities within these areas will not be subject to any new regulations. The ODFW COA map, dataset, and underlying profile information should only be used in ways consistent with these intentions." The stated recommended conservation actions for the Alvord Lake Basin are to: 1) Maintain alkaline wetland habitats; 2) Maintain, restore, or improve riparian/wetland vegetation communities; and 3) Promote early detection and suppression of invasive plants. Consultation with ODFW (EA at 4.1), terms and conditions set by this AMP to protect riparian habitat (EA at Table 5 and Section 2.3.1), and positive trends in habitat and wildlife indicate that BLM actions in the area are consistent with the goals of the Alvord Lake Basin COA (EA at Table 4).

Comment 20: The Audubon Society has identified the eastern slopes of Steens Mountain and the Alvord Lake and Basin as Important Bird Areas—“sites in our state most important to bird conservation.”

Response 20: The USFWS directs management of birds and is the regulatory agency. The Memorandum of Understanding (MOU) between BLM and USFWS that addresses specific management of Important Bird Areas expired in 2017 and is currently under revision. However, the expired MOU encourages each agency to "immediately begin developing conservation measures, as set forth in this MOU, as appropriate and practicable". BLM is not obligated to specifically address these areas until a new MOU is signed that provides guidance for specific management for these areas. However, as the expired MOU lists grazing as a permitted activity and the proposed alternatives in the Alvord AMP EA were designed utilizing principles of proper grazing with the goal of sustainable use that provides ecological benefits to migratory birds and their habitats within the affected area and analysis is documented in EA Section 3.3.2. BLM has acted in good faith to demonstrate our commitment to the conservation of migratory birds and their habitat in the spirit of the expired MOU.

Comment 21: There are four citizen-proposed (but not currently recognized by the Bureau) wilderness areas, including the 23,214-acre Grassy Ridge, the 22,377 acre Coffin Butte, the 36,372 acre Ancient Lake Addition, and the 11,400 acre Big Basin Addition (ONDA 2002a, 2002b). In addition, there are nearly 80,000 acres of Bureau-recognized roadless areas. See Appendix A. ... There is no discussion of the four citizen-proposed wilderness units ONDA inventoried, found to possess wilderness characteristics, and submitted to the Bureau in 2002.

Response 21: Alvord AMP EA section 3.6.1.3 was updated to identify these citizen-proposed units by name and to provide additional details. While roadlessness is a wilderness characteristic that is considered when determining if areas contain lands with wilderness character, the 2005 Andrews RMP did not designate any roadless areas, or provide any management direction specific to these areas. Recognizing an area as roadless during an inventory does not require any specific management or prevent construction of new roads but is a statement that the area does not currently have any roads; these areas would continue to be managed in accordance with the 2005 Andrews RMP as amended by the 2015 GRSG ARMPA.

Comment 22: The Bureau fails to address and show that its grazing proposal will be consistent with the ICBEMP Strategy, which is part of the Andrews Management Unit ("AMU") RMP and the Steens Mountain CMPA RMP. See 43 U.S.C. § 1732(a) (site-specific projects must be consistent with land use plan requirements).

Response 22: The BLM describes within the Alvord AMP EA how the proposed actions are consistent with the 2005 Andrews RMP/ROD as amended by the 2015 GRSG ARMPA and incorporated resources objectives as appropriate (EA at 2.1.1 and Appendix B). The Interior Columbia Basin Strategy (Strategy) provides principles that incorporate the science data and resource information developed by the project into land use plans (Forest and Resource Management Plans) and project implementation. The Strategy identifies key principles that are relevant to future planning efforts including an update of ecological principles. During the RMP development, the BLM identified and reviewed the findings from the ICBEMP Scientific Assessment (USDI/USDA 1999) relevant to issue identification across the Interior Columbia Basin. The findings that applied to the Subbasin Review area supporting the RMP were incorporated in Appendix C of the 2005 RMP document. Upon review of Appendix C in the 2005 Andrews RMP, the BLM was unable to locate any instance where the proposed action in the Alvord AMP is not consistent with the ICBEMP Strategy.

Comment 23: ONDA remains concerned that the Burns District's inventory and conclusions are not only outdated and stale, but significantly out of step and inconsistent with the neighboring Lakeview and Vale Districts. The Bureau made errors in its road determinations (as noted above) and committed at least three major errors in its "naturalness" determinations. First, the agency in its 2003 determinations often included human-made features such as water storage tanks or crested wheatgrass seedings at the roadless area boundary that could be excluded by simply adjusting the unit boundary. Second, the agency considered naturalness in a segmented, piecemeal fashion rather than over the entire roadless area. The Bureau compounded these problems through its third error: an overly strict approach to assessing naturalness....Of particular concern here is the Bureau's proposal to construct two new wells and a road through the ONDA-proposed Grassy Ridge wilderness area, in addition to three more wells in the ONDA-proposed Ancient Lake Addition and one well in the ONDA-proposed Coffin Butte wilderness area. And again: even though the Bureau in 2003 rejected these areas as having wilderness characteristics, the agency did conclude that they are roadless for wilderness purposes. See Appendix A. The EA fails to acknowledge this or to consider the environmental impacts of establishing a new road through the middle of these large, agency-recognized roadless areas.

Response 23: The BLM inventoried citizen-proposed lands with wilderness characteristic units in the 2005 Andrews RMP process and found that only one area, Alvord Desert LWC parcel, contains wilderness character. As conditions in the Alvord Allotment have not changed since 2005, the BLM has determined that at this time, the areas within the Alvord Allotment do not need to have an updated inventory. These inventories looked at wilderness characteristics which are the same across federally managed land, and those have not changed with implementation of new guidance. The BLM finds that previous and new guidance align and would not result in changes to the LWC inventory in this area. Future inventories would continue to be consistent with the most up to date policy, currently Manual 6310 Conducting Wilderness Characteristics Inventory on BLM Lands. In addition, Manual 6310 "provides that the preparation and maintenance of the inventory shall not, of itself, change or prevent change of the management or use of public lands." Therefore, an inventory would not limit the BLM's ability to carry out any of the proposed actions within this document or change the analysis as the 2005 RMP/ROD (page RMP-76) directs "parcels with wilderness characteristics are not provided special management status. Parcels would be managed according to RMP direction for surrounding non-WSA land. The protections afforded (e.g. the mineral withdrawal, prohibition on cross-county motorized/mechanized vehicle use, and adjacent ROW avoidance/exclusion areas) were considered as providing sufficient protection to meet the goal/objective." See EA section 3.6.2.4 for environmental consequences related to LWC, which has been updated with additional information.

Comment 24: The proposed livestock grazing, and associated management actions would significantly impact recognized roadless areas and irreplaceable wilderness values present in these areas…

Response 24: While the BLM identifies areas without roads as part of the wilderness characteristics inventory, the 2005 Andrews RMP did not designate any roadless areas, or provide any management direction specific to these areas. Recognizing an area as roadless during an inventory does not require any specific management or prevent construction of new roads but is a statement that the area does not currently have any roads; these areas would continue to be managed in accordance with the 2005 Andrews RMP as amended by the 2015 GRSG ARMPA. For effects to wilderness characteristics see EA section 3.6.2.4 and comment response 21.

Comment 25: To date, the Burns District has never evaluated wilderness values on and around Steens Mountain, including within the Alvord AMP planning area, under any current wilderness manual.

Response 25: On the Burns District, wilderness values were evaluated in the late 1970's, and a Final Intensive Inventory Decisions was completed in November 1980, with the Wilderness Study Report released in October 1981. The updating or release of wilderness manuals does not automatically result in a requirement to update all inventories as all agency direction is based on existing laws, which have not changed. The BLM has determined that management within the Alvord Allotment has not changed to an extent to warrant new wilderness character inventories in that area. Updating wilderness characteristic inventories is not a part of the Purpose and Need associated with this AMP EA and will not be completed as part of this project. For analysis of alternatives on Wilderness Study Areas see EA Section 3.6.2.

Comment 26: See AMU-CMPA Proposed RMP and Final EIS at 2- 158 to -159 (identifying Bridge Creek (1,526 acre), High Steens (629 acres), Lower Stonehouse (2,176 acres), and Alvord Desert (2,033 acres) as "Parcels with Wilderness Characteristics"). The Bureau decided that those four parcels would "not [be] provided additional special management status" and would "be managed according to the RMP direction for surrounding non-WSA lands." CMPA RMP at 81. Yet, there is conflicting text in the EA regarding how those Parcels will be managed.

Response 26: Three of the above identified parcels with wilderness character are not part of the Alvord Allotment. There is only one parcel with wilderness character within the allotment, as identified in the 2005 Andrews RMP, which is the Alvord Desert Lands with Wilderness Characteristic unit. Alvord AMP EA Section 3.6.1.3 states "Parcels with wilderness characteristics are not provided special management status. Parcels will be managed according to RMP direction for surrounding non-WSA land. The protections afforded (e.g., the mineral withdrawal, prohibition on cross-county motorized/mechanized vehicle use, and adjacent ROW avoidance/exclusion areas) were considered as providing sufficient protection to meet the goal/objective (AMU RMP-76)." The BLM is unable to find conflicting text in the EA.

Comment 27: The IMP [Interim Management Policy] explained that the Bureau could approve new, permanent livestock developments only if "they truly enhance wilderness values, and the developments are substantially unnoticeable." Manual 6330 sets out a new standard for when the Bureau can conclude that new livestock developments "enhance wilderness characteristics" as a limited exception to the non-impairment standard. The standard for invoking the "Enhancing Wilderness Characteristics" exception is "if the structure's benefits to the natural functioning of the ecosystem outweigh the increased presence of human developments and any loss of naturalness or outstanding recreational opportunities cause by the new development." The Manual also requires that the Bureau study cumulative impacts and directs that proposed range development must not require new motorized access.

Response 27: The only development that is being proposed within any WSA is to have the pipeline proposed for maintenance in the Desert #6 Pasture ending in an existing reservoir just within the WSA boundary (about 100 feet). This maintenance would follow the original construction of the pipeline, which historically drained into the reservoir, but has been unfunctional for a number of years. However, the EA also analyzes an alternative watering location, which would be a trough, placed just outside of the WSA (EA Section 2.3.4.5). Per direction in WSA Manual 6330, the BLM analyzes these effects to wilderness characteristics, including if the development meets an exception, in EA Section 3.6.2.5. No proposed range developments would require new motorized access within a WSA. EA Section 2.3.4.3, 2.3.4.5, and 3.6.2 have all been updated.

Comment 28: Even if wells alone were sufficiently effective at managing livestock distribution—a proposition that finds no support in the EA—within the 190,433-acre pasture, the placement of these wells on the edge of, or just inside, WSAs will lead to livestock wandering and congregating in these areas and additional removal of AUMs from WSA lands. It is notable that while the EA discusses yearly monitoring to assess WSA-designated lands, the EA provides no additional monitoring requirements for the 190,433-acre pasture— particularly during the phase-in period described in the EA—or any details about where, when or how compliance checks and monitoring will occur to ensure that AUMs are only being removed from non-WSA lands.

Response 28: Using water as a tool to manage livestock distribution is documented in EA Section 3.1. Ganskopp (2001) found moving water in arid pastures was the most effective tool for changing the distribution of cattle (EA Section 3.1). Research has found that "[t]he location and number of watering points on grazing lands are important in controlling the movement, distribution and concentration of grazing animals" (Vallentine 2001) (EA Section 3.1). EA Section 3.1 has additional references and others have been added to the document in response to this comment. Only the three wells in the interior of the non-WSA area are planned to help "hold" livestock utilizing the reinstated AUMs (EA Sections 2.3.2 and 2.3.4.4). The proposed wells on the edge of the WSA are proposed to help improve livestock and wild horse distribution across the allotment as a whole and are not planned to be used to "hold' livestock utilizing the reinstated AUMs in the non-WSA areas (EA Section 2.3.4.4). EA section 2.3.2 specifies how the BLM would monitor following the reinstatement of suspended AUMs and includes responses that would occur based on that monitoring. In addition, EA Sections 2.1.2. and 2.1.3 identify monitoring for the allotment along with identified thresholds and responses (EA Table 5). These sections have been updated to include additional monitoring and responses. Analysis of the effects of new water development is found in EA section 3.6.2.4. This section has also been updated with additional information utilizing piosphere modelling and includes estimates of the amount of non-WSA and WSA acres and AUMs that would be made available with the proposed developments, looking both at all proposed developments and only those that are intended to provide AUMs available for reinstated AUMs.

Comment 29: As the Bureau states elsewhere in the EA, "[d]ue to the presence of WSA designated lands within many of the Alvord Allotment pastures, the BLM cannot reinstate the suspended AUMs in any of these pastures without putting in additional measures to ensure (to the extent possible) that these additional AUMs are only being removed from non-WSA designated lands." EA at 31. Here, the additional measures of new water developments along the boundary of WSA designated lands fails to provide additional measures that "ensure these additional AUMs are only being removed from non-WSA designated lands." This would violate FLPMA's non impairment requirement. 43 U.S.C. §1782(c).

Response 29: See comment response 28. The proposed new water developments along the boundary of the WSA and within the interior of the non-WSA portion of the Desert Pasture can be a tool for "controlling the movement, distribution and concentration of grazing animals" (Vallentine 2001) (EA Section 2.3.2). As clarified in the EA, the wells on the boundary of the WSA are not meant to hold reinstated AUMs in the non-WSA area, they are meant to improve livestock distribution within the allotment as a whole, including within the WSA areas. Only the three proposed wells in T. 33 S R. 37 E are meant to "hold" livestock within the non-WSA lands See EA Section 2.3.2 for details on how the reinstatement of suspended use AUMs would occur and EA Section 2.1.2 and 2.1.3 for monitoring and thresholds, responses and actions that would be in place to ensure there is no increase in use in the WSA lands. See EA Sections 3.1 and 3.6 for a discussion on the effects on distribution of livestock with additional water sources and the continued allowable livestock grazing use of 50 percent on native bunchgrasses, and piosphere modelling on how these developments would change distribution, including estimates of the increase in acres and AUMs available for grazing and their distribution on WSA and non-WSA areas.

Comment 30: The proposed development of five new wells within the Desert #6 pasture for livestock administration fails to recognize the severity of the water situation in eastern Oregon. This is on top of an already challenging water situation in Harney County, where wells are going dry. Drilling additional wells to facilitate livestock grazing on arid lands in this region is cause for significant concern for other resources and values in the region, including resources under the Bureau's management. In fact, the EA seems to recognize (as makes sense) that additional water may not even be available. EA at 19 ("if at least one proposed well is successful in establishing water . . .").

Response 30: BLM is subject to the State of Oregon when it comes to filing for water rights and construction of water improvements for livestock and wildlife use. The Oregon Water Resources Department is the agency that regulates water availability and ultimately decides whether water is available for such use. The Burns District BLM does not regulate water availability or issue permits. BLM must go through the same process that businesses and private citizens do. Our guidance from the BLM Water Rights Manual (7250) states that the BLM is to acquire and perfect water rights through state law. In general, you must obtain a water right permit before using water from any well. However, there are exceptions called "exempt uses," defined in Oregon Revised Statutes (ORS 537.545). ORS 537.545 includes stock watering as one groundwater use exempt from needing a water right. However, the state of Oregon must still deem that water is available for such use. These uses are exempt from applying for a water right permit but must use water beneficially and without waste. Withdrawing groundwater under the exemption carries the same weight as a water right and does have a priority date. An exempt use is still subject to state water law and subject to the same privileges and restrictions as any water right permit or certificate. In fact, the Department has the authority to regulate, reduce, or stop groundwater withdrawals when they interfere with prior or "senior" water rights. The EA does recognize that drilling a well may not result in water (EA Section 2.3.4.4). This is due to the fact that aquifers are not available at all locations. To date, there have been no detailed aquifer studies completed in the area that would help the BLM site the wells. The Alvord Basin is part of the larger tectonic geomorphic Basin and Range province, a region of alternating narrow faulted mountains and flat arid valleys with abrupt elevation changes. This structure, along with lithology, are the principal control on the occurrence and movement of groundwater in Basin and Range aquifers (Robson and Banta, 1995). Faults can act as aquitards, with the fault core creating less permeable zones incapable of transmitting useful quantities of water (Turndage, et.al., 2018), this further isolates the sequences and distinct volcanic strata that underlay the Alvord Basin. In the Alvord Basin this occurs beneath 100 to 275 meters of unconsolidated Pliocene alluvium (Cleary, 1976). This makes predicting groundwater patterns and flows difficult as it is a challenge to find the isolated aquifers beneath the Alvord Basin area. In addition, water may be at a deeper depth than the BLM would be able and willing to drill to. This is especially true for wells where solar power is planned to be used, as the depth of the well is limited to what the solar power is capable of drawing up.

Comment 31: The EA contends, without elaboration, that this change in season of use would meet exception F to the non-impairment standard "by protecting or enhancing the naturalness component of wilderness characteristics." EA at 103. … In the Bureau's recent Bridge Creek AMP EA, also on the Andrews Resource Area, the Bureau found just the opposite: that protecting areas from livestock would improve naturalness. Bridge Creek AMP EA at 134, 167. Yet here, the EA confusingly and inconsistently states that grazing would improve naturalness.

Response 31: Within the Alvord AMP EA (Section 3.6.2.4) the BLM provides many reasons why this change in the permitted season of use would enhance the naturalness component through the ability to utilize improved grazing management. Analysis of whether or not livestock grazing would improve naturalness or if protection from grazing is needed to protect wilderness character is site specific and depends on multiple elements such as grazing management, location, water availability, topography, slope, vegetation, etc. Each analysis is unique to the specified alternatives and related factors; therefore, broad general statements are not appropriate and different EA analyses may have different conclusions. However, in response to the commenters claim that BLM is making "inconsistent" statements about achievement of non-impairment standards related to a proposed change in season of use in alternatives in the Bridge Creek AMP EA (page 143) and this Alvord AMP EA (EA Section 3.6.2.4), the BLM finds no inconsistencies.

Comment 32: The EA fails to provide any data or further information or evidence on the historic grazing levels for the area within the proposed Indian Creek Pasture, or to demonstrate in any way that the proposed changes would remain at, or below proven historic use. ... In fact, elsewhere in the EA, the Bureau states that livestock use has historically been limited in the proposed Indian Creek Pasture area due to snowpack and that use "would change from sporadic use in the spring, or when a temporary season is authorized, to summer use every other year." The implication here is that grazing use would be more consistent—and thus a higher frequency of use—under the proposed changes.

Response 32: Range developments within the proposed Indian Creek Pasture date back to the 1960's showing livestock grazing is a historic use within that area as part of the Andrews Common Allotment #8. In 1989, the Indian Creek Area was moved into the Serrano Point Allotment, as its own pasture, with a permitted season of use from April 1 through October 31. Personal correspondence with an employee of the permittee at that time verified that this part of the pasture was typically used early to mid-summer (Gillette Ranch Employee, Personal Communication, 2021). In 1999, the Indian Creek Area was moved into the Alvord Allotment as part of Pike Creek Pasture. BLM records show that this area was historically used season-long, as possible dependent upon weather conditions. Table 34 shows actual use within this area. Historically, this area was used both as its own pasture, and in conjunction with an adjacent pasture; therefore, actual use AUMs shown in the table may be for an area larger than just the Indian Creek Area. In addition, years that do not show use may have received use under a blanket allotment authorization (no pastures were specified). Those years are not shown in the table below since records are limited and it would be difficult to say the Indian Creek area was definitively used. In years when the pasture is used in combination with other pastures, use typically followed green-up up the mountain. This means that livestock were turned out into the lower elevation areas, and then livestock moved up the mountain later in the year to take advantage of the more nutritious green grass. Prior to the Steens Act of 2000, there is no record of the BLM requiring the area in Indian Creek to be rested or use following a rotation; the Indian Creek Area was used when available, as needed. Boundaries and acreages have changed on the Indian Creek Area over time so a 1:1 comparison of AUMs historically used to AUMs proposed is not appropriate. The BLM has utilized historic maps and AUM data, along with current vegetation, to determine the proposed AUM level of 222 AUMs.

The area of the proposed Indian Creek Pasture was part of the 1980 Final Wilderness Intensive Inventory Steens Unit 2-85F. The existing water developments within the proposed Indian Creek Pasture were identified in the wilderness inventory, as were the existing pasture gap fences. At the time Indian Creek was designated as a WSA, use in the area was occurring as show in Table 34. The Steens Act of 2000 resulted in this area being designated as Wilderness, but not as part of the No Livestock Grazing Area. 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)) which the proposed Indian Creek Pasture is a part of. Use occurred in the proposed Indian Creek Pasture area both before and after designation of Wilderness, and the proposed action is in compliance with the Steens Act.

Table 34: Historic Indian Creek Actual Use

YEAR	HEAD	TURNOUT	GATHER	AUMS
2020	200	7/15	8/17	224
2016	100	6/25	8/25	204
2013	245	5/15	7/1	387
2005	250	4/10	6/10	510
1998	350	4/1	6/15	874
1994	250	4/4	6/4	510
1992	200	4/15	6/15	408
1990	364	7/16	9/1	574
1989	200	6/1	7/31	401
1988	150	6/2	6/30	145
1987	230	5/15	7/6	399
1981	325	5/16	6/15	325
1980	100-400	5/16	9/21	1,153
1979	125-209	4/16	8/15	752
1978	44-93	4/16	10/15	595
1977	150	6/1	8/31	450
1976	166	5/1	7/15	415
1975	119	5/16	7/31	301

The characteristics of this pasture would continue to limit use as there are no proposed developments to ensure a reliable water source for the entire authorized grazing season, and the high elevation would continue to result in deep snow and other weather events that would make forage unavailable to livestock during winter and spring. Use in this pasture is proposed for every other year and would not occur more often than that. Additional information was added to EA Section 3.6.

Comment 33: Here the proposed water developments would "artificially concentrate domestic and wild ungulates in important GRSG habitats, thereby exacerbating grazing impacts in those areas such as heavy grazing and vegetation trampling." 75 Fed. Reg. at 13,941. Diverting water from natural springs dries up natural riparian areas and wet meadows, in some cases completely eliminating these essential habitats. Id The Bureau's proposed grazing should require the agency, prior to implementing or continuing the use, to calculate the effect of water diversion on local hydrology.

Response 33: Proposed grazing levels and management are designed to optimize and improve ecological health of native vegetation and are expected to improve overall habitat conditions for GRSG and other wildlife. Grazing prescriptions and AUM allocations are determined by allocation of a percentage of available forage throughout the allotment based on conditions at the time cattle are to be turned out, with overall percentage of allowed utilization, based on long-term sustainability of impacted vegetation. The ability to distribute cattle more evenly throughout the allotment by adding additional water infrastructure ensures that prescriptions designed to improve range health are evenly applied over the landscape. Additionally, providing additional water infrastructure reduces grazing pressure in and around natural water sources such as springs and riparian areas that are important for native wildlife. BLM is also working on a District programmatic plan to address restoration and improvement of natural water sources and is in the process of developing a strategy (with appropriate NEPA) to provide water for wildlife within and adjacent to the Alvord Allotment where long-term drought has impacted historic water sources. Those plans are not related to the purpose and need of the Alvord AMP EA and are therefore outside the scope of this EA and not addressed within that document except as potential future actions.

No new spring developments or other overland water diversions are proposed within this EA. The only proposed water developments (wells and troughs) in this EA are not located near any natural riparian areas or wet meadows and are outside the 1.2-mile buffer for GRSG leks as required by the 2015 ARMPA and would therefore not contribute to concentration of wild and domestic ungulates on important breeding sites. BLM does disclose in the EA (Section 3.3.2.4.) that, "cattle are expected to congregate at newly constructed water sites. Congregation can lead to overutilization of vegetation near the water site and soil compaction that would reduce migratory bird habitat in very small, impacted areas (typically <1 acre but typically no more than 5 acres). Reduction in habitat would be very small cumulatively considering the size of the allotment and the availability of adjacent habitat." Although there would be expected congregation areas, rationale (EA Section 3.3.2.4) was provided to show how those impacts would be offset by beneficial effects including, "newly created water sources allowing for better distribution of cattle throughout the allotment. Improved distribution and development of additional water sources would also be beneficial as it would reduce continued overutilization of vegetation near the few existing water sites. Improved distribution would also be beneficial to migratory bird habitat overall as it would result in more even consumption of forage and subsequent reduction in contiguous fine fuels that contribute to an increased risk for large wildfire." Analysis in EA Section 3.3.2.4 found that while there would be an increase in congregation at new water sites, the improvement in distribution across the allotment would be more beneficial to wildlife, including GRSG, than the resultant small areas of higher impact. In addition, proposed grazing would result in livestock being removed from the Desert #6 Pasture in April, allowing time for vegetation to grow following removal. 75 Fed. Reg. 55 at 13,941 also says that "[t]he impacts of livestock operations on GRSG depend upon stocking levels, season of use, and utilization levels." Grazing proposed in the Alvord AMP has a carefully developed plan and rotation to address ecological and wildlife concerns within the allotment, which would minimize impacts to GRSG from livestock operations. EA Section 3.3.2.4. includes an updated discussion of the impacts of developments within the allotment.

Comment 34: The EA points out, cattle watering stations create an evenly scattered system of points at which cattle are encouraged to congregate. While that may lure the cattle slightly away from springs and meadow/wetland complexes that are suffering due to livestock trampling, overgrazing, or dewatering by spring developments, grazing at evenly scattered, artificial watering points will create literally thousands of mosquito breeding sites, increasing the probability of disease transmission in addition to a network of heavily trampled dead zones on the landscape. While the EA briefly discusses the potential impacts of the West Nile Virus to GRSG, it fails to disclose or discuss how any proposed water developments may impact disease transmission and the potential effect on GRSG populations within the Allotment and surrounding area.

Response 34: Natural and anthropogenic sources of ponded water are abundant throughout the allotment and within the 18 km radius of occupied leks within the allotment boundary that mosquitos can travel between and utilize (Walker and Naugle 2011). Mesic habitats found in and around Alvord Allotment are naturally ponded water, riparian zones, livestock reservoirs, livestock spring developments, natural springs, private reservoirs, and irrigated agriculture fields. In addition, the nearby Alvord Desert is an alkali flat that is regularly flooded in the spring months. Many of these wet areas can persist from early spring through the fall, when the virus has been identified to be most virulent. To increase WNV risk, water must be present at a time of year when the specific species that carry WNV are breeding (spring-summer, with peaks July-September; Snyder 2022) and is required for the larvae and pupae stage of development. The 2015 OR/WA ARMPA says that preventing livestock from trampling and disturbing shorelines, enriching sediments with manure, and create hoof print pockets of shallow water that are “attractive to breeding mosquitoes” can reduce the risk of WNV (BLM 2015 C-10). Water troughs, such as those proposed in this EA would meet the above BMP and would have less potential for stagnate water as they get used regularly. Proposed troughs would be consistent with OR/WA ARMPA (2015) management decision for livestock grazing (8) which says to “[d]esign new and maintain existing water projects to avoid standing pools of shallow water that would spread West Nile Virus.”

The proposed action is to increase available water with nine new troughs. A PDE is included in EA Section 2.3.4.7 to mitigate for *Culex tarsalis,* the mosquito species known to be a vector for WNV transmission. The PDE is designed to disrupt or eliminate this species ability to utilize these troughs for their reproductive life cycle. The PDE states that is to use troughs during fall, winter, and early spring which would avoid this species active and reproductive life cycle. The PDE also says when troughs are used during this species life cycle to treat troughs with the bacterium, *Bacillus thuringiensis* subspecies *israelensis* (Bti) when troughs are filled, and through the reproductive season. While proposed general livestock grazing would occur in the fall, winter, and early spring, avoiding the main reproductive season for mosquitos, wild horses are present in the area and these troughs may be turned on in the late spring and summer for their use.

Bti is a biological or a naturally occurring bacterium found in soils (EPA 2022). It contains spores that produce toxins that specifically target and only affect the larvae of the mosquito, blackfly and fungus gnat (EPA 2022), it does not impact other beneficial insects such as bees. EPA has registered five different strains of Bti found in 48 pesticide products that are approved for use in residential, commercial and agricultural settings primarily for control of mosquito larvae (EPA 2022). Bti has been used for mosquito control for more than 30 years (CDC 2022)The toxins are not toxic to humans because, like all mammals, we cannot activate them, and *Bti* is not toxic to non-target wildlife (CDC 2022). Therefore, with these mitigation measures for *Culex tarsalis,* there would be no measurable effect on the virus, or its spread caused by the proposed action to develop new water sources.

Cattle hoof prints would be minimal when the majority of grazing is proposed to occur in the fall and winter and due to the riparian areas within the allotment being largely armored. In addition, water that may accumulate in a hoof print, within this allotment which is typically dry during the mosquito breeding season and consists of sandy soils, would likely be absorbed or evaporate well before a mosquito could utilize it. Regardless of any proposed water troughs, there would still be substantial mosquito breeding habitat remaining on the landscape from other sources within an 18 km radius. Water infrastructure being proposed are in compliance with Management Directions, Required Design Features, and Best Management Practices as described in the 2015 ARMPA. EA Section 3.3.2.4 has been updated with this additional analysis.

Comment 35: The selected alternative should limit grazing to lighter utilization levels to support minimum height, preferred cover, increased diversity and resiliency of native grasses and forbs in GRSG habitats.

Response 35: This suggested grazing alternative has been added and addressed in the Alternatives Considered but Eliminated from Detailed Analysis section of the EA (Section 2.6). The commentor does not offer information for site specific management or new information that would result in a substantial change in the analysis in the EA.

Comment 36: The EA's apparent goal for grazing planning and management on these public lands is to reduce fire fuels in sagebrush habitats through use of higher utilization levels, as evinced by the heavy emphasis on this otherwise questionable management practice throughout the Bureau's review. See EA at 36, 38, 56, 59, 61, 134.

Response 36: The "Actions Common to Grazing Alternatives A-C, Monitoring" section of the EA (Section 2.1) describes utilization thresholds for upland native key species (50 percent) and upland desirable nonnative key species (60 percent), which is consistent with objectives from the Andrews RMP/ROD (2005) (EA Section 2.1). In contrast, there is no utilization limit on invasive annual grasses because they are undesirable; however, that does not imply allowing heavier utilization levels on desirable grasses. This same section of the EA (Section 2.1) Table 5: Thresholds and Responses, is very clear about the timely removal of livestock if monitoring shows the utilization thresholds are met for desirable upland species. The only time BLM proposes to allow utilization above the utilization threshold for upland grasses is on the desirable nonnative key species (crested wheatgrass) in the proposed action (EA Section 2.3.4.2) where the "60 percent utilization threshold may be exceeded no more than once every five years to allow vegetation management through the grazing of wolfy plants to reduce residual dry matter and fuel loading." Of course, this only applies to pastures seeded with upland desirable nonnative key species and "must be authorized by the BLM in advance and be for ecologically-based reasons" (EA Section 2.3.4.2).

Comment 37: The EA's reference to Davies et al. (2009) (EA at 36, 39) to support proposed management [50% utilization level] is notable given that those researchers measured study plots grazed as little as 30 percent utilization to compare native plant communities, wildfire resilience and invasibility by annual grasses on grazed and ungrazed sites.

Response 37: In EA Section 3.1.1. the moderate use was referred to using different citations than Davies 2009, specifically Davies et. al 2017 and Davies and Johnson 2015 that are specific to moderate livestock grazing use between 40-60 percent depending on season of use. The reference to Davies 2009 was discussing grazing and potential effects to fire risk, severity, and post fire annual grass invasion when compared to complete grazing exclusion in general. For part of EA Section 3.1.1. the commenter is correct; for Davies 2009 the moderate use was considered 30-45 percent of available forage based on previously collected data. On the upper bound that is 5 percent different (less) than the BLM defined moderate use range midpoint (50 percent) on native perennial bunchgrasses. The commenter has not provided information in this comment to assist the BLM in determining whether the 5 percent difference between the study's definition of moderate use and the BLM's definition of moderate use (50 percent) would produce a different result than that of the studies; the BLM does not believe this difference would result in a different study conclusion.

Comment 38: The ARMPA requires the Bureau to maintain a >7-inch height for perennial grasses and forbs in arid (warm-dry) sites and >9-inch height in mesic (cool-moist) sites in GRSG nesting and brood-rearing areas. See BLM (2015) at 2-4, Table 2-2 (also indicating this is "most important and appropriately measured in nest areas"); see also 43 U.S.C. § 1732(a) (site-specific actions like this project must be consistent with land use plan requirements like those outlined in the ARMPA).

Response 38: The actions proposed within this EA are in compliance with the 2005 AMU RMP as amended by the 2015 Oregon/Washington ARMPA. Quantitative habitat plot data (AIM and LMF plots) is used to determine site suitability ratings for existing seasonal habitats within the allotment. This data covers many indicators, including perennial grass height (height may be limited by the ESD and site potential). Indicators are considered together to determine suitability and are not based solely on whether or not any one indicator is achieved (EA Section 3.3.1.3.). To date there are 15 AIM plots and 42 LMF plots located within the Alvord Allotment (EA Section 2.1.2). AIM data currently shows an average perennial grass height within the allotment of over 9.6" and LMF data currently shows an average perennial grass heigh of 7.6". Perennial grass height would continue to be monitored through AIM. This data shows that across the allotment the BLM is currently meeting the perennial grass height target. As grass height is an indicator considered in habitat suitability, it is not typically discussed in analysis directly, but thought the habitat suitability discussions which can be found in EA Section 3.3.1.3, with additional information added.

Comment 39: A lower utilization rate is more likely to support habitat objectives for vegetation height, cover and diversity in GRSG seasonal habitats. Range scientists have determined that stocking rate, rather than grazing system, is the primary factor affecting rangeland production (Briske et al. 2008; Holechek et al. 1998; Van Poolen and Lacey 1979). Reducing livestock utilization is recommended to support rangeland restoration (Van Poolen and Lacey 1979, defining light utilization as 20–40 percent utilization of annual forage production by weight; Holecheck et al. 1999, defining light-moderate utilization as 30–35 percent utilization). Holechek et al. (2010: 290), citing Gregg et al. (1994) and Sveum et al. (1998), noted that grazing must be kept at conservative levels (25 to 35 percent use) “for high nesting success by sage-grouse.” Braun (2006, unpublished) similarly recommended limiting grazing use to 25–30 percent utilization.

Response 39: Stocking rate is different from utilization. Stocking rate is the number of animals on a certain land area, over a certain period of time. Utilization is how much vegetation is removed from the site. Different stocking rates lead to different utilization levels. The BLM utilizes stocking rates in planning annual allotment grazing authorizations. The BLM utilizes monitoring, including utilization to adjust the stocking rate to ensure objectives are met. Grazing management is a combination of stocking rates, rotations, and utilization to best meet objectives. Proposed grazing within the Alvord AMP EA is designed to utilize all grazing management tools to meet objectives, based on scientific research. See EA Section 3.1 for more information on grazing management. France et al. (2008) found with utilization up to 40 percent, perennial grass plants in the interspaces between sagebrush plants were utilized and grass plants beneath the drip line of sagebrush were not utilized. After 40 percent utilization, use increased on plants under the drip line of sagebrush but was less than expected as utilization increased into the heavy to extreme category. Visual obstruction observations decreased by 5 percent with utilization increasing from 40 to 75 percent in the interspaces. Spreading canopy sagebrush, such as Wyoming big sagebrush which GRSG would be more likely to nest under, with branches closer to the ground decreases livestock grazing of under canopy grasses. Timing of grazing, grazing system, and utilization levels make a difference in rangeland production. Winter and spring grazing when native plants are dormant, allows livestock to remove dead material which if left ungrazed, may increase the probability that if fire occurs, plants would suffer mortality from increased heat from accumulated dead matter in the crown (Davies et al. 2018). By fall and early spring grazing when invasive annual grasses are greening up before perennial bunchgrasses start growth, livestock would target greener annual grasses which helps reduce growth and seed production of invasive annuals and allows perennial bunchgrasses to access available soil moisture that annuals may have used during their earlier growth. Long term moderate grazing (30-45 percent) has minimal effects to the structure of native bunchgrasses (Davies et al. 2018). Davies et al. (2016) also found that moderate pre-fire winter grazing reduced maximum temperatures and duration of elevated temperatures (heat loading) at the meristematic crown of perennial bunchgrasses during a fire due to decreased accumulated fuel load. In addition, AIM monitoring has found that current grazing, with a 50 percent utilization on native perennial grasses, has resulted in average grass height across the allotment exceeding the >7” objective identified as in indicator in the 2015 GRSG ARMPA. EA Section 3.1.1.1 has been updated with the above information.

Comment 40: The EA fails to adequately address or account for the contributions of livestock grazing to the spread of annual grasses in the planning area. Along with limiting grazing utilization to restorative levels, the Bureau must specifically describe how grazing would be managed in each alternative to avoid the continued incursion of cheatgrass in sagebrush steppe, and especially GRSG habitats.

Response 40: In EA Section 3.1.2, BLM acknowledges that livestock can be a vector for the spread of annual grasses but provides considerable detail as to why livestock grazing management in this allotment would "either be neutral or reduce the spread or dominance of annual invasive species". This section explains that there are multiple variables that contribute to the spread of invasive annual species, but 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.

Comment 41: There is a robust and growing scientific record on this subject (below) that is known to the Bureau, relevant to this EA, and certainly must be weighed against studies such as Perryman et al. (2020) (promoting repeated autumn grazing to reduce cheatgrass seed banks; EA at 36) and the potential of future weather patterns (citing Boyte et al. 2016; EA at 36) to affect cheatgrass cover in thirty years. Notably, the proposed grazing management in the EA would not support repeated deferred grazing to manage annual grasses as Perryman et al. recommend. Domestic Livestock Grazing Contributes to the Spread of Invasive Annual Grasses in Sagebrush Steppe Reisner et al. (2013) found that, even after controlling for other factors that may contribute to the spread of cheatgrass, there is a strong correlation between grazing effects and cheatgrass incursion (see also Reisner 2015). Cattle grazing increases cheatgrass dominance in sagebrush steppe...

Response 41: The Reisner studies that the commenter referenced are largely observational studies, designed to use models to establish a correlation between factors, mostly cheatgrass and livestock grazing. Observational, meaning they observe the direction one factor moves (increases, decreases, stays the same) if the other factor moves (increases, decreases, stays the same). The predominant themes of the papers cited are that if livestock grazing increases then cheatgrass increases, or if livestock grazing was decreased, cheatgrass would be less, whether directly or indirectly through mostly other vegetation driven variables. Because the studies are observational rather than experimental, they were not designed to establish the cause of cheatgrass as livestock grazing. Examination of the assumptions under the hypothesized mechanisms (list of variables) in many of the models presented by the papers generally appear to assume up front that livestock grazing would have a negative effect to desirable vegetation and biological soil crusts, which contradicts science used in the Vegetation (Section 3) of the EA. Furthermore, the studies are inconsistent with the scale of management being presented in the EA, either representing a very small percentage of the landscape examined, or where the areas observed are limited to those that livestock are most likely to use at a higher level (nearest to water), while downplaying the larger area contained within an allotment boundary that would not receive the same concentrated use. The BLM acknowledges in the EA (Section 3.1) that livestock use is higher near water sources and is more likely to have invasive species as a result of that disturbance, as with any disturbed area associated with multiple use. However, BLM also recognizes that that is on only a small percentage of the landscape it is charged with managing in the project area and that it does not represent livestock use across the pastures or allotments. The commenter did not describe how the excerpts were applicable to the EA that would help the analysis between alternatives, nor describe how the specific situation in the Alvord Allotment was applicable to the excerpts. The BLM has reviewed the literature and determined that they do not provide new information that would result in a substantial change in the analysis in the EA. BLM has added additional information about the impacts of livestock grazing exclusion in EA Section 3.1.1.

Comment 42: Bock et al. (2007: 233) similarly found that “livestock grazing facilitated the invasion [of exotic grasses] into native grasslands, such that the proportion of total grass cover consisting of exotics was 2.5-fold greater on grazed than on ungrazed areas 22 years after we began this study.” Their results demonstrated that livestock grazing served as an exogenous disturbance on the landscape in a manner that was more favorable to exotics than to most native southwestern grasses (Milchunas et al. 1988; Milchunas 2006; Bock et al. 2007). The latest research by Williamson et al. (2019: 12) further support these findings: “[o]ur results suggest a strong positive relation between the probability of presence and prevalence of cheatgrass and livestock grazing, particularly in unburned locations, where resistance to cheatgrass is greater than in burned locations.”

Response 42: The study area setting and weather, livestock grazing management, and invasive species considered between the Bock et al. 2007 study and the Alvord Allotment are very different. First, the study area is in a southeast Arizona short grass prairie, where the temperature regime (semi-desert) and precipitation pattern is monsoonal. These two factors influence the type of photosynthetic pathways grasses use to be successful and facilitates warm season grasses. The main forage grasses on the Alvord Allotment are cool season grasses and respond differently to livestock grazing. Monsoonal weather patterns of Arizona also create different growing season than the Alvord Allotment, with more precipitation and grass growth later into the summer in SE Arizona. The Bock et al. 2007 study focuses on Lehmann lovegrass and Boer lovegrass, which are unpalatable to livestock and were intentionally planted and invaded rangelands from the planted sites. Furthermore, the article claims that they "continue to spread regardless of the condition of the native grasslands they are replacing (Cox et al., 1988; Angell and McClaran, 2001)". The Bock et. al 2007 study does not indicate what the level of use (utilization) was in the studied pastures; both study sites varied in pasture size, class of livestock, and duration of use making a comparison of the effects of the grazing management proposed in the Alvord Allotment tenuous at best. Williamson et al. 2019 was conducted in the Great Basin in Nevada, at the sample points which were visited 3-6 times in a year. Data was collected whether grazing by domestic cattle had occurred or not (physical observations at the sample site of yes or no) and the author augmented those observations with whether grazing was permitted or not. All active allotments at the sample points were ultimately assumed to be grazed whether it was physically observed or not. Apparently, no information on the intensity (utilization level) of livestock grazing was collected or information from records used. The author acknowledges that the characterization of grazing includes uncertainty and that they did not consider livestock grazing intensity. This also makes comparing the results of the Williamson et al. study to the effects of the grazing management in the Alvord Allotment questionable, particularly when the Williamson et al. study appears to assume that management would "often" reduce native perennial bunchgrasses. Allowing a reduction in native perennial bunchgrasses is not being proposed in the Alvord AMP EA (refer to EA Sections 3.1.1.2 and 3.1.2.4), nor is it consistent with the Land Use Plan guiding livestock grazing management on the Alvord Allotment (See EA Appendix B). Allowable use limits or utilization levels (EA Table 5), measured by utilization on desirable perennial bunchgrasses would ensure desirable native and non-native vegetation are not being damaged in the long-term from livestock grazing and has been discussed in detail throughout EA Section 3.

Comment 43: The EA fails to both acknowledge and describe how grazing management would achieve a key management objective for annual grasses in the ARMPA: Objective VEG 3: “Reduce the area dominated by invasive annual grasses to no more than 5 percent within 4.0 miles” of all leks. “Manage vegetation to retain resistance to invasion where invasive annual grasses dominate less than 5 percent of the area within 4.0 miles of such leks.” BLM (2015) at 2-10.

Response 43: Objective VEG 3 in the ARMPA (2015) is an objective for our District, and we continue to work toward that goal through other projects such as spraying appropriate herbicides and ensuring proper livestock grazing management. Objective VEG 3 in the ARMPA (2015) is not an explicit purpose and need for the Alvord AMP. However, this objective in addressed indirectly through the proposed action within this EA, which is designed to maintain or improve perennial bunchgrasses. Having a healthy understory of perennial bunch grasses promotes resistance to annual grasses (EA Section 3.1). In addition, grazing when vegetation is dormant tends to increase use on annual invasive grasses, which further decreases their ability to spread (EA Section 3.1). For more information on how the proposed action and grazing management would impact annual grasses see EA section 3.1.

Comment 44: In dismissing Biological Soil Crusts as an Issue Considered but Not Fully Analyzed (EA at 132-135), the EA cites one reference indicating that soil crusts are not a major component of big sagebrush communities in the northern Great Basin (since post-dated by other science) and then proceeds to compare grazing and occurrence of soil crusts pre- and post-fire, which skirts the question of whether grazing effects on soil crusts contributes to the spread of invasive species regardless of whether an area has burned. In the same appendix, in also discharging Soils as an issue for further consideration in the EA, the draft does acknowledge that repeated “over-grazing” can kill perennial grass and biological soil crusts. EA at 144.

Response 44: In the great basin, when present, BSCs such as soil lichens are located in the interspaces while mosses are more commonly found under shrubs or trees (BLM TR-1730-2). Per Concostrina-Zubiri, et. al. (2014), 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. Loss has been shown to occur with increased stocking rates; however, most livestock travel two-three miles from any water source with the majority of their use located around water sources. While over-grazing can impact BSC, over-grazing (higher than the 50 percent limit) is localized around water developments and average utilization across a pasture must remain below the 50 percent utilization threshold on native perennial grasses. Grazing management in the Alvord AMP EA is designed to prevent over-grazing by applying utilization thresholds and responses (EA section 2.1.4). Additionally, there are a total of 118 water developments (wells, troughs, dugouts, reservoirs) within the Alvord allotment, 62 of those are located within in the Desert Pasture. Three of the existing wells in the Desert Pasture, are within the Alvord Desert ACEC and are no longer utilized. In addition, many of developments within the allotment, especially in the Table Mountain and Desert Pastures, are dependent on precipitation and are typically dry when livestock are turned out in the fall and winter. This means that at many of these developments are not used by livestock during the annual grazing period. Therefore, disturbance estimates below are expected to be an over-estimate.

Within the Alvord Allotment, the current areas with high disturbance[66] associated with water developments is approximately 495.6 acres (4.2 acres/development[67]); this is approximately 0.22 percent of the BLM-managed acres within the allotment. Within the Desert Pasture 260.4 acres show high disturbance around water developments which equals approximately 0.13 percent of the BLM-managed acres within the pasture. Adding 9 new troughs (two proposed troughs would replace existing ones located in the seedings which are assumed to be 100 percent disturbed for BSCs due to prior drill seeding) and 2 miles of new road would add approximately 42.7 new acres of disturbance to the Desert Pasture and the allotment (9 troughs * 4.2 acres=37.8 acres troughs; 12-foot-wide road + two 4-foot berms/ditches=20-foot wide disturbance times 2 miles (10,560 feet) = 4.9 acres). With proposed developments, disturbance from additional water developments could potentially increase total allotment disturbance due to water developments to 0.24 percent, and within the Desert Pasture it would be increase to 0.16 percent. If you make the assumption that each new trough would result in additional livestock trails, which would also have high disturbance to BSCs, it is still unlikely that disturbance within the allotment would exceed 1 percent of new disturbance to BSCs. Appendix C has been updated with additional information.

Comment 45: The Bureau, in multiple planning documents prepared as part of the National Greater Sage-Grouse Planning Strategy (BLM 2011), has acknowledged that livestock grazing can contribute to the spread of invasive plants (e.g., Buffalo DEIS, 2013: 306; Bighorn Basin DEIS, vol. 2, 2011: 4-146; Billings-Pompey's Pillar DEIS, 2013: 3-88; Miles City DEIS, vol. 1, 2013: 3- 77; South Dakota DEIS, 2013: 361; Oregon FEIS 2015: 4-34).

Response 45: The BLM, in the Alvord AMP EA does not argue the fact that livestock grazing can be a vector for the spread of invasive plants (EA Section 3.1 and Appendix C). However, the BLM has found that the spread of invasive weeds is largely related to improper grazing, which is not something that is proposed in the Alvord AMP EA. In addition, the BLM determines in the Alvord AMP EA that while livestock may be a vector for weed spread in the area, the removal of livestock would not measurably reduce the spread of invasive or noxious weeds nor would the reinstatement of suspended AUMs result in a measurably larger spread of invasive noxious weeds (EA Section 3.1).

Like the Alvord AMP EA, the Buffalo FEIS (2013) acknowledges that livestock grazing can contribute to the spread of invasives under certain scenarios, such as improper grazing, overuse of desirable forage grasses, and in areas of concentration such as watering sites. Also like the Alvord AMP EA, the Buffalo FEIS acknowledges that grazing can be used to reduce fine fuel load (in relations to fire) and under certain conditions reduce the spread of invasive grasses. Furthermore, they found that light to moderate grazing does not appear to affect perennial grasses (Buffalo FEIS page 1,320) and that literature suggests that moderate grazing is compatible with GRSG habitat (Buffalo FEIS page 1321).

The Bighorn Basin FEIS (2011) page 4-165 states: "Livestock grazing can cause both adverse and beneficial impacts to vegetation communities. Historically, overgrazing of native perennial grasses has contributed to the spread of nonnative annual grasses (DiTomaso 2000). However, proper grazing in grassland and shrubland communities does not adversely impact rangeland health, and may improve it in certain instances....Livestock grazing of noxious weeds at crucial points in their life-cycles can decrease the spread of invasive species. Proper livestock grazing management also increases a plant community's resistance to cheatgrass invasion after a disturbance such as wildland fire (Davies et al. 2009)."

Billings-Pompeys Pillar Nat'l Monument PRMP / FEIS (2013) says "Noxious weeds and invasive plant species are mostly associated with areas experiencing natural or manmade disturbances such as waterways, roads, recreational destinations, heavily utilized rangeland, pipelines, drilling pads, ROW, and livestock/wildlife paths and congregation areas" but goes on to say that they need to achieve Montana S&Gs. The Alvord Allotment is currently achieving S&Gs or livestock grazing has not been determined to be a causal factor. In addition, the BLM is proposing a grazing management system that would limit utilization within each pasture to utilization thresholds (EA Section 2.1.2). The Alvord EA (Section 3.1) has a large discussion on how heavy use can (and has) reduced ecological conditions, as well as a scientifically supported discussion on the affects and benefits of moderate grazing.

[66] Defined in this situation as areas where shrubs have been removed. These areas are expected to have minimal to no BSCs present.
[67] This number was determined by estimating the area around reliable year-long water in the Alvord Desert Allotment where shrubs appear to have been removed, using 2017 OSIP 1-foot imagery in GIS, and averaging them. Range of areas around the 12 reliable water sources was 0.6 – 16.3 acres.

South Dakota RMP FEIS (2013) Chapter 3 states that “Factors that affect invasive species include natural and anthropogenic pathways and disturbance mechanisms. Their ability to spread is not always associated with proximity to established infestations. Natural processes that contribute to the spread of invasive species include fire, flooding, ice scouring in streams, drought, wind, and wildlife. Construction activities (roads, wells, and pipelines), recreation, and agricultural uses also contribute to the spread of invasive species. These challenges require coordination across all of the BLM’s resource programs to develop, integrate, and implement aggressive management techniques and strategies for controlling the adverse impacts and the spread of invasive species in the planning area" and goes on to say that livestock grazing must achieve S&Gs. The Alvord AMP EA includes Thresholds and Responses (EA Section 2.1.3, Table 5), Terms & Conditions (EA Section 2.3.1), General Project Design Elements (EA Section 2.3.4.7), Required Design Features from the GRSG ARMPA (EA Section 2.3.4.8), and Best Management Practices from the GRSG ARMPA (EA Section 2.3.4.9) to ensure all resource programs are working together to address noxious and invasive weed concerns.

The BLM was unable to find an instance in the Miles City FEIS Vol. 1 Chapter 3 where it contributed the spread of invasives to proper livestock management.

Comment 46: Even targeted grazing management might only impede the spread of cheatgrass temporarily. “As populations of B. tectorum decrease in one generation, and in the absence of competition from native perennial plants, the remaining individuals tend to produce more seeds for the next generation compensating for temporary population reductions (Mack and Pyke 1983; Hempy Mayer and Pyke 2008)” (Pyke et al. 2016: 318-319). Moreover, “[s]eed banks in soil may not be impacted directly by grazing intensities (Clements et al. 2007); therefore, once Bromus becomes abundant within plant communities, their seed densities tend to dominate seed banks (Chambers et al. 2015)” (Pyke et al. 2016: 319).

Response 46: Hempy-Mayer and Pyke (2008) also say that “Mosley (1996) makes a strong case for using intensive sheep grazing as a method for controlling cheatgrass in rangelands. Other studies have considered the possibility of using sheep or cattle for this purpose (Booysen et al. 1963; Miller et al. 1994; Vallentine and Stevens 1994). There is strong qualitative and quantitative evidence that grazing could be effective in reducing the abundance of cheatgrass in the landscape (Daubenmire 1940; Finnerty and Klingman 1962; Mack and Pyke 1984; Pyke 1986, 1987; Tausch et al. 1994; Mosley 1996).” Their study also “indicated that a single defoliation of 2.5 cm at the P[urple] stage was also able to drastically reduce cheatgrass seed density. However, the purple stage would not be a recommended time for grazing. The large number of viable seeds produced during the purple stage creates a higher risk of dispersing viable seeds, particularly with livestock, because seeds disturbed at that time can dislodge and disperse” (Hempy-Mayer and Pyke 2008). The Alvord AMP EA largely proposed fall and winter grazing on the majority of the allotment. This use would occur after cheatgrass seeds in the purple stage entered the soil (often in May-July), and during the germination of cheatgrass (prior to it reaching the purple stage) (EA Section 2.3.3.2). Hempy-Mayer (2008) also found that “clipping to 7.6 cm (3 inches) in a cheatgrass-dominated area is not always adequate” for reducing a cheatgrass seedbank in preparation for restoration seeding, but that their “results are consistent with observational studies examining cheatgrass phenology and the use of prescribed grazing that generally recommend defoliating cheatgrass before its seed enters the soft ‘‘dough’’ stage to avoid viable seed production (Mosley 1996). Therefore, grazing treatments that defoliate cheatgrass multiple times before seed maturity begins at the P stage have the greatest potential for reducing cheatgrass populations.” This information supports the conclusions made in the EA that grazing can have positive impacts with respect to cheatgrass. This information has been added to EA Section 3.1) Currently, annual invasive grasses do not dominate within the allotment, and proposed grazing management is intended to prevent that dominance from occurring. Therefore, the point made that “’once Bromus becomes abundant within plant communities, their seed densities tend to dominate seed banks (Pyke et al. 2016: 319)” and the point that “’As populations of B. tectorum decrease in one generation, and in the absence of competition from native perennial plants, the remaining individuals tend to produce more seeds for the next generation compensating for temporary population reductions (Mack and Pyke 1983; Hempy Mayer and Pyke 2008)’ (Pyke et al. 2016: 318-319)”, while accurate, is not currently relevant to the Alvord Allotment as the allotment has a largely intact and healthy understory and is currently meeting relevant S&Gs (EA Section 1.1, Table 4).

Comment 47: Grazing system designs such as the Green-Brown grazing method (Smith et al. 2012), in which livestock graze when invasive annual grasses are green earlier in spring and native species are cured later in the year, have been proposed as a biocontrol for annual grasses to help shift dominance to native sagebrush steppe. The USDA has investigated this method and determined that "there are no published papers demonstrating success of this method for sagebrush steppe. In addition, if locations for targeted grazing are sage-grouse nesting or brood rearing habitat, then adequate perennial grass height for maintaining habitat guidelines may be required" (Pyke et al. 2017: 27). The USDA's recent review of best management strategies for preventing unnatural fire in the sagebrush steppe also noted that "[i]n general, improper livestock use, such as heavy grazing during the critical growth period…".

Response 47: While part of the principles of the Green-Brown Grazing Strategy overlap with what BLM is proposing, such as timing of perennial and annual grass phenological stages to when livestock grazing occurs and grazing invasive annual grasses when they are more palatable to livestock, the BLM is not proposing the Green-Brown Grazing Strategy. The important distinction is the Green-Brown strategy is "also known as time-controlled, short-duration, high-intensity grazing" (Smith et. al 2012 on page 1). The BLM is not proposing a high stocking rate (which would facilitate a short duration), or a high intensity grazing (including desirable perennial grasses) under any grazing alternative in the Alvord AMP EA (Section 2). The Green-Brown Strategy allows grazing to return to a pasture in the growing season if desirable perennial grasses have 10 or more inches of new growth. Similar to the Green-Brown Grazing Strategy the level of utilization on non-desirable invasive annual grasses is not limited; however, the BLM authorized allowable use on desirable native and non-native perennial grasses is limited to 50 percent and 60 percent respectively regardless of time of year; while the Green-Brown strategy does not suggest a utilization on these desirable species. The grazing proposed under the proposed action in the EA (Section 2.3.3.2) provides for critical growing season rest for desirable perennial grasses to allow them to complete their life cycle.

The BLM is assuming that the references to USDA and Pyke et al. 2017 the commenter has supplied are all part of the same document, BLM is referring to a USGS Circular 1426 because the language in the comment matches language within the circular. Circular 1426 suggests there are four types of targeted grazing, summarized; 1. Biological controls, 2. Fuel breaks, 3. Agent for weed control, and finally 4. Use to create plant community compositional changes. Under type four is the mention to the Green-Brown Grazing Strategy the commentor included. The Circular questions the use of the Green-Brown Grazing Strategy (which is a guide geared towards communicating basic principles to landowners) in the scientific literature but does not question the use of livestock to change plant community composition. The concepts of community composition, positive/neutral/negative effects in relationship to livestock grazing have been published extensively in foundational range research to more current studies. Several of these citations are in the EA Section 3. Proposed grazing to change community composition over time (favoring perennial vegetation such as tall perennial bunchgrasses or shrubs) is proposed in a way to maintain or increase perennial vegetation cover and would not reduce viability of GRSG nesting or brood rearing habitats areas.

Comment 48: The EA doesn't mention or identify measures to maintain habitat connectivity on the Alvord Allotment.

Response 48: The EA Section 3.3 has been updated with additional information on connectivity. Well and trough placement, along with the proposed road construction are the only proposed actions that would result in habitat removal under the proposed action (EA Section 2.3). The disturbance areas associated with these projects would be minimal (typically <1 acre but typically no more than 5 acres each) and would not result in habitat fragmentation, therefore connectivity for GRSG would not be affected. As very little human development occurs or is expected to occur within or adjacent to the Alvord allotment, the greatest threat of habitat loss resulting in reduced connectivity is wildfire. Threat Based Models (Johnson et al. 2019) in the area indicate wildfire is likely to result in conversion of areas currently infested with invasive annual grasses to an invasive annual grass dominated system with frequent fires resulting in further habitat loss. While grazing is not the only treatment option to reduce the risk of wildfires resulting from fine fuel loading within the Alvord Allotment, utilizing cattle to target these grasses during their winter green-up period reduces competition for native grasses, which typically both germinate and initiate their annual growth cycle after invasive annual grasses already occupy a large percentage of available soil space and have utilized available water in the soil (EA Section 3.1). In addition to utilizing grazing to target these invasive grasses, BLM is also plans to continue herbicide treatments targeting areas that become dominated with annual grasses to further reduce competition to native bunchgrasses and reduce the risk of large fires that would result in both habitat loss and large fire scars that would fragment habitat and result in a loss of connectivity between different populations as well as movement between seasonal habitats.

Comment 49: The proposed action should include specific directives to achieve water quality standards as rapidly as possible—including removal of cattle from damaged stream and riparian areas. See also USDA et al. (2014).

Response 49: As explained in the EA (Section 1.1) failure to achieve water quality standards was due to exceeding ODEQ's 68˚F seven-day-average maximum temperature (EA Table 4). This table also explains that repeat wildfires within these creeks resulted in the lack of a mature age class of shading woody species, and the expected cause of temperature exceedance. Riparian woody species use by cattle was shown to be minimal and monitoring shows an upward trend in vegetation community structure. Cattle were not a causal factor in this standard not being achieved. The fundamentals of rangeland health stated in 43 CFR 4180 include: "Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established Bureau of Land Management objectives...". 43 CFR 4180.2(c) states, "If the authorized officer determines through standards assessment and monitoring that existing grazing management practices or levels of grazing use on public lands are significant factors in failing to achieve the standards and conform with the guidelines that are made effective under this section, the authorized officer will ... formulate, propose, and analyze appropriate action to address the failure to meet standards or to conform to the guidelines." In this case, livestock are not a causal factor for non-achievement and therefore no changes in grazing management are warranted. Several terms and conditions for the continued protection of riparian and water quality are included in the proposed action of the Alvord AMP EA (Sections 2.1 and 2.3).

Comment 50: The EA indicates that streams within the project area are on Oregon DEQ's 303(d) list (water quality-limited waters). In order to comply with its water quality mandates, the Bureau must provide for more concrete compliance with water quality standards. Before the Bureau decides to do anything that will increase sedimentation, the agency must know how much the stream(s) can carry away. Without a baseline, there is no way but speculation to determine how the sediment impacts water quality, adversely or beneficially. A decision to carry out this project in watersheds with already compromised streams, without knowing the exact condition and capacity to cope of those streams, would be unsupported otherwise.

Response 50: The current water quality EPA Approved Integrated Report (2020) names the area covered by this AMP EA as the Mosquito Creek - Frontal Alvord Desert. This area is indicated as being water quality impaired by "Temperature - Year Round" with a category of 4a (already has an EPA-approved TMDL plan in place and implemented). Baseline stream temperature data is included in the EA (EA Section 3.2.1 Table 20). The current ODEQ 303(d) list does not state that sediment is a contributing factor to water quality impairment in the area covered by this AMP. Furthermore, direct measurements of livestock streambank alteration on Willow and Little Alvord creeks were taken in 2017 following the MIM (TR 1737-23) protocol and bank alteration was only at 1 percent, indicating that cattle are not a significant source of sediment.

Comment 51: The Alvord Lake Total Maximum Daily Load ("TMDL") has a number of shortcomings that the Bureau must address in this NEPA review.

Response 51: The federal Clean Water Act requires states, or the U.S. Environmental Protection Agency, to develop a TMDL for each water body on the state's polluted waters list, also known as the 303(d) list (Integrated Report). According to the Oregon Department of Environmental Quality TMDL website (https://www.oregon.gov/deq/wq/tmdls/Pages/default.aspx), "TMDL development and implementation is a public process. That means we work to keep people informed and to consider their concerns and ideas. DEQ establishes a local advisory group to provide information and feedback on the TMDL during development. We coordinate with local and tribal governments and we incorporate environmental justice practices to make participation as open and accessible as possible. Community members and organizations can participate in TMDL project development and implementation in a number of ways. We strive to include local input as we plan and carry out TMDL projects. In addition, we have a formal public comment period where anyone can provide comments. DEQ develops a response to comment document that is available to the public." Oregon Department of

Environmental Quality should be contacted for concerns related to the Alvord TMDL. Changes to that report are outside the scope of the Alvord AMP EA.

Comment 52: We now can use U.S. EPA emission factors for greenhouse gas emissions and sinks. In the 2019 report, Kauffman relied on IPCC default values. The EPA values are specific for the western USA and even Oregon. The EPA notes that "[c]attle, due to their large population, large size, and particular digestive characteristics, account for the majority of enteric fermentation CH_4 emissions from livestock in the United States. A more detailed methodology (i.e., IPCC Tier 2) was therefore applied to estimate emissions for all cattle." GHG Inventory at 5-5. While Dr. Kauffman relied upon general numbers in his 2019 report, applying these new Tier 2 numbers makes a significant difference in the calculations. All of these changes provide a more detailed and accurate estimate of the greenhouse gas emissions from range cattle. The average emissions from cattle reported in the 2019 report were 185 kg CO_2/AUM. The updated calculations show this was a dramatic underestimate in greenhouse gas emissions. Based upon USA1203 specific data for beef cattle from the EPA, and using a 15-year GWP, the emission factor for range cattle on public lands is 875 kg/AUM. This is a social carbon cost that is $35– 45/AUM. See Tables 1 & 2.

Response 52: Based on your comment, the BLM reached out to April Laytem, a contributing author of Ch. 10 in the 2019 IPCC document for assistance with emissions calculations. The BLM had added calculations from the 2019 IPCC report and additional information in EA Appendix C Greenhouse Gas Emissions and Climate Change. Calculations found that total metric tons of CO_2 equivalent is less than 2,500 for the proposed action, which is below the reporting threshold of 25,000 metric tons of carbon dioxide equivalent for several industrial and agricultural sectors (40 CFR 98.2). An excel sheet showing full calculations will be included in the project record.

Comment 53: The ODFW recommend riparian exclosures on streams inhabited by LCT with water gaps for cattle or solar wells to provide access for cattle. The ODFW staff understand that this may not be acceptable due to GRSG concerns and recommend an alternative condition to actively move cows out of the riparian area during the 'graze' portion on these allotments. The purpose for this is to enhance and quicken the pace of the establishment of riparian vegetation with height to shade streams. The ODFW staff believe the establishment of riparian habitat with height will ameliorate stream temperatures as occurs in the Trout Creek Mountains, thus helping meet Standard 4 and possibly standard 5. It will also reduce bank compaction, sloughing and sedimentation that affect LCT habitat that lead to increased stream channel width, shallow water depths, increased stream temperatures and sediment addition reducing spawning habitat.

Response 53: During Proper Functioning Condition assessments conducted in 2021, BLM found that woody riparian vegetation was well established on the banks throughout all of the LCT containing streams within the Alvord Allotment and had more than adequate heights to provide cooling shade. Very little bank alteration was found and sloughing and sedimentation from cattle trampling was considered very minor. Recently observed riparian condition indicates that current grazing practices are not a likely cause for any failures to meet temperature standards on these streams. Please see representative photos of LCT creeks taken during the latest PFC assessments (EA Appendix H) and EA Section 3.2 for additional information.

Comment 54: The rational for meeting water quality standards for both North Foothills and South Foothills contains language that references Pike Creek and not the streams that flow through them. Do the streams within these allotments achieve water quality standards as well?

Response 54: BLM has updated EA Section 3.2 to include more recent information, including a table with most current stream temperature data for all LCT containing streams to the EA (EA Section 3.2.1 Table 20). Most recent monitoring indicates that only Cottonwood Creek and the lower elevation of Willow Creek were not meeting the temperature standard of 72° F, found to be optimal for LCT (Coffin and Cowan 1995). Of note on Cottonwood Creek, the portion of stream on BLM land is mostly within a bedrock bottomed valley, there is limited potential for shading riparian vegetation within this portion of the creek, grazing is not a casual factor for lack of shading vegetation and associated increased temperatures within Cottonwood Creek.

Comment 55: The longer permitted season of use under Alternative B would allow for improved grazing management of the Pike Creek and Indian Creek pastures by allowing grazing to occur later in the year after snow drifts and frequent spring storms, which currently prevent livestock from accessing and grazing this high up on the mountain. However, the [USFW]Service is concerned about the potential negative impacts to LCT under this Alternative, specifically the impacts associated with extended grazing treatments in the Indian Creek pasture. In addition, the change of Indian Creek into a summer-use pasture could potentially introduce more intensive grazing use of riparian areas in the higher elevations of Pike Creek. Although the current management of the pastures has proven successful in maintenance and restoration of riparian vegetation and stream habitat, the proposed timing of use corresponds to LCT spawning and the Service is concerned about the potential for cattle disturbance in spawning areas.

Response 55: Recent monitoring visits in Alvord Allotment found that dense cottonwood and willow dominates the majority of the stream banks on these LCT streams, and the substrate mostly consists of larger cobbles and boulders (See EA Appendix H). The limited access to the stream due to dense woody vegetation, combined with the cobble and boulder dominated substrate, greatly limits the ability of cattle to access and move within the stream channel. This is supported by recent MIM data that found bank alteration at only 1 percent on these streams. Indian Creek pasture does not contain any streams with LCT present, though there is the potential for cattle to drift into the headwater portion of Pike Creek from the Indian Creek pasture. Channel topography, steep valley slopes, and dense woody vegetation would prevent cattle from moving downstream. Also of note is that the upper portion of Pike Creek, where cattle can potentially access from the Indian Creek pasture, was dry in the late summer of 2021, providing no habitat for LCT at that time and decreasing the likelihood of cattle drifting into Pike Creek. Furthermore, monitoring for cattle in Pike Creek would be conducted regularly when they are present in those pastures (EA Section 2.1) and terms and conditions are present to ensure the permittee is aware of their responsibilities and the thresholds and responses associated with grazing in Indian Creek (EA Section 2.3), reducing the potential for disturbance. Any livestock found in the Pike Creek Allotment outside of the proposed terms and conditions would be in trespass and would be treated as such.

Comment 56: Under Alternative B, negative effects to migratory bird habitat would be expected. The proposed season of use changes in the Alvord Allotment would allow grazing during the nesting season for migratory birds (April 15-July 15) and could result in negative impacts to ground and low-shrub nesting birds since these areas were not grazed (regularly) during this period before. In addition, late-season use of GRSG (*Centrocercus urophasianus*) habitat would decrease residual cover the following spring and may reduce nest success in areas used by GRSG for nesting. The [USFW]Service recommends grazing strategies that promote vegetation that supports migratory bird habitat and GRSG nesting, brood-rearing, and winter habitats including maintenance or recovery of shrub and herbaceous (native grasses and forbs) cover. We recommend strategies that retain residual cover adequate to conceal GRSG nests and broods from predation, and plant communities that provide a diversity of plant and insect food sources.

Response 56: Breeding bird surveys conducted in the vicinity of the allotment show a stable trend in species richness and abundance with changes to species composition occurring in response to wildfires and subsequent increase in species favoring grassland habitats and a corresponding decrease in shrubland adapted species (Sauer et al. 2017) (EA Section 3.3). EA Section 3.3.2.4 describes potential negative impacts to migratory birds. However, proposed range management changes, including temporary use or permanent suspension of AUMs, would not increase overall utilization above what is currently authorized; therefore, the effects of forage consumption by cattle to migratory bird habitat would be the same as current grazing practices. This is especially true in years when full suspended use was used as NR AUMs. Proposed grazing management in the North Foothills, South Foothills, Pike Creek, and Table Mountain pastures is similar to that which is currently occurring. Therefore, the BLM expects migratory bird populations and use to remain the same in those pastures. Changes in grazing management are proposed for the Alvord Seeding Pasture, which would include a graze treatment in two out of three years. For the largest pasture, Desert #6 a graze treatment would be added every first and third year of the grazing rotation. In the second year of the grazing rotation, livestock may be present during the nesting season. Pastures where proposed season of use changes would allow grazing during the nesting season for migratory birds (April 15–July 15) could result in impacts to ground and low shrub nesting birds since these areas were not grazed (regularly) during this period before. These potential impacts are described in EA Section 3.3.2.4). Late-season use of identified GRSG habitat would decrease residual cover the following spring and may reduce nest success in areas used by GRSG for nesting. However, since utilization levels would remain at or below the target level of 50 percent under each grazing alternative, which would leave residual vegetation for forage and nesting cover, it is expected that nest success would not measurably change from current success rates within the allotment (EA Section 3.3.2.4). Improved distribution and utilization of invasive annual grasses and fine fuels would be beneficial to wildlife and reduce the potential for large wildfire and subsequent habitat loss that could alter plant communities and ecological function within and adjacent to the fire area for the foreseeable future and result in habitat loss for GRSG and other wildlife (EA Section 3.3.2.4). The proposed action utilizes grazing strategies that would promote vegetation in the long-run and continue to achieve S&Gs (EA Section 3.1). Healthy ecological systems and vegetation supports livestock and wildlife, including migratory birds, GRSG nesting, brood-rearing, and winter habitats, and provide a diversity of plant and insect food sources. Utilization thresholds are proposed to ensure that residual cover adequate to conceal GRSG nests and broods from predation is retained (EA Section 2.1). Analysis in the EA Section 3.3.2.4 found that potential impact to migratory birds and GRSG from grazing would be minimal and offset by improved grazing management within the allotment and the associated ecological benefits, including the improvement in distribution and the reduction of risk of catastrophic wildfire.

Comment 57: In section 3.3.1.3, the BLM discusses potential impacts to GRSG. The [USFW]Service encourages you to reach out to the Oregon Department of Fish and Wildlife when planning management actions to ensure that the actions taken will provide the intended benefits to GRSG populations.

Response 57: The ODFW was provided a copy of the EA and provided comments on the document and the proposed actions. BLM has considered and responded to all ODFW comments and incorporated their recommendations as appropriate. The BLM will continue to coordinate with ODFW on actions related to GRSG and other wildlife.

Comment 58: The [USFW]Service recommends that the BLM develop specific monitoring objectives (EA Section 2.1.2) for all pastures containing streams with LCT to protect riparian habitats and provide the best protection of occupied LCT habitat within the Alvord Allotment.

Response 58: The BLM had developed specific monitoring thresholds and responses for all pastures containing streams with LCT (EA Section 2.1). Aquatic AIM reaches have been established on all streams that contain LCT within the Alvord Allotment. A MIM reach was established on Little McCoy Creek on the Mann Lake Allotment. MIM reaches have also been established on Little Alvord and Willow Creeks on the Alvord Allotment, providing representative monitoring sites on both the North Foothills and South Foothills pastures, where use is rotated between the two pastures. Monitoring is planned to take place on all LCT containing streams when cattle are present, with rotated monitoring on the Alvord Allotment pastures. The following monitoring objectives have been added to the EA (Section 2.1): 1) Utilize monitoring to document the condition and direction of change (trend) of stream habitat and riparian areas. 2) Utilize monitoring to determine whether management practices are effective in maintaining or improving the structure and function of riparian habitat. 3) Change grazing management as needed to achieve management goals on occupied LCT habitat.

Comment 59: On page 67, the EA describes a proposed right-of-way improvement to construct a motor vehicle crossing (hardened-rock ford or bridge spanner) and parking area for the Pike Creek trailhead. The [USFW]Service recognizes a full analysis under the National Environmental Policy Act would be completed for the proposed Pike Creek Parking EA prior to actions being taken related to improvements on the stream crossing; however, this project has the potential to impact LCT habitat downstream (0.7 of 3.0 miles) from the crossing, through increased fine sediment input from the construction process, flow from the graveled parking area, and vehicle use of the hardened crossing. Construction and use of the crossing may also cause incidental take of LCT.

Response 59: The proposed right-of-way development project on Pike Creek is outside the scope of this EA. Considerations of sediment input and incidental take on LCT associated with construction of the stream crossing, parking area, and motor vehicle use would be addressed for that specific project proposal. The BLM will consult with the USFWS separately on this topic as appropriate.

13 APPENDIX H: RIPARIAN CONDITION PHOTOS

Figure 6: Representative photo of Pike Creek – October 2021

Figure 7: Representative photo of Big Alvord Creek – September 2021


Figure 8:Representative photo of Little Alvord Creek – September 2021

Figure 9:Representative photo of Cottonwood Creek – September 2021

Figure 10:Representative photo of Willow Creek – September 2021


Figure 11:Representative photo of Mosquito Creek – September 2021

Figure 12: Representative photo of Little McCoy Creek – September 2021