United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-B050-2016-0008-EA

Sage Creek Watershed Environmental Assessment

June 7, 2016

Mayberry and Sage Creek Allotments, July 2015

U.S. Department of the Interior
Bureau of Land Management
Dillon Field Office
1005 Selway Drive
Dillon, Montana 59725
Phone: (406) 683-8000
Fax: (406) 683-8066

Table of Contents

List of Tables ii
List of Figures iii

1.0 Purpose of and Need for the Proposed Action 1

1.1 Introduction and Background 1
1.2 Purpose and Need... 2
1.3 Issues..... 5
1.4 Scope of this Environmental Analysis – Scope, Plan Conformance, Critical Elements, and Issues.... 13
1.5 Decisions to be Made..... 15
1.6 Applicable Legal and Regulatory Requirements..... 15
1.7 Coordination Requirements..... 16

2.0 Description of Alternatives 17

2.1 Process Used to Formulate Alternatives 17
2.2 Alternatives Considered but Eliminated from Further Analysis 17
2.3 Description of Alternatives 20
2.3.1 Features Common to All Alternatives, Including the No Action 20
2.3.2 Description of Alternative A - No Action 24
2.3.3 Features Common to All Action Alternatives 26
2.3.4 Description of Alternative B 31
2.3.5 Description of Alternative C 42
2.4 Summary Comparison of Alternative Actions 47

3.0 Affected Environment 52

3.1 General Setting 52
3.2 Description of Affected Key Issues/Resource Concerns 53
3.2.1 Issue #1: Riparian, Wetland, and Aquatic Habitat 53
3.2.2 Issue #2: Upland and Sagebrush Steppe Habitat 63
3.2.3 Issue #3: Recreation and Travel Management 69
3.2.4 Resource Concern #1: Special Status Species Habitat 69
3.2.5 Resource Concern #2: Forest, Woodland and Priority Species Habitat..... 79
3.2.6 Resource Concern #3: Noxious and Invasive Species..... 81
3.2.7 Resource Concern #4: Wilderness Characteristics and Wilderness Study Area 82
3.2.8 Resource Concern #5: Socioeconomics 84
3.2.9 Resource Concern #6: Cultural and Paleontological Resources 86
3.2.10 Resource Concern #7: Visual Resources Management 86
3.3 Description of Relevant Non-Affected Resources 87
3.3.1 Air Quality 87
3.3.2 Climate Change 87

4.0 Environmental Consequences 90

4.1 Introduction 90
4.2 Predicted Effects of Alternatives 91
4.2.1 Predicted Effects Common to All Alternatives, Including the No Action 91
4.2.2 Predicted Effects of Alternative A-No Action 97
4.2.3 Predicted Effects Common to All Action Alternatives 100
4.2.4 Predicted Effects of Action Alternatives B and C by Grazing Allotment 113
4.2.5 Predicted Effects of Aspen Protection/Restoration Treatment 126
4.2.6 Predicted Effects of Recreation and Travel Management Alternatives B and C 130
4.2.7 Comparative Effects for All Alternatives by Issue or Resource Concern 131
4.3 Cumulative Effects for All Alternatives 142

5.0 List of Preparers - Consultation/Coordination 154

5.1 List of Preparers 154
5.2 Consultation/Coordination 154
5.3 Glossary of Terms 155
5.4 References 159

Appendices

Appendix A- Sage Creek Watershed Maps #1-14 170
Appendix B- Sage Creek Watershed Monitoring Plan 171
Appendix C- Sage Creek Watershed Biological Evaluation for Special Status Fish and Wildlife Species 172
Appendix D- Sage Creek Watershed Biological Evaluation for Special Status Plants 173
Appendix E- Dominant Native Grasses in Sage Creek Watershed 174

Tables

1.1 Determination of Standards by Allotment 3
1.2 Critical Elements of the Human Environment 14
2.1. Livestock Grazing Allocations and Management Within the Sage Creek Watershed 25
2.2 Current Authorized Use for Armstead Mountain and Gallagher Mountain AMP 33
2.3 Proposed Authorized Use for Armstead Mountain and Gallagher Mountain AMP 33
2.4 Current Authorized Use for Bull Heifer Creek Allotment 34
2.5 Proposed Authorized Use for Bull Heifer Creek Allotment 34
2.6 Current Authorized Use for Dell Allotment 34
2.7 Proposed Authorized Use for Dell Allotment 35
2.8 Current Authorized Use for Huntsman Allotment 35
2.9 Proposed Authorized Use for Huntsman Allotment 35
2.10 Current Authorized Use for Knox Allotment 36
2.11 Proposed Authorized Use for Knox Allotment 36
2.12 Proposed Authorized Use for Knox Allotment 36
2.13 Current Authorized Use for Mayberry Allotment 37
2.14 Proposed Authorized Use for Mayberry Allotment 37
2.15 Current Authorized Use for Red Butte Allotment 37

2.16 Proposed Authorized Use for Red Butte Allotment 37
2.17 Current Authorized Use for Red Butte SE Allotment 38
2.18 Proposed Authorized Use for Red Butte SE Allotment.....38
2.19 Current Authorized Use for Sage Creek Allotment.....39
2.20 Proposed Authorized Use for Sage Creek Allotment 39
2.21 Current Authorized Use for Tallent Allotment.....40
2.22 Proposed Authorized Use for Tallent Allotment 40
2.23 Aspen Protection/Restoration Treatments, Alternative B.....41
2.24 Current Authorized Use for Armstead Mountain and Gallagher Mountain AMP.....43
2.25 Proposed Authorized Use for Armstead Mountain and Gallagher Mountain AMP, Alternative C.....43
2.26 Current Authorized Use for Dell Allotment 44
2.27 Proposed Authorized Use for Dell Allotment, Alternative C 44
2.28 Current Authorized Use for Knox Allotment 44
2.29 Proposed Authorized Use for Knox Allotment, Alternative C 44
2.30 Proposed Authorized Use for Knox Allotment, Alternative C 45
2.31 Current Authorized Use for Mayberry Allotment 45
2.32 Proposed Authorized Use for Mayberry Allotment, Alternative C 45
2.33 Aspen Protection/Restoration Treatments, Alternative C.....46
2.34 Comparison of Proposed Livestock Grazing or Administrative Alternatives 47
2.35 Comparison of Aspen Protection/Restoration Treatments.....51
2.36 Comparison Travel Management Actions by Alternative 51
3.1 Functional Status of Lotic and Lentic Reaches within the Sage Creek Watershed 57
3.2 Developed Springs.....61
3.3 Sage Creek Watershed Fish Streams and Species 62
3.4 Average Monthly Precipitation (inches).....64
3.5 General Cover Types 65
3.6 Pool Frequency, Depth and Stream Bed Particle Size.....75
3.7 Sage Creek Stream Temperature Data.....78
4.1 Summary of Proposed Projects on All Grazing Allotments by Action Alternative 111
4.2 Comparative Effects for Issue #1: Riparian, Wetlands and Aquatic Habitat 131
4.3 Comparative Effects for Issue #2: Upland Habitat.....134
4.4 Comparative Effects for Issue #3: Recreation and Travel Management 136
4.5 Comparative Effects for Resource Concern #1: Special Status Species Habitat.....136
4.6 Comparative Effects for Resource Concern #2: Forest, Woodland, and Priority Species Habitat (Aspen Protection/Restoration Treatments).....141
4.7 Comparative Effects for Resource Concern #3: Noxious and Invasive Species 141
4.8 Comparative Effects for Resource Concern #5: Socioeconomics 142
4.9 Comparative Effects for Resource Concern #6: Cultural and Paleontological Resources 142
4.10 Comparative Effects for Resource Concern #7: Visual Resource Management 142

Figures

2.1 Mussigbrod Aspen Browse Barrier Photo, October, 2006 41
2.2 Mussigbrod Aspen Browse Barrier Photo, August, 2009.....41
3.1 Percent of Sage Creek Watershed Lotic Reach Miles Meeting/Not Meeting Standards in 2005 Compared to 2015.....56

3.2 Sage Creek Lotic Reaches by PFC Functional Rating, 2015.....56
3.3 Sage Creek Lentic Reaches by PFC Functional Rating, 2015.....57
3.4 Gallagher Mountain AMP Photo Point 10S09W2301, Chemically Sprayed in 1969 68

Chapter 1

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction and Background

The Sage Creek Watershed (SCW) is located in southeastern Beaverhead County, Montana on the eastern slopes of the Rocky Mountains. The watershed lies in Townships 10-13 South, Ranges 6-10 West Montana Principal Meridian (M.P.M). The assessment area covers public lands administered by the BLM from approximately I-15 on the west side of the watershed to the top of the Blacktail Range on the east and from Clover Divide on the south to the Blacktail Range on the north. The SCW roughly corresponds to the 5th level Hydrologic Unit (HU) also known as Sage Creek (1002000106) used by Montana Department of Environmental Quality (DEQ). A portion of Armstead Mountain allotment is located west of I-15. While the majority of the assessment area includes public lands within the Sage Creek HU, portions of other HUs are also included. The assessment area boundary shown on Map 1 follows grazing allotment boundaries and includes some allotments that are partially outside the watershed.

The Gallagher Mountain AMP grazing allotment is located in the Beaverhead West Watershed which borders the Sage Creek Watershed on its northern boundary (See Map 1). Due to the rugged topography of the Gallagher Mountain AMP allotment, the three southern most pastures (Sheep Canyon, Sage Creek and Divide Creek), which have a combined total of 4,756 acres of BLM administered lands, are geographically separated from the other Gallagher Mountain AMP pastures and are conveniently located near grazing pastures in the Armstead Mountain-allotment. The Armstead Mountain allotment is located in the SCW. The Gallagher Mountain AMP and the Armstead Mountain allotments have the same BLM grazing permittee. In this EA, the permittee and the BLM will be proposing to include the three pastures in the Gallagher Mountain AMP allotment (Sheep Canyon, Sage Creek and Divide Creek) into the Armstead Mountain allotment to improve the administration of both allotments.

Within the Sage Creek Watershed Assessment area boundary, there are approximately 203,628 acres of which the BLM administers 114,475 acres. This report addresses only public lands administered by the BLM within the watershed. However, approximately 41,312 acres administered by the State of Montana Department of Natural Resources (DNRC) and 47,842 acres of privately owned lands also occur within the watershed assessment area.

In 2015, a BLM interdisciplinary (ID) team assessed the land health of BLM administered land in the Sage Creek Watershed. The ID team assessed the following 5 Rangeland (Land) Health Standards: Upland Health, Riparian Health, Water Quality, Air Quality, and providing for Biodiversity. The Watershed Assessment reported the condition/function of resources within the assessment area to the Authorized Officer. The Authorized Officer considered the Assessment Report to determine whether Land Health Standards (Standards) were met, and then signed a Determination of Standards documenting where Standards were or were not met. The Assessment Report was completed and released to the public in December, 2015 and is available at the Dillon Field Office.

Condition/function declarations regarding the Standards are made as either:

- Proper Functioning Condition (PFC),
- Functioning At Risk (FAR); which is assigned a trend of up, down, static, or not apparent, or
- Nonfunctioning (NF).

Land Health Standards are met when conditions across an allotment as a whole are at PFC or FAR with an upward trend. This is dependent on scope and scale and determined by the Authorized Officer. The Determination of Standards has been completed and is being mailed to the public along with this EA.

The assessed condition/function and recommendations in the Assessment Report and Determination of Standards, along with comments received through public scoping have been used to develop alternatives to initiate progress towards Proper Functioning Condition and address site specific resource concerns where needed. This EA was completed in accordance with established procedures to analyze and implement area, allotment or site specific management changes.

By working on a watershed basis, a broader landscape is considered and more consistent management can be applied. It is the BLM's intent to implement watershed management cooperatively. Any changes in livestock management will be implemented through grazing decisions that address allotments or groups of allotments with a common permittee. Wildlife and fisheries habitat management and vegetative treatments or projects will be implemented through Decisions appropriate for the respective programs.

The Amended Dillon Field Office's Resource Management Plan (RMP) approved in 2006 provides guidance for all programs in the Dillon Field Office.

1.2 Purpose and Need

The purpose of this EA is to improve land health and enhance biodiversity while maintaining the BLM's multiple use mandate by:

- Restoring, improving and/or maintaining riparian, wetland and aquatic health through revised livestock grazing management, construction and/or maintenance of structural projects, road maintenance and stream crossing improvement and/or implementing vegetative treatments.
- Maintaining and/or enhancing upland health including sagebrush steppe habitat (species composition and structure) through revised livestock grazing management, construction, maintenance or modification of structural projects, and/or vegetation treatments.
- Restoring and/or maintaining historic density, structure, and species composition of forest and woodland habitats through mechanical and chemical treatments, and/or prescribed fire.
- Eradicating new and containing/controlling existing noxious weed and invasive species infestations as well as preventing the spread of noxious and invasive species.

- Mitigating resource impacts from recreational activities while providing access to public lands through modifications to motorized travel route designations.

Additionally the purpose is for the BLM to renew term grazing permits/leases as mandated by legislation from the Taylor Grazing Act of 1934 and the Federal Land Management and Policy Act of 1976.

The need for the actions proposed in this EA is in direct response to land health condition/function and recommendations identified in the SCW Assessment Report. In that document, the IDT described several causal factors, which, when combined, negatively impact the biological, physical, and/or ecological processes within specific areas or allotments within the watershed. As a result, the Authorized Officer determined that one or more of the Standards are not met in 5 of the 22 grazing allotments.

The Fundamentals of Rangeland Health and Land Health Standards require the BLM to initiate management actions that ensure, "Watersheds are in, or are making significant progress toward, properly functioning condition, including their upland, riparian-wetland, and aquatic components…," if an assessment determines that one or more of the Land Health Standards are not being met (43 CFR 4180.1(a)).

Table 1.1 Determination of Standards by Allotment

Allotment Name Number Category & BLM acres	**Are Healthy Rangelands Standards Being Met?**				
	Upland	**Riparian Wetland**	**[1]Water Quality**	**Air Quality**	**Bio-diversity**
Armstead Mtn. & Upper Sage # 30008 (I) Acres: 25,729	Yes	Yes	1	Yes	Yes
Big Spring Gulch #10129 (M) Acres: 4,607	Yes	N/A	N/A	Yes	Yes
Bull Heifer Creek # 10137 (M) Acres: 1,134	Yes	Yes	1	Yes	Yes
Crooked Creek AMP # 30010 (M) Acres: 2,346	Yes	N/A	N/A	Yes	Yes
Dell # 20620 (C) Acres: 40	No	N/A	N/A	Yes	No
Gallagher Mtn AMP #30013 (I) Acres: 4,755	Yes	No	1	Yes	Yes
Huntsman # 10123(M) Acres: 1,650	Yes	N/A	N/A	Yes	Yes
Kent-Price Canyon #10138 (I) Acres: 1,031	Yes	Yes	1	Yes	Yes

Allotment Name Number Category & BLM acres	Are Healthy Rangelands Standards Being Met?				
	Upland	Riparian Wetland	[1]Water Quality	Air Quality	Bio-diversity
Knox #10136 (I) Acres:6,710	Yes	Yes	1	Yes	Yes
Knox-Non AMP #10624 (C) Acres: 45	Yes	Yes	1	Yes	Yes
Little Spring SGC #20604 (M) Acres: 1,603	Yes	Yes	1	Yes	Yes
Long Creek # 20178 (C) Acres: 1,194	Yes	Yes	1	Yes	Yes
Mayberry #10143 (I) Acres: 10,886	Yes	No	1	Yes	Yes
Mosman AMP # 30011 (M) Acres: 3,530	Yes	N/A	N/A	Yes	Yes
Railroad # 20175 (C) Acres: 902	Yes	N/A	N/A	Yes	Yes
Red Butte #20630 (C) Acres:40	No	N/A	N/A	Yes	No
Red Butte SE # 30615 (C) Acres: 275	No	N/A	N/A	Yes	Yes
Sage Creek AMP #30012 (I) Acres: 42,268	Yes	Yes	1	Yes	Yes
Stanford # 20717 (C) Acres: 320	Yes	N/A	N/A	Yes	Yes
Tallent AMP # 20027 (M) Acres: 3,223	Yes	Yes	1	Yes	Yes
Welborn-Dell # 20714 (M) Acres: 1,516	Yes	N/A	N/A	Yes	Yes
Wolfe #10703 (I) Acres: 640	Yes	N/A	N/A	Yes	Yes

[1] The United States Environmental Protection Agency (EPA) and the State of Montana Department of Environmental Quality (DEQ) have divided the Red Rock Watershed for purposes of assessment and development of Water Quality Restoration Plans into the Upper and Lower Red Rock. Sage Creek Watershed is located in the Lower Red Rock Watershed. This assessment has not been initiated and little information is available regarding beneficial use support provided by Red Rock streams. The BLM and the State of Montana have detailed how they will cooperate in the assessment and planning process through a formalized Memorandum of Understanding.

The Authorized Officer determined that livestock grazing impacts are contributing to one or more of the Standards not being met in five grazing allotments. Pursuant to 43 CFR 4180.2(c),

livestock-caused failure to meet any of the Standards mandates the BLM to change the terms and conditions of the grazing permit/lease for the applicable grazing allotment prior to the next grazing season and implement actions that will result in significant progress toward fulfillment of the Standards. Further, BLM guidance stipulates that if other actions are necessary and cannot be implemented before the next grazing season interim adjustments will be made prior to the next grazing season and a schedule for final changes must be developed and documented (H-4180-1). Allotments requiring livestock management changes to address specific resource concerns are: Dell, Gallagher Mountain AMP, Mayberry, Red Butte, and Red Butte SE. Site specific concerns will also be addressed in the Armstead Mountain, Huntsman, Knox, and Sage Creek AMP allotments.

1.3 Issues

Identification of Key Issues and Resource Concerns

Issues and resource concerns were identified during the SCW Assessment and the public scoping process. Issues, as described below, have a direct bearing upon the proposed action and the process of how the purpose and need will be achieved. The development of management alternatives are in direct response to the identified issues. Resource concerns do not necessarily drive the development of alternatives, but may be affected by proposed actions in the alternatives.

A range of management alternatives to address the resource issues and concerns are described in Chapter 2. The predicted effects on the environment of the various alternatives, and their relative effectiveness in meeting objectives, are analyzed in Chapter 4.

Three primary land health issues and seven additional resource concerns are identified below. A brief description and explanation of the issues and concerns, as well as the management objectives for each issue and resource concern are defined.

Progress toward meeting some objectives can be quantifiably measured. Others, like reducing stream bank impacts and sediment input into streams, are evaluated over time by long term trend indicators such as relative changes in riparian vegetation composition and abundance and/or channel width/depth ratio.

Additional information about methodologies and documented resource concerns can be found in the SCW Assessment Report which is available at the Dillon Field Office or on the internet at http://www.blm.gov/mt/st/en/fo/dillon_field_office.html.

Not all issues or resource concerns identified below are applicable to all allotments in this EA. Site specific issues and concerns are discussed in Chapter 3 and the Sage Creek Watershed Assessment Report.

Objectives were developed for factors that were found to be limiting to land health (riparian, upland, travel management) in specific areas or allotments within the watershed. Fish, wildlife and special status species habitat needs that may be affected by the alternatives are included as

Resource Concerns. Additional resource concerns include forest and woodland habitat and priority species, noxious and invasive species, wilderness characteristics and Wilderness Study Areas, visual resource management, socioeconomics, and cultural and paleontological resources.

1.3.1 Issues

Issue #1: Riparian, Wetland, and Aquatic Habitat
Standard #2 of the Western Montana Standards for Rangeland Health is **"**Riparian and Wetland Areas are in Proper Functioning Condition (PFC)." PFC is defined as the ability of a stream or wetland to perform its riparian functions. These functions include sediment filtering, bank building, water storage, aquifer recharge and hydrologic energy dissipation. Streams or wetlands that are categorized as Functional-At-Risk (FAR) with an upward trend also meet the riparian health standard. The methods and procedures used to determine riparian health in the Sage Creek Watershed are discussed in the SCW Assessment Report.

Objectives:

- Increase composition and cover of deep-rooted riparian species along stream channels and spring/wetland areas (reduce bare ground).
- Increase vigor and regeneration of aspen.
- Improve physical condition of stream channel/streambanks.
- Stop head cuts and restore vertical channel stability.
- Reduce sediment inputs into streams generated by human activities.
- Restore, maintain and/or enhance native vegetation and hydrology of springs, seeps and wet meadows with emphasis on ecological function and biodiversity.

Issue #2: Upland and Sagebrush Steppe Habitat
"Uplands are in PFC" is identified as Standard #1 of the Western Montana Standards for Rangeland Health. The determination of upland health was based on the evaluation of three criteria: degree of soil stability and watershed function, nutrient cycles and energy flows, and available recovery mechanisms. The indicators used to determine upland health are discussed in the SCW Assessment Report.

The uplands in 19 grazing allotments in the SCW are functioning properly under existing management. Upland health standards were not met in Dell, Red Butte, and Red Butte SE allotments which include 355 acres. Resource concerns in these allotments include a shift in the dominant herbaceous vegetation communities from cool season bunchgrasses, annual invasive species and/or unpalatable vegetation, increased bare ground, wind and water erosion, and/or invasive species.

Sagebrush habitat in the SCW is in good condition and is not a resource issue. However, the BLM recognizes the value of healthy sagebrush habitats, and will continue to rigorously monitor conditions within the SCW with the intent of maintaining or improving sagebrush habitat. Objectives related to sagebrush habitat are also included below under Resource Concern #1: Special Status Species Habitat.

Objectives:

- Restore the soil/site stability, hydrological function, and biotic integrity of

upland sites in allotments where one or more of these attributes of rangeland health was determined to be reduced.

- Increase cover and frequency of native perennial cool season herbaceous species where concerns were documented, which will improve the hydrological function and site productivity.

Issue #3: Recreation and Travel Management

Objectives:

- Effectively implement the Amended Dillon RMP Travel Management Plan.
- Revise motorized route designations as necessary to correct mapping errors and improve route designations.
- Reduce unauthorized (non-designated route travel) motor vehicle use which occurs most frequently during the big game hunting season.
- Maintain reasonable motorized wheeled vehicle access to those areas where it already exists, and improve access to public land where appropriate and where opportunities are currently limited.
- Provide a spectrum of recreational opportunities that includes both motorized and non-motorized opportunities.
- Reduce resource impacts caused by recreationists, including spread of noxious weeds, habitat fragmentation, wildlife security issues, loss of vegetation and soil compaction/erosion from unauthorized motor vehicle use.

1.3.2 Resource Concerns

Resource Concern #1: Special Status Species Habitat

Special Status Species (SSS) include federally listed Threatened, Endangered, Proposed and Candidate Species, and BLM Sensitive Species. See the Biological Evaluations (BE) on Threatened and Endangered (T&E) species, Special Status plants, wildlife, and fish in Appendix C for additional information. Special Status Species are discussed in the SCW Assessment Report, as well as chapters 3 and 4 of this EA. Objectives for Riparian Health, Upland Health and Forest and Woodland Health also include objectives related to fish, wildlife and special status species habitat.

Objectives:

- Maintain existing sagebrush habitat so that 80% or more of big sagebrush communities provide vegetative composition and structure for sage grouse nesting/early brood rearing, >40% sagebrush habitat meets summer/late brood habitat characteristics, and >80% meets winter habitat characteristics where appropriate (relative to ecological site, etc.).
- Maintain an average 7 inches herbaceous understory within site potential within sage grouse nesting/early brood rearing habitat.
- Maintain or increase composition of highly nutritious forbs (e.g. composites and legumes) in sage grouse nesting/early brood rearing habitat.

- Maintain/enhance habitat for cold water fisheries in occupied streams within the watershed.
- Cooperate with MT Fish, Wildlife and Parks to expand the current distribution of westslope cutthroat trout (WCT) in the Sage Creek Drainage.
- Maintain or enhance habitat for sensitive plant species and provide ample opportunity for reproduction and seedling establishment.

Resource Concern #2: Forest, Woodland and Priority Species Habitat
Forests and woodland habitat make up a relatively small percentage of the SCW and is therefore valuable habitat for many wildlife species. Forest and woodlands have also provided people with timber for building materials and fuelwood for generations. Non-commercial timber harvest and fire exclusion has affected mid-elevation Douglas-fir and limber pine dominated forest stands, causing some shift in structure and density compared to historic conditions. Higher elevation forest stands comprised of spruce, subalpine fir and lodgepole pine are generally within their historic range of variation, in terms of species composition, structure and density. Recent mountain pine beetle activity has caused the mortality of mature lodgepole pine, and in conjunction with white pine blister rust, has caused extensive mortality of limber pine where it occurs within the SCW. All aspen stands within the SCW are declining in vigor and/or extent, and most are not regenerating past browse height. Lack of available water, insects/disease, and old age is contributing the mortality of mature aspen trees. Repeated ungulate browsing is limiting the regeneration of new aspen stands. Curl-leaf mountain mahogany is a priority species that is heavily browsed by big game, preventing reproduction and stand expansion.

Objectives:

- Maintain/enhance existing aspen and promote the successful regeneration of aspen.
- Retain and promote five needle pine trees that appear to have some resistance to white pine blister rust.
- Explore options to enhance mountain mahogany habitat.

Resource Concern #3: Noxious and Invasive Species
Spotted knapweed, leafy spurge, houndstongue, Canada thistle, black henbane, common mullein, and cheatgrass occur as relatively small patches or scattered individual plants in various locations within the SCW. These noxious and invasive species can affect upland health, riparian health and biodiversity. Noxious and Invasive Species are discussed in the SCW Assessment Report, as well as chapters 3 and 4 of this EA.

Objectives:

- Reduce or eliminate noxious and invasive vegetative species within the watershed.
- Mitigate the spread of noxious and invasive plants into, within, or from the watershed.

Resource Concern #4: Wilderness Characteristics and Wilderness Study Area
The Sage Creek Watershed includes roughly 2,900 acres of the 17,479 acre Blacktail Mountains Wilderness Study Area (WSA). These lands are managed in accordance with the BLM Manual

6330 – Management of Wilderness Study Areas, published in July, 2012. WSAs are to be managed so as to not impair their suitability for preservation as wilderness until such time as Congress either designates them as wilderness or releases them from further study. If the WSA is released by Congress it will be managed to emphasize other multiple uses and for semi-primitive non-motorized recreation. The VRM management will be modified to Class II objectives rather than Class I.

Recently published BLM policy also emphasizes that, "Section 201 of FLPMA requires the BLM to maintain on a continuing basis, an inventory of all public lands and their resources and other values, which includes wilderness characteristics." In accordance with this direction, an inventory was conducted of seven units within the SCW, three of these units were found to possess wilderness characteristics set forth in that policy. These units are Big Spring Gulch, Maurer Mountain, and Antelope Flats.

Objective:

- Maintain wilderness characteristics of the Blacktail Mountains Wilderness Study Area.
- Maintain Lands with Wilderness Characteristics values of: sufficient size, retain their natural character, and provide outstanding opportunities for solitude or primitive and unconfined recreation.

Resource Concern #5: Socioeconomics

Many ranches that hold BLM grazing leases/permits have developed operations dependent on a combination of public land grazing preferences and private land resources.

Non-commercial hunting opportunities on BLM administered public lands in the SCW provide an important economic contribution to the local economies of Dillon, Dell, and Lima. One big game outfitter is permitted to operate within the Blacktail Mountains/Sage Creek Outfitter Permit Area. The authorized permit area covers only the southern portion of the watershed.

Objectives:

- Continue to contribute to the local economy by providing an opportunity for sustainable uses on public land including livestock grazing and recreational activities.

Resource Concern #6: Cultural and Paleontological Resources

A detailed summary and description of the cultural and paleontological resources occurring on each allotment in the SCW is on file in the Dillon Field Office.

Objectives:

- Preserve and protect significant cultural and paleontological resources and ensure that they are available for appropriate uses by present and future generations.
- Reduce imminent threats from natural or human-caused deterioration, or potential conflict with other resource uses.
- Ensure that all authorizations for land and resource use avoid inadvertent damage to federal and nonfederal cultural and paleontological resource in compliance with

Section 106 of the National Historic Preservation Act and the Paleontological Resources Preservation Act.

Resource Concern #7: Visual Resource Management
With the exception of the Blacktail Mountains WSA and another 885 acres adjacent to the WSA, the remaining 110,776 acres of the planning area is managed as VRM Class III. "The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape may be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes caused by management activities may be evident but should not detract from the existing landscape."

Blacktail Mountains WSA is managed according to VRM Class I objectives. "Preservation of the landscape is the primary management goal in Class I areas. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention." The 885 acres adjacent to the WSA is managed as VRM Class II, with the objective to "retain the existing character of the landscape. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape."

Objectives:

- Partially retain the existing character of the area outside WSA.
- Keep any changes to characteristic landscape very low so as not to attract attention within Blacktail Mountains WSA.

1.3.3 Key Issues and/or Resource Concerns considered, but eliminated

Water Quality and Total Maximum Daily Loads (TMDL)
Water, specifically water appropriation, and water rights were considered but eliminated from further analysis.

Water in Montana is the property of the State of Montana. The Montana Constitution has the following to say about water, "All surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state…" (Montana Code Annotated 2014, Article IX, Section 3, (3)). State Rights to appropriate water are recognized by the Federal Government in the Federal Water Pollution Control Act of 1972 (33 U.S.C. 1251 et seq.) more commonly known as the Clean Water Act (Title 1, Section 101 (g)) The Bureau of Land Management respects the State of Montana's authority to appropriate water. Except in minor instances, which are discussed where necessary in Chapter 2, water and water appropriation has been considered, but eliminated from further analyses.

Water Quality and Total Maximum Daily Loads were considered but eliminated from further analysis.

The Clean Water Act set a new national goal "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters", with interim goals that all waters be fishable and swimmable where possible. The Act embodied a new federal-state partnership, where federal guidelines, objectives and limits were to be set under the authority of the U.S. Environmental Protection Agency, while states, territories and authorized tribes would largely administer and enforce the CWA programs, with significant federal technical and financial assistance (USEPA 2012). The federal government recognized that Montana's waters belong to the State (Montana Code Annotated 2011). The 1987 Amendments to the Clean Water Act (CWA) require States to develop plans for controlling non-point sources of water pollution and to develop Total Maximum Daily Loads (TMDLs) (EPA 1972). To comply with the CWA, Montana has divided the State into water quality planning areas. Guidance includes Montana' Nonpoint Source Management Plan (DEQ, 2012), which is updated every five years. The plan was most recently updated in 2012. The Dillon Field Office follows the guidance set out in this document.

In an effort to meet its obligations under the Clean Water Act, the Montana Dakotas BLM entered into a memorandum of understanding with the State of Montana titled, *Memorandum of Understanding Regarding Water Quality Management on Bureau of Land Management (Administered) Lands in Montana Between the Montana Department of Water Quality and the United States Department of the Interior Bureau of Land Management* (USDI, 2010). This MOU documents the BLM's strategy for managing and controlling non-point source (NPS) water pollution from the BLM managed lands and authorizations. The goal of this MOU is discussed in detail in a paper titled, *Using watershed function as the leading indicator for water quality* (Aron et al 2013). There is growing support for this approach (Hall et.al. 2014, Koslowski et. al. 2013) In short, there is growing concern that the goal of the Clean Water Act to 'restore and maintain the chemical, physical and biological integrity of the nation's waters' is not being fully achieved (USEPA, 2012), that traditional TMDL approaches are ineffective and inappropriate in many settings and that methodologies that assess watershed function such as Proper Functioning Condition (PFC) are appropriate for land management agencies seeking to identify causes and solutions (Hall et al. 2014, Koslowski et al. 2013).

One of the Western Montana Standards for Rangeland Health is **"**Riparian and Wetland Areas are in Proper Functioning Condition (PFC)." PFC is defined as the ability of a stream or wetland to perform its riparian functions. These functions include sediment filtering, bank building, water storage, aquifer recharge and hydrologic energy dissipation. PFC is a prerequisite to achieving desired condition (USDI 1998). As described in the previous paragraph, use of the PFC methodology to assess function is recognized as an early indicator of water quality trends. Streams or wetlands that are categorized as PFC or Functional-At-Risk (FAR) with an upward trend are heading in the right direction towards meeting desired future condition, but may not necessarily meet water quality standards. The Dillon Resource Management Plan and Record of Decision of 2006, as amended predicts the achievement of desired future condition in 20 to 50 years.

The BLM's watershed approach of assessing land health, also known as ecosystem function, can be a leading (early) indicator to guide adaptive management as opposed to traditional water quality monitoring which is seen as a lagging indicator. Land health assessments are very well designed to assess the physical and biological integrity of our Nations waters. As part of the

MOU, the BLM reports to DEQ actions taken to address NPS water pollution as well as effectiveness of Best Management Practices (BMPs). Water Quality Monitoring is conducted on Public Land by Montana DEQ as part of their responsibilities under the Clean Water Act. Additionally, as discussed in the Aron paper, the BLM has entered into a cooperative water quality monitoring agreement shifting some of the workload to Montana DEQ and freeing the BLM to focus more attention to watershed function.

In conducting watershed assessments with respect to nonpoint water pollution, upland, forest, wetland and riparian assessments are used to determine how BLM management is affecting water quality. The BLM evaluates uplands for land cover condition (ability of plants, rocks, and litter to protect soil from erosion, promote infiltration and reduce runoff). Wetlands are assessed to determine their extent and condition and their ability to recharge ground water, cycle nutrients, filter sediments, promote infiltration and mitigate flooding. Streams and their adjacent riparian areas are evaluated to determine channel morphology and stability, access to floodplains, ability to move sediment, species composition and condition of riparian vegetation. Wells, pipelines and spring developments are recognized as BMPs, and are evaluated to determine condition and effectiveness. Due to the extent of stream miles in the Dillon Field Office, temperature monitoring is limited to selected streams. PFC assessments also provide clues to stream temperature. Shallow, over-widened streams with limited vegetation receive more solar radiation and are more at risk for thermal impacts than deep, narrow, well vegetated streams. Improvements in channel condition and riparian cover directly correlate to reductions in thermal impacts. As stated above, PFC is an early indicator of water quality and a prerequisite to achieving desired condition. The assessment team also looks at current and historic mining, timber harvests, abandoned beaver dams, erosion from roads, and concentrated livestock waste.

Since the BLM uses the Land Health Assessment process to identify early indicators of nonpoint pollution as well as BMP assessments, and since these areas are covered by other key issues in this document, Water Quality and TMDLs have been considered and eliminated from further consideration as key issues in this document.

Soil Compaction

Soil compaction was rated as none to slight on the upland sites assessed during upland health assessments in the watershed. Soil compaction was noted as a minor concern in some localized riparian areas and was part of the reason that some wetlands were rated as FAR. The ID team agreed that soil compaction wasn't an issue in upland habitats and further agreed that although it is a resource concern in wetland areas that were rated as FAR or NF, it would be adequately addressed and analyzed under Key Issue #1: Riparian, Wetland and Aquatic Health. Changes in riparian/wetland vegetation cover, composition and vigor and the relative amount of bare ground will be measured as a surrogate to measure soil compaction in riparian and wetland areas. Therefore, since soil compaction will be addressed under issue #1, it was not carried forward as a separate issue.

Wildlife

Wildlife species and their habitats in the SCW were considered during the assessment. Since not all wildlife and their associated habitat had concerns, not all were included in this EA as an issue or resource concern, and are not analyzed if they are not affected. Several wildlife species,

including a variety of birds, utilize the same habitats that are included as issues. While not every species is mentioned in the impact analysis, the effect to those species is similar to that of species that are included and analyzed (i.e. impact on foraging, cover, nesting, etc.). Particular habitat requirements and levels of dependence on these habitats vary by species and in general, the group is often represented by an "umbrella" or "focal" species whose habitat needs represent the needs of other species (i.e. sagebrush obligate species represented by sage grouse since they use a diversity of habitat).

1.4 Scope of this Environmental Analysis – Scope, Plan Conformance, Critical Elements

1.4.1 Scope

The scope of the proposed action includes authorizing livestock grazing, implementing restorative vegetation treatments, and minor changes in travel management within the SCW. Proposed vegetation treatments are designed to restore specific habitat types on public lands, specifically aspen. The proposed action may also include installation, construction, removal or modification of fences, water developments and road construction and maintenance (including adding, removing, upgrading or replacing culverts; adding hardened stream crossings).

The proposed action addresses several program areas that affect land health. It is not an all-inclusive management plan or a programmatic EA.

1.4.2 Conformance with BLM Land Use Plans, Programs, and Policies

This document is tiered to the Amended Dillon RMP, approved in 2006 and the BLM's Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment (ARMPA) approved in 2015. The management alternatives considered are in conformance with both the RMP and the RMP Amendment. Applicable guidance is in the Record of Decision (ROD) and Approved Dillon RMP, which may be accessed on the internet at http://www.blm.gov/mt/st/en/fo/dillon_field_office/rmp.html. The Idaho and Southwestern Montana Greater Sage-Grouse Approved RMO Amendment and ROD can be accessed on the internet at https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=42003.

The ROD identified goals, objectives, land use allocations, and management actions for each program area on public lands managed by the BLM Dillon Field Office. All alternatives in this EA, except the No Action Alternative, propose treatments in support of these identified actions, allocations, and objectives.

The proposed actions are in conformance with the Federal Land Policy and Management Act, the Taylor Grazing Act, the Standards for Rangeland Health and Guidelines for Grazing Management (43 CFR 4180), BLM Manual 6330 – Management of Wilderness Study Areas, BLM policies and Federal regulations.

All treatments of invasive species in the proposed action will conform to all applicable guidance and standards set forth in the Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States Programatic EIS (Federal Registry notice published on April 8,2016 and expected to be finalized and signed before this documents final decision is issued), the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic EIS approved on September 29, 2007 and the Noxious Weed Control on Public Lands EA (MT-050-08-12) approved April 2008, to which this EA is tiered.

The goals, objectives and management recommendations in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana, Sage-Grouse Habitat Assessment Framework, and the 2010 Nonpoint Source Memorandum of Understanding were also considered during alternative development.

The No Grazing Alternative analysis in the Mountain Foothills EIS was also reviewed and considered in preparation of this document and is incorporated by reference.

1.4.3 Critical Elements of the Human Environment

Critical Elements of the Human Environment, as defined by BLM Manual 1790-1, must be considered in all BLM EAs and Environmental Impact Statements (EISs). The scoping process indicated which Critical Elements may be affected by the alternatives.

Table 1.2: Critical Elements of the Human Environment

Critical Element	Not present	Present, but not affected	May be affected*	Comments
Abandoned Mine Lands (AML)		X		See description of relevant non-affected resources in section 3.3 and reasonably foreseeable future actions in section 4.3.2.
Air Quality		X		
Areas of Critical Environmental Concern (ACEC)	X			
Cultural Resources		X		See features common to all alternatives in section 2.3.1, and a broader discussion of Cultural Resources in section 3.2.9.
Environmental Justice		X		No low income or minority groups would be disproportionately affected.
Farmland (prime or unique)		X		Prime or unique farmland will be conserved through actions that address Land Health Standards
Floodplains[1]			X	Discussed under 1.3.1 Resource # 1 – Riparian, Wetland and Aquatic Health.
Hazardous and Solid Wastes	X			
Invasive Non-native Species			X	Discussed under 1.3.2 Resource # 3 - Noxious and Invasive Species.
Native American Religious Concerns	X			Tribes familiar with the area have expressed no religious concerns.
T&E species		X		See BE for T&E and Sensitive Species in Appendix C. Also discussed under Resource Concern #1-Special Status Species Habitat.
Water Quality (drinking or ground)			X	Discussed under 1.3.1 Resource # 1 – Riparian, Wetland and Aquatic Health.

Critical Element	Not present	Present, but not affected	May be affected*	Comments
Wetlands/Riparian Zones			X	Discussed under 1.3.1 Resource # 1 – Riparian, Wetland and Aquatic Health.
Wild and Scenic Rivers	X			
Wilderness		X		A portion of the Blacktail Mountains WSA is present within the watershed. Lands within the WSA will not be affected.
* An "X" in this box means that the resource is further evaluated in the affected environment and environmental impacts sections. [1] Floodplains are part of stream systems. Actions which improve streams and riparian habitats will comply with Executive Order 11988 in that they are designed to restore and preserve the natural and beneficial values served by floodplains.				

1.5 Decisions to be Made

The BLM is preparing this EA to allow the Authorized Officer to make a reasoned and informed decision regarding improving riparian health, maintaining/enhancing upland health including sagebrush steppe habitat, improving forest and woodland health, enhancing biodiversity, adjusting motorized route designations, and revising or renewing term grazing permits. Revised grazing permits would contain appropriate terms and conditions to initiate significant and measurable progress towards achieving the Standards and established goals and objectives within the SCW.

The Dillon Field Manager will choose the alternative that best addresses resource concerns identified by the BLM and issues identified through scoping, and allows for multiple use.

The Dillon Field Manager must also determine if a selected alternative is a major Federal Action that significantly affects the quality of the human environment. If she determines that it is, then an EIS must be prepared before the SCW management plan can proceed.

Implementation of the Decisions issued as a result of this EA will begin in 2017, but full implementation may take several years and is subject to budget constraints. The decisions will be implemented in consultation and coordination with the affected permittees, the agencies having lands or managing resources within the area, and other interested parties. As with all similar BLM decisions, affected parties will have an opportunity to protest and/or appeal these decisions.

1.6 Applicable Legal and Regulatory Requirements

- Title 43, Code of Federal Regulation, Part 4100
- Taylor Grazing Act of June 30, 1934, as amended
- Sikes Act of 1960, as amended (Habitat improvement on Public Land)
- National Historic Preservation Act of 1966, as amended
- Carlson-Foley Act of 1968 (Weed Control on Public Lands)
- National Environmental Policy Act of 1969 (NEPA)
- Endangered Species Act of 1973
- Federal Noxious Weed Act of 1974, as amended in 1988, 1994
- Federal Land Policy and Management Act of 1976 (FLPMA)

- Fishery Conservation and Management Act of 1976
- Clean Water Act of 1977
- Public Rangelands Improvement Act of October 25, 1978
- Fish and Wildlife Improvement Act of 1978
- State of Montana Streamside Management Zone Law of July 1991
- National Fire Plan of 2000
- Healthy Forests Initiative of 2002
- Healthy Forests Restoration Act of 2003
- Dillon Resource Management Plan of 2006, as amended
- Management of Wilderness Study Areas (manual 6330), 2012
- Paleontological Resources Preservation Act of 2009
- Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment, September 2015
- Sage-Grouse Habitat Assessment Framework, June 2015

1.7 Coordination Requirements

The Council on Environmental Quality (CEQ) regulations require that agencies "make diligent efforts to involve the public in preparing and implementing their NEPA procedures" (40 CFR 1506.6(a)). Scoping is a form of public involvement in the NEPA process. External (or public) scoping is optional for EAs (40 CFR 1501.7). However, the BLM has found public scoping to be very beneficial. External scoping involves notification and opportunities for feedback from other agencies, organizations, tribes, local governments, and the public. External scoping is used to identify coordination needs, refine issues through public, tribal and agency feedback on preliminary issues; gather additional information, identify new issues and develop additional alternatives. Public scoping serves to build agency credibility and promote constructive dialogue and relations with tribes, agencies, local governments and the public.
External scoping for the Sage Creek Watershed was done by announcing the initiation of the watershed assessment process in May, 2015 via a media release and letters to a comprehensive mailing list inviting input and participation and by announcing completion of the Watershed Assessment Report in December, 2015 through a media release and mailing it to all interested parties with a cover letter asking for comments. The watershed assessment report was also posted on BLM's external web page (eplanning). Many meetings were held by various IDT members with other agencies, public land users, land owners in the watershed and other interested parties to gather information and develop management alternatives.

In addition, according to 43 CFR subparts 4110, 4120, 4130 and 4160, coordination requirements identified in the Range regulations include affected permittees or lessees, the interested public, the State having lands or responsible for managing resources within the area, other Federal or State resource management agencies, and the Resource Advisory Council.

"Interested public" in the context of the Range Regulations means an individual, group or organization that has submitted a written request to the Authorized Officer to be provided an opportunity to be involved in the decision making process for the management of livestock grazing on specific grazing allotments, or has submitted written comments to the Authorized Officer regarding the management of livestock grazing on a specific allotment.

Following the SCW Assessment Report, the BLM met with other federal agencies, state agencies, permittees and the interested public while developing this EA. A full list of persons and agencies consulted is included in Chapter 5.

Chapter 2

2.0 DESCRIPTION OF ALTERNATIVES

This chapter describes the alternative development process, alternatives considered but eliminated from further analysis, and alternatives carried forward and fully analyzed. As many as three management alternatives will be fully analyzed: the No Action Alternative (continuation of current management) and up to two action alternatives. Alternatives may apply to individual allotments (e.g., grazing management changes), or across a broader landscape (e.g., noxious and invasive species mitigation). Based on identified issues, combinations of allowable use levels, grazing systems, stocking rates, vegetative treatments, and program specific projects were discussed at length and carefully considered during scoping and the formulation of the management alternatives by the IDT.

2.1 Process Used to Formulate Alternatives

The development of management alternatives for the watershed was guided by provisions of FLPMA and NEPA, as well as planning criteria defined in Chapter 1 (key issues, resource concerns, objectives), and public input received during scoping. Other laws, as well as BLM planning regulations and policy, also directed alternative considerations and focused the alternatives on appropriate watershed-level decisions. Chapter 1 discusses the key issues and resource concerns used during the alternative development. The Affected Environment (Chapter 3) discusses existing resource conditions related to the issues and resource concerns identified in Chapter 1.

2.2 Alternatives Considered but Eliminated from Further Analysis

Alternatives that would not make significant progress toward meeting the objectives of the proposed action (section 1.2), or are not consistent with the intent of current BLM legal and regulatory requirements or policy, are not fully analyzed in this document. Alternatives that propose exclusive utilization, development or protection of one resource at the expense of other resources are not considered. FLPMA mandates the BLM to manage public lands for multiple use and sustained yield. This eliminates alternatives such as closing all public land to livestock grazing, oil and gas leasing, or managing only for wildlife values at the exclusion of other considerations. In addition, resource conditions in the SCW do not warrant watershed-wide prohibitions of any specific use. Each alternative considered in this EA allows for some level of support, protection, and/or use of all resources present in the planning area. The following alternatives were considered, but eliminated from detailed study.

2.2.1 Elimination of Livestock Grazing on BLM Administered Lands in the Sage Creek Watershed

Eliminating livestock grazing from all BLM administered lands in the watershed was considered, but eliminated from detailed study for the following reasons:

- Eliminating livestock grazing from all BLM administered lands in the watershed does not meet the purpose and need of this EA.
- Resource conditions within the Sage Creek Watershed do not warrant elimination of livestock grazing on a watershed-wide basis. (i.e., Upland health was met on all but three small allotments and all five Rangeland Health Standards were met on seventeen of the twenty-two allotments within the watershed).
- The amended 2006 Dillon RMP identifies 114,475 acres of public land in the SCW available for livestock grazing. Therefore, an allocation of this level of use has been analyzed and approved for this watershed in the Land Use Plan.
- Due to the intermixed land ownership pattern in the allotments included in the Sage Creek Watershed, at least 245 miles of fence at an average cost of $9,000 per mile ($2,205,000 total) would need to be constructed between private and/or state land and BLM administered land to effectively implement a "No Grazing" alternative on BLM administered land. This figure does not include fencing around parcels that are essentially unavailable to livestock due to topography. Surveying and constructing approximately 245 miles of fence along BLM boundaries would be economically unfeasible and cause an unacceptable level of barrier/entanglement hazard for big game and collision hazard for sage grouse within the Sage Creek Watershed.
- A Land Use Planning level "No Grazing" alternative was previously analyzed in the Mountain Foothills EIS (March 1980). Although this EIS is 36 years old, important portions of the analysis within the EIS are still relevant, (i.e. Approximately 2,700 miles of new fence construction would be necessary to eliminate livestock grazing on public land within the Dillon Field Office; the area would still need to be monitored to ensure compliance to non-use, etc.). This EA is not tiered to the Mountain Foothills EIS, but relevant information in that EIS is used as information.
- Fencing public lands would create numerous small isolated parcels, and management of these tracts would be problematic. Isolated and publically inaccessible tracts could result in an expanded public land exchange and/or sales policy in an attempt to block up public land and provide access. This process would be very time consuming, extremely expensive and could result in a net loss of public land for recreation, wildlife habitat, timber harvest, fire wood gathering and other multiple use activities.
- Eliminating livestock grazing would also result in a build-up of fine fuels which would increase the severity of wildfires (both natural and man-caused) moving faster and spreading further within the public lands as well as adjacent private lands.
- Eliminating livestock grazing on all public within the Sage Creek Watershed would have a substantial adverse economic and social impact on the ranch operations and many of the landowners in the Sage Creek Area. The economic impact would carry over to some

degree to the businesses in the local area and tax revenue within Beaverhead County. The permittees may be forced to operate with fewer livestock, graze private and/or other available lands more, or even sell a portion of, or the entire livestock operation. If the business is sold, private lands associated with the ranch have the potential to be sold and developed. Ranches build connections between public and private land, and between rural and urban communities. "Private lands are disproportionately important to the maintenance of our region's natural heritage because they are disproportionately more productive" (Knight 2007). Private lands often contain springs, riparian, rich soils, and/or critical habitat that wildlife depends on. A few of the consequences from development of rural lands are landscape level fragmentation, decreased access to public lands, decrease in biodiversity, loss of important wildlife habitat and development in the Wildland Urban Interface. The elimination of grazing from public land can have a long term effect on the environment and economy by forcing ranchers to produce more meat on private or leased land, thus increasing the potential need for fertilizers, supplement feeds and water for irrigation that requires more energy from fossil fuels and electricity than on rangelands (Journal of Range Management 27(3), May 1974). In addition, the BLM would still incur a workload to monitor compliance to non-use of the public land within the SCW.

2.2.2 Elimination of Livestock Grazing in the Red Butte and Red Butte SE allotments.

A no grazing alternative was considered for the Red Butte and Red Butte SE allotments. It was considered because these BLM grazing allotments did not meet the BLM's Upland health standard and livestock grazing was a causal factor. Both allotments consist of small, isolated parcels of BLM administered land surrounded mostly by private lands. Red Butte allotment consists of one single, 40 acre tract surrounded by several hundred acres of private land. Red Butte SE has three separate land tracts of 160, 80 and 40 acres respectively, surrounded by hundreds of acres of private land.

Both the Red Butte and Red Butte SE are small acreages of BLM administered lands surrounded by private lands. There is no legal public access to any of these BLM parcels. To eliminate livestock grazing on both allotments, BLM would need to build about 5 miles of new fence. In order to build these new fences BLM must survey the private/BLM land boundary (surveying is required by BLM when building new fence on private/BLM boundaries). The cost of building and surveying five miles of new fence to exclude 320 acres of BLM administered lands from being grazed may not be financially feasible and may exceed the cash value of the 320 acres of land. Also, if eliminating livestock grazing on these parcels was chosen, BLM may not be granted legal access to the lands to build the fences because private lands separate the county road and all BLM administered tracts of land in both allotments. If BLM was granted access to survey and build the five miles of fence to eliminate livestock grazing, BLM would then be tasked to maintain these fences which would require access to these fences on an annual basis. If access was not granted and fences were not maintained, cattle may be able to enter the BLM-administered land and the expense of surveying and building the new fence to eliminate livestock grazing would be in vain. If access to construct and maintain fences was not granted by private landowners, BLM could rent a helicopter to drop fence supplies and a fence contractor to

complete construction and annual maintenance. The above factors make this proposal economically and/or technically unfeasible. Because of the reasons listed above, a no-grazing alternative has been considered but eliminated for the Red Butte and Red Butte SE allotments.

2.2.3 Curl-leaf Mountain Mahogany Treatments

Heavy browsing on mountain mahogany was identified as part of Resource Concern #2. In exploring opportunities to enhance/improve/protect mahogany in SCW, no long-term solutions are considered feasible. Since browsing is the cause, creating a barrier to prevent wildlife (specifically mule deer and moose) from accessing the mahogany stands is the logical solution. However, considering that the mahogany habitat is located in isolated patches in different areas of the watershed, preventing wildlife from accessing it would eliminate this important forage source for wintering big game. Fencing mahogany stands would have to be implemented long-term, because once the fence/barrier is removed, wildlife would resume browsing the accessible leaders. Building big game barrier fences around mahogany stands was determined to not be a feasible solution since it would remove a limited, key winter forage from the landscape.

2.3 Description of Alternatives

2.3.1 Features Common to All Alternatives, Including the No Action

Livestock Management:

Term Grazing Permits for eleven allotments including 17,734 BLM administered acres that have been determined to **not** have resource issues or concerns relating to current livestock management, or where administrative changes are not proposed, will be reissued with the same mandatory Terms and Conditions. These allotments are: Big Spring Gulch, Crooked Creek AMP, Kent Price Canyon, Knox Non-AMP, Little Spring SGC, Long Creek, Mosman AMP, Railroad, Stanford, Welborn-Dell, and Wolfe.

The BLM encourages, and if warranted, will require use of temporary electric fence, livestock supplement (e.g., salt, protein block) placement, riding, and herding as a means of improving livestock distribution in all alternatives. When used, livestock supplement will be placed on ridges or terraces at least ¼ mile from the nearest livestock water source. Supplement will be placed in existing disturbed areas to reduce impacts to sage grouse habitat.

Annual utilization thresholds on cool season bunch grasses will be 50% (to maintain plant health/vigor and leave adequate residual cover for sage grouse) OR when livestock use on sedges averages four inches along the greenline (to prevent excessive trailing along streams) on non-fisheries or non-native fisheries streams and six inches on WCT streams, whichever occurs first. These thresholds will be terms and conditions of the term grazing permits, and will be applicable to all allotments included in the SCW as a tool to determine moves between pastures and/or off the allotment, and in conjunction with long term trend data to determine management effectiveness. For example, when a threshold is met, livestock would be moved to the next pasture or off of the allotment.

Annual utilization thresholds for uplands will be measured by trained BLM range staff that gather vegetation data (utilization, height, dominant species composition) using multiple key

areas that represent the primary range found in the pasture or the allotment (if the allotment has just one pasture). Secondary range vegetation is generally not measured because historical livestock use of the allotment has shown that livestock usually do not graze these areas due to one or a combination of factors including: distance to water, topography and/or vegetation type. Standard operating procedure for determining key areas in primary range is to place the key areas approximately 200 to 600 meters from a suitable (capable of watering all authorized livestock in a 30 minute period) livestock watering location in areas with <15% slopes. The number of key areas that are needed to adequately represent the pasture or allotment will be in direct correlation to the size of the pasture and/or allotment the key area is representing and the complexity of the vegetation found on the pasture and/or allotment.

Water Developments:

- All water developments and troughs no longer in use will be removed, but spring exclosure fences may be retained and maintained.
- Wildlife escape ramps will be installed in all water troughs.
- Annual maintenance will be completed, as agreed to in Cooperative Agreements, to assure that water developments, including spring boxes, pipelines, troughs, valves, shutoff devices, and exclosures are functioning and in good condition.
- Design features to mitigate potential for West Nile Virus would be incorporated into water developments (USDI, 2015a, Appendix C), including:
    - Maintain a properly functioning overflow on troughs to prevent water from flowing onto the pad and providing for mosquito habitat.
    - Clean and drain stock tanks before and after the grazing season. Vegetation and soil free clean tanks are not conducive to mosquito reproduction.
    - Install and maintain float valves on stock tanks/troughs to minimize overflow which may provide mosquito habitat.
    - Modify developed springs, seeps and associated pipelines to maintain predevelopment riparian areas within sage grouse habitat where necessary.

Fences:

- Existing BLM fences that impede wildlife movement will be modified or rebuilt to BLM specifications on a prioritized schedule. Dysfunctional or unnecessary fences on public land will be removed, modified, and/or rebuilt.
- Fences and exclosures that are determined to be in a high use area for sage grouse (i.e. fences within ¼ mile of a lek and/or winter concentration areas; considering topography, vegetation, visibility, etc.) would be marked with flight diverters to reduce collisions (USDA, 2012).

Forest and Woodland Treatments:

Personal use firewood and Christmas tree permits will continue to be issued.

Travel Management and Roads:
Travel management will be implemented as prescribed in the Amended Dillon RMP. Roads identified as open to public use will be signed with a white arrow symbol on a flexible sign post. Roads not identified as open to public use will be:

- Left unsigned unless there is evidence of regular use.
- Signed closed if there is evidence of regular use.
- If signing is ineffective at discouraging use, roads will be obliterated to the extent possible (made unnoticeable), at least at the intersection with an open route, or physically closed when continued use is causing unacceptable resource impacts or user conflicts.

Noxious and Invasive Species:
Management of noxious weeds will continue in cooperation with Beaverhead County, federal and state agencies, private landowners and other partners. All invasive species on the Montana noxious weed list will be treated on a prioritized basis to the degree financial resources allow. Any new noxious weed infestations will be targeted for prompt eradication before they have a chance to get well established. When a biological control becomes available for houndstongue it will be considered for release on infestations within the watershed.

An average of 35 acres in the Sage Creek Watershed will be treated with herbicides annually, pending funding. Roads, trails and washes as well as areas where private landowners actively cooperate, participate, and support the BLM's weed management strategies, will be given a higher priority for treatment

Special Status Species:
Activities that disturb mineral soil (such as blading, plowing, ripping, etc.) may not be allowed within the boundaries of populations of special status plant species. In habitats likely to support rare plants, field inspections will be conducted to search for special status plant species prior to authorizing surface disturbing activities. If rare plants are found in the course of the botanical survey, adverse impacts will be mitigated through project redesign or abandonment.

The BLM, in cooperation with other agencies and partners, will continue to monitor sage grouse leks. In areas where sage grouse use may be more concentrated, such as within ¼ mile of leks or wintering areas, depending on topography, vegetation, visibility, etc., fences will be marked so they are more visible and collision with wires is reduced (USDA, 2012). Seasonal habitat objectives from the BLM's Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment will be incorporated including maintenance of existing habitat so that 80% or more of big sagebrush communities provide vegetative composition and structure for sage grouse nesting/early brood rearing, >40% sagebrush habitat meets summer/late brood habitat characteristics, and >80% meets winter habitat characteristics where appropriate (relative to ecological site, etc.), an average of 7 inches herbaceous understory within site potential within sage grouse nesting/early brood rearing habitat, and composition of highly nutritious forbs (e.g. composites and legumes) in sage grouse nesting/early brood rearing habitat will be maintained or increased (USDI, 2015). As stated in the RMP Amendment (page 2-4): "*These habitat objectives are not obtainable on every acre within the designated GRSG habitat management areas. Therefore, the determination on whether the objectives have been met will be based on the specific site's ecological ability to meet the desired condition identified in the table*".

West Nile Virus (WNV) has been linked to sage grouse mortality in multiple areas. WNV has not been documented on BLM lands within the Dillon Field Office, nor in sage grouse in Beaverhead County. Appendix C in the Idaho and Southwestern Montana Greater Sage-Grouse Approved RMP Amendment provides guidance for WNV. Management to reduce impacts of WNV focuses on eliminating man-made water sources that support breeding mosquitoes known to vector the virus. Whether the water development is for livestock water, wildlife habitat, fish, or storm water management, potential habitat for mosquitoes may be increased. Incorporating applicable design and mitigation measures in water development projects can reduce mosquito production through modifying and eliminating mosquito breeding sites.

Term grazing permits shall be amended to state that depredation losses from wolves and grizzly bear are possible. A stipulation will also be added to grazing permits stating that the permittee, agency personnel, and Montana FWP will jointly determine how to properly treat or dispose of livestock carcasses on BLM administered land to reduce the potential for attracting predators. Although there have not been any grizzly bear conflicts reported in SCW, permittees must notify the BLM, MT FWP, or Wildlife Services as soon as is practical of any grizzly bear depredation on livestock or conflicts between grizzly bears and livestock, even if the conflict does not result in the loss of livestock. This notification would likely reduce the potential for livestock depredation and removal of the grizzly bear. Food storage recommendations would also be posted and encouraged to reduce potential conflicts between grizzly bear and public land users. These food storage recommendations may be required at some point in the future.

Stream temperature monitoring of WCT and selected fishery streams would continue on a 5 year schedule. Population monitoring of WCT populations within the Sage Creek watershed would continue to be conducted on a 5 to 10 year schedule. The ongoing nonnative brook trout removal project in East Creek will also continue.

Wilderness:

There is no congressionally designated wilderness within the Sage Creek Watershed planning area. Roughly 2,900 acres on the northwest portion of the 17,479 acre Blacktail Mountains Wilderness Study Area (WSA) lies within the Sage Creek watershed boundary (Map 1). This portion of the WSA contains the only route within the WSA that is designated open to wheeled motorized vehicles since it was an inventoried 2-track vehicle route at the time of the wilderness inventory in 1980. This route accesses the top of the Blacktail Ridge, but is not open to the public across the private land below, and should therefore not be open to the adjacent landowner for recreational use according to the travel management policies in the amended RMP. The route is subject to an easement that allows the private landowners access to their property. The access authorized under that easement will continue, but public recreational access would not be allowed, and there would be no access allowed beyond the limits of the easement or the private property. The WSA is also closed to snowmobile use in the amended RMP.

The Blacktail Mountains WSA contains 10,586 acres that were recommended by the BLM as suitable for wilderness designation (essentially the northern 60%), including that portion within the SCW. The Wilderness Study Area will continue to be managed in accordance with BLM Manual 6330, Management of BLM Wilderness Study Areas until such time as it is either designated as wilderness or released from further consideration as wilderness by Congress. BLM

Manual 6330 replaces the Interim Management Policy for Lands Under Wilderness Review, but retains the overarching guidance of managing to preserve the wilderness characteristics that existed at the time of the original wilderness inventory from the early 1980s. This policy is referred to as the "non-impairment" policy.

Recreation:
Dispersed recreational activities will continue to be managed consistent with other resource management objectives. Special Recreation Permits will continue to be considered on a case-by-case basis with the exception of big game hunting. Outfitted big game hunting will continue to be limited to existing permits and historical use levels. Opportunities for big game hunting, wildlife viewing, horseback riding, and other backcountry recreation would be maintained.

Cultural Resources:
As required by Section 106 of the National Historic Preservation Act, a Class III cultural resource inventory is required prior to the implementation of any proposed range or habitat improvement project. Should significant cultural resources be identified, impacts would be mitigated through project abandonment or redesign. Care would be taken to avoid and protect significant cultural resources and any standing structures (should they be present) during the course of any proposed project. As required by the Paleontological Resources Preservation Act, a paleontological inventory is required in areas with a high potential for paleontological resources prior to the implementation of any proposed range or habitat improvement projects. Should paleontological resources be identified, impacts would be mitigated through project abandonment or redesign. In addition, personnel from the BLM should be notified of the presence and location of any cultural or paleontological resources encountered by contractors or permittees during the course of operations on public lands.

Monitoring:
Under all alternatives, resource monitoring will be completed to measure progress toward meeting site-specific objectives. Monitoring will be done according to the monitoring plan shown as Appendix B.

2.3.2 Description of Alternative A - No Action (Continuation of Current Management)

No Action is defined as "no change" or the continuation of current management. This alternative will be analyzed to serve as baseline information for the Authorized Officer to make a reasoned and informed decision.

Livestock Grazing Management:
Under Alternative A, livestock management would continue under the current Terms and Conditions in all 22 grazing allotments as shown in Table 1. No new range improvement projects would be constructed.

Table 2.1. Livestock Grazing Allocations and Management Within the Sage Creek Watershed

Allotment Name, Number, and Category	Livestock Kind	Season of Use	Grazing System[2]	BLM Stocking Rate	BLM Acres	BLM AUMS	Acres in Other Ownership[3]	Total Acres
Armstead Mountain 30008, (I)	Cattle	7/11-12/10 6/1-7/10	RR	12.3	25,729	1,514 580	8,805 PVT 6,819 St	41,353
Big Springs Gulch, 10129 , (M)	Cattle	5/1-6/25	RR	12.4	4,607	370	758 PVT 890 St	6,255
Bull Heifer Creek, 10137, (M)	Cattle	6/1-9/30	RR	14.5	1,134	78	601 St	1,735
Crooked Creek AMP, 30010, (M)	Cattle	5/6-6/30 8/15-9/14	RR	11.8	2,346	200	106 PVT 640 St	3,092
Dell, 20620, (C)	Cattle	5/1-11/30	CU	2.8	40	14	21 PVT	61
Gallagher Mtn AMP, 30013, (I)	Cattle	5/1-11/20	RR	5.0	4,755	950	2,440 PVT 84 St	7,279
Huntsman , 10123 (M)	Cattle	5/6-7/15	STG	5.0	1,650	331	692 PVT	2,342
Kent-Price Canyon, 10138, (I)	Cattle	7/1-7/31 9/1-10/31	RR	5.2	1,031	200	None	1,031
Knox, 10136, (I)	Cattle	6/1-6/30 10/1-11/30	RR	7.4	6,710	901	3,736 PVT 1,633 St	12,107
Knox Non-AMP, 10624, (C)	Cattle	3/1-11/30	STG	5.0	45	9	1,820 PVT 153 St	2,018
Little Spring SGC, 20604, (M)	Cattle	5/15-6/30	STG	5.7	1,603	283	4,372 PVT 203 St	6,178
Long Creek, 20178, (C)	Cattle	9/1-10/30	DR	34	1,194	35	629 PVT 2,462 St	4,285
Mayberry, 10143, (I)	Cattle	7/1-11/30	DR	4.6	10,886	2,372	2,539 PVT 3,830 St	17,255
Mosman AMP, 30011, (M)	Cattle	11/10-01/19	DR	6.9	3,530	514	1,239 PVT 579 St	5,348
Railroad, 20175, (c)	Cattle	11/1-12/01	DR	3	902	296	874 PVT	1,776
Red Butte, 20030, (C)	Cattle	4/1-10/31	CU	2.9	40	14	None	40
Red Butte SE, 30615, (C)	Cattle	6/1-10/30	STG	2.5	275	110	266	541
Sage Creek AMP, 30012, (I)	Cattle	5/15-12/10	RR	7.1	42,268	5,933	13,362 PVT 23,137 St	78,767
Stanford, 20717, (C)	Cattle	10/15-11/30	STG	3.7	320	87	160 PVT	480
Tallent AMP, 20027, (M)	Cattle	5/15-12/10	RR	6.8	3,223	473	4,774 PVT	7,997
Welborn Dell, 20714, (M)	Cattle	5/15-6/1	RR	5.7	1,516	266	174 PVT	1,690
Wolfe, 10703, (M)	Cattle	5/15-10/15	RR	3.7	640	175	82 PVT 860 St	1,582
BLM Totals				**7.3**	**114,444**	**15705**	**88,768**	**203,212**

[1]Livestock Kind: C=cattle
[2]Grazing System: RR=rest rotation, DR=deferred rotation, STG= short term grazing system, CU=custodial use
[3]Other Ownerships: ST=Montana DNRC, PVT=Private
[3]Total Acres is an estimate. The total acres in the allotment may not be completely accurate because BLM doesn't have authority to map allotment boundary fences on private lands.

Under the No Action Alternative, all other currently authorized activities (recreation permits, mineral development, etc.) would continue as permitted. No woodland treatments, changes to

travel management designations, or other vegetative treatments would be implemented. Treatment of noxious weeds would continue as in the past with roads, trails, and washes (spread vectors) being the primary targets. An average of 35 acres would be treated with herbicides annually within the SCW under the No Action Alternative.

2.3.3 Features Common to All Action Alternatives

This section covers proposed actions and project design features that would be implemented regardless of the action alternative or combination of alternatives chosen by the Authorized Officer.

Livestock Management:

- Livestock management changes would be initiated during the 2017 grazing season. Implementation which is dependent on other proposals, e.g. rangeland projects, may take up to five years, due to financial, logistical, or other constraints.
- AUMs reduced from current active use would be held in suspended non-use on the revised Term Grazing Permits.
- With prior approval, flexibility would be authorized for the season of use on each allotment if annual weather conditions and forage production warrant. The season of use begin and end dates may be adjusted up to seven days earlier than specified on the permit due to yearly variations in weather affecting forage production. Livestock may need to be removed from a specific pasture prior to the maximum number of days specified in the grazing schedule. If this occurs, the time allocated in subsequent pastures would be adjusted proportionally. Conversely, if annual production is unusually high, livestock may be allowed to remain in a given pasture for up to seven additional days and the remainder of the rotation schedule adjusted accordingly.
- After consultation with the BLM, and written approval, the planned pasture grazing sequence (AMP) may be adjusted due to drought or other unforeseen natural events. Also, with prior approval, more livestock may be grazed for a shorter period within the authorized season of use. However, the maximum authorized AUMs, or season of use, as specified in the Term Grazing Permits cannot be exceeded by allowing this flexibility.
- Permittees or lessees shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands.

Projects:

- Place new, taller structures, i.e. water storage tanks, out of line of sight or at least one km from occupied leks, where such structures would increase risk of avian predation.
- No repeated or sustained behavioral disturbance (e.g. visual, noise over 10 dbA at lek, etc.) to lekking birds from 6:00pm to 9:00am within 2 miles (3.2 km) of leks during lekking season (March 1 – May 15).

***Water Developments**:*

- All applicable State and Federal Permits would be obtained and the terms and conditions

applied.

- Spring sources and associated riparian wetland habitat would be fenced where appropriate, to exclude livestock use on developed springs.
- Any proposed pipelines and water troughs would be located in existing disturbed areas or unsuitable sage grouse habitat to the extent practical.
- Flow measurements would be gathered at springs proposed for new development. Springs that have inadequate flows to provide a reliable water source for authorized livestock, while maintaining wetland/riparian habitat would not be developed. Adequate water would be left at the spring source to maintain wetland hydrology, hydric soils, and hydric vegetation.
- No new roads would be authorized as a result of water developments. Permit holders may be authorized to travel along pipeline routes to perform maintenance as defined in the term grazing permit.
- All old materials (pipeline, troughs, head boxes, etc.) would be cleaned up and removed when springs are re-developed, maintained or abandoned.
- Soil disturbance resulting from pipeline installation would be seeded with a native seed mix during the fall, following construction.
- State of Montana Water Right laws and administrative procedures would be followed in applications for Water Rights on Public Land. The BLM would limit maximum flow rates to 35 gallons per minute or less and maximum volumes to 10 acre-feet or less for new developments. The BLM would submit proposed changes to Montana DNRC and comply with Public Notice requirements for changes to existing water rights. Approvals would be obtained prior to construction where additional stock tanks resulting in new points of use are to be added to existing systems and changes to existing water right claims would occur. Applications for new water rights would be submitted after construction in most cases. The BLM is committed to respect water rights of all parties and would not knowingly infringe on other water rights holders.
- Design features to mitigate potential for West Nile Virus would be incorporated into new water developments (USDI, 2015a, Appendix C), including:
    - Design new spring developments in sage grouse habitat to maintain or enhance the free flowing characteristics of springs and wet meadows to benefit wildlife including sage grouse.
    - Construct water return features and maintain functioning float valves to prohibit water from being spilled on the ground surrounding troughs to provide mosquito habitat.
    - Harden stock tank pads to reduce tracks that can potentially hold water and provide mosquito habitat.
    - Develop and maintain non-pond/reservoir livestock watering facilities, such as troughs and bottomless tanks, to provide livestock water.

Fences:

- Any new or replacement boundary fences would normally be a four-wire fence and any new interior (pasture) fences would normally consist of three wires, constructed in conformance with BLM Fencing Handbook H-1741-1.
- High tensile electric fences would be considered in areas where they may provide an effective alternative to traditional barbed wire construction. These would also be constructed in conformance with BLM Fencing Handbook H-1741-1.
- Avoid building new wire fences within 2 km of occupied leks. If this is not feasible, ensure that high risk segments are marked to avoid collisions (USDI, 2015a, Appendix C).
- New fence construction, including exclosures, that are determined to be in a high use area for sage grouse (i.e. fences within ¼ mile of a lek and/or winter concentration areas; considering topography, vegetation, visibility, etc.) would be marked with flight diverters to reduce collisions (USDA, 2012).

Forest and Woodland Treatments

5-Needle Pine Treatments

Limber pine are found in mixed conifer stands throughout the SCW. Whitebark pine hasn't been positively identified in the watershed, but could potentially be present at harsh, high-elevation sites. Some individual 5-needle pine trees have withstood multiple bark beetle attacks, and more recently, exposure to white pine blister rust. The following actions would be considered for all action alternatives.

- Cones would be collected from limber and/or whitebark pine trees suspected to be resistant to white pine blister rust and would be sent for testing to determine their resistance level.
- Pheromones (e.g. verbenone) would be applied to selected trees to help resist mountain pine beetle attack. (Refer to Pheromone Use in the Dillon Field Office EA #DOI-BLM-B050-2011-007-EA).
- Additional cones would be collected as funding and cone crops allow. This seed may be sent to the national seed bank and genetic restoration program and/or incorporated into an office-wide operational collection that has been banked for future management efforts.

Aspen Protection/Restoration Design Features

The following design features would be common to all treatments designed to protect existing aspen, and to promote the successful regeneration of aspen.

- Aspen Protection/Restoration treatment areas are shown on Maps 6 and 7 in Appendix A. The actual treatment areas may vary in width, depending on where aspen currently exists or has the potential to regenerate. Treatments would occur between the upland vegetation on one side of a stream or riparian area, and the upland vegetation on the opposite side.
- BLM resource specialists would be consulted prior to treatment implementation to ensure mitigation measures adequately address site specific concerns. If mitigation measures cannot adequately address those concerns, aspen restoration treatments would not be

implemented in the affected portions of the treatment area.

- Existing roads which are not designated open routes may be used to access treatment areas. Vehicle and/or equipment use on closed routes would be minimized to the extent possible.
- Treatments would be monitored for noxious weeds and cheatgrass and treated if necessary. If noxious weeds or other undesirable vegetation is likely to increase as a result of treatment implementation, then the treatment method would be modified or not implemented.
- Treatment areas would be surveyed for raptor nesting prior to implementation. If an active nest is found in a treatment area, timing stipulations would be enforced to avoid disturbing nesting activity.
- The implementation of Aspen Protection/Restoration treatments would occur over the next ten years.
- Treatments to protect aspen from ungulate browse would include a combination of one or more of the following methods:
    - Creating browse protection structures using on-site woody materials (i.e. downed trees, branches, slash). The structures would be constructed by hand, or by utilizing low ground pressure, tracked equipment (skidsteer, excavator). Tracked equipment would be limited to operation on slopes less than 20%.
    - Felling dead or dying aspen trees, and live conifers where they are present, within or near live aspen clones to create browse obstacles to ungulates.
    - Constructing temporary exclosures using fencing materials that would prohibit all ungulate access to aspen regeneration. Exclosure fences may be up to eight feet in height or may follow other fence specifications that have proven effective in prohibiting ungulate access. Exclosure fences would be removed when aspen regeneration has exceeded browse height.

<u>Riparian, Wetland, and Aquatic Habitat Improvement or Restoration</u>

Features common to all riparian, wetland, and aquatic habitat improvement or restoration projects:

- Prior to action that would disturb any riparian or aquatic habitat, all applicable State and Federal permits would be obtained.
- Surveys for botanical sensitive species would be completed prior to implementation of any project. Results of the survey would be incorporated into project design to enhance and/or protect identified populations; or an area would be eliminated from action if survey results indicate disturbance would be detrimental to known sensitive species.
- Surveys for cultural resources would be completed prior to implementation of any project. Results of the survey would be incorporated into project design to protect identified resources; or an area would be eliminated from action if disturbance to an identified resource would be unavoidable.

- Surveys for noxious weeds and cheatgrass would be completed prior to implementation of any project. Results of the survey would be incorporated into the design to limit the spread and/or propagation of the species identified.

As determined by resource specialists and as identified by permitting agencies on a site by site basis, a native seed mix and/or erosion control material in the form of straw/coconut fiber blankets and/or rolls (wattles) would be used on as needed basis to stabilize and minimize loss of soil and sediment contribution to any adjacent aquatic habitat.

Wetland Restoration

Sites for proposed wetland restoration are identified within the allotment descriptions of Alternatives B and C. Sites selected received a Functioning-At-Risk rating during the assessment due to extensive hummocking leading to an alteration in hydrology and degraded wetland function as further described in Chapter 3.

The restoration proposed would include the use of tracked heavy equipment to physically eliminate the hummocks and restore soil elevations across the wetland complex to more closely resemble pre-disturbance conditions. Site specific design will incorporate features to encourage and improve diversity in wetland vegetative species composition and distribution. This would be accomplished by matching existing topography of the valley, drainage, or meadow and if applicable, slight undulations within portions of the restored wetland area would provide for further variation in duration of saturation.

If the wetland area has a defined outlet that has degraded and lost elevation, restoration would include action to restore the outlet elevation and the effected water table at the site. This would require work with a tracked excavator or by hand crew with shovels.

Ground disturbing activity would occur during driest possible conditions following the growing season (typically between but not limited to August 1 and September 30) and/or in the spring immediately before start of the next growing season, when the ground may be partially frozen (for example but not limited to; February 15 through April 1). This timing will minimize ground disturbance, maximize growth in the first season following disturbance, and provide equipment access to a greater amount of area. Duration of activity at each site would vary on site size but would consist of approximately 4-8 acres per day.

Following restoration, the area restored would be fenced off from the surrounding pasture for a minimum of two growing seasons (electric fence may be used). This would allow adequate time for the area to vegetate and become a productive, sustainable portion of a grazing rotation again. If after two years, BLM evaluation of the site indicates that vegetation has not recovered to a level that would meet the BLM's land health standard for riparian and wetland areas, the area would remain segregated and re-evaluated after each growing season thereafter.

Stream Crossings:
Stream crossings currently identified for improvement are identified in the *Projects* section of the allotment descriptions included in Alternatives B and C. Stream crossing improvements are not limited to these sites but these and all stream crossings projects will adhere to the following guidelines:

- All applicable State and Federal Permits would be obtained and all permit conditions would be followed for construction of stream crossings.
- The most appropriate stream crossings, e.g. culverts, hardened crossings or temporary bridges would be selected based on site specific conditions and impacts: floodplain fill, economics, road safety as well as long term impacts to stream channel function (e.g.; scour/deposition) and vegetation.
- Temporary and/or permanent culverts placed under roads would be adequately sized to maintain stream dimensions, patterns and profiles.

Noxious and Invasive Species:
Three herbicides that have been analyzed in the "Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States" Programmatic EIS would be used, where appropriate. All applicable Standard Operating Procedures and Best Management Practices discussed in the EIS would be followed.

2.3.4 Description of Alternative B

Livestock Management
Livestock management changes are being proposed for five grazing allotments in which current and/or historic livestock use has been determined to be one of the causal factors in at least one Rangeland Health Standard not being met. These allotments are: Dell, Gallagher Mountain AMP, Mayberry, Red Butte, and Red Butte SE. In addition to the actions described above under 2.3.3, one or a combination of the following actions would be implemented: administrative changes, modification of grazing management plans, the construction or modification of range improvement projects, and/or the implementation of vegetative treatments.

This EA is also an opportunity to adjust grazing management plans on allotments that met all five Land Health Standards, but have livestock related impacts to localized areas. Two grazing allotments are in this category: Knox and Sage Creek AMP.

The Tallent AMP, Huntsman, Bull Heifer Creek and Armstead Mountain grazing allotments met all five Land Health Standards during the 2015 assessment. However, in response to the BLM's scoping request for input by all affected parties, the grazing permittees for these allotments have requested the BLM to consider administrative changes, adjustment to the authorized season of use or completion of structural projects. Changes for these four allotments are proposed under Alternative B.

Please refer to the allotment maps 6-12 in Appendix A to see the location and extent of the proposed rangeland improvement projects and administrative actions.

Armstead Mountain #30008 and Gallagher Mountain AMP #30013 (Map #6)

History: As stated on page three of the Sage Creek Assessment Report, the grazing permittee for the Gallagher Mountain AMP has proposed to insert three Gallagher Mountain AMP allotment pastures (Sheep Canyon, Sage Creek and Divide Creek) into the Armstead Mountain allotment to improve management of both allotments. Due to topography, it is nearly impossible to move young calves from the northern pastures in the Gallagher Mountain AMP allotment to the three southern pastures in the allotment (Sheep Canyon, Sage Creek and Divide Creek). Moving the three southern pastures in the Gallagher Mountain AMP allotment into the Armstead Mountain allotment would eliminate the topography challenges for younger livestock.

Administration: Insert three Gallagher Mountain AMP allotment pastures (Sheep Canyon, Sage Creek and Divide Creek) into the Armstead Mountain allotment to improve management of both allotments. Nine hundred and fifty AUMs of authorized grazing along with the associated acres would be removed from the Gallagher Mountain AMP allotment and added to the Armstead Mountain allotment (See attached map 6).

Grazing Management:
Over the last 10 years, two herds of 600-750 cattle each grazed portions of the Armstead Mountain allotment. Under alternative B, two herds of < 500 cattle each would be authorized to graze the Armstead Mountain allotment.

For herd number 1, six pastures in the Armstead Mountain allotment that contain BLM administered lands would be authorized for livestock use. Each pasture would be limited to <500 cattle and a specific number of grazing days during the grazed cycle as follows:
-Divide Creek 15 days
-Sage Creek 25 days
-Middle Creek 25 days
-Poison 15 days
-Sheep Canyon 25 days
-Freeman 25 days

In addition, the Divide Creek pasture would be rested every other year as compared to once every three years like the previous 10-year grazing management plan directed. All other pastures would receive rest once every third year, except Poison pasture under this new alternative. The Poison pasture could be grazed every year given that the pasture is grazed after August 15 annually as a deferred pasture.

For Herd number 2, six pastures that contain BLM administered lands in the Armstead Mountain allotment would be authorized for <500 cattle. Under alternative B, each pasture would be limited to a specific number of grazing days during the grazed cycle as follows:
-Spring Gulch 45 days
-Buck Creek 45 days
-High Field 25 days
-Horseshoe Timber 25 days
-Buckhorn (M. Canyon) 25 days
-Armstead 25 days

In addition, Spring Gulch and Buck Creek must be rested every other year. Of the remaining pastures (High Field, Horseshoe Timber, Buckhorn, Armstead), one must be rested every year during the four year grazing cycle and all pastures must be rested once every four years. The grazing rotation must begin in a different pasture every year.

***The Buck Creek holding water gap is closed to livestock grazing except for trailing to and from the Buck Creek pasture.

Projects:

- Install culverts at the following locations. For further description see the heading *Stream Crossings* in Section 2.2.3, *Features Common to All Action Alternatives*.
    - Install culvert on the crossing over Reach 9, Map 6.
    - Install culvert on the crossing over Reach 31, Map 6.

Table 2.2: Current Livestock Grazing Terms and Conditions for Armstead Mountain and Gallagher Mountain AMP allotments

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Armstead Mountain	7/11	12/10	43	1514
	06/01	7/10	63	580

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Gallagher Mountain AMP	05/01	11/20	52	4185

Table 2.3: Proposed Livestock Grazing Terms and Conditions for Armstead Mountain and Gallagher Mountain AMP allotments

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Armstead Mountain	7/11	12/10	43	2464
	06/01	7/10	63	580

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Gallagher Mountain AMP	05/01	11/20	52	3235

Bull Heifer Creek #10137 (Map #7)

Grazing Management:

- Rest the allotment every other year. Grazing days in the allotment during grazing years would not exceed 21 days.

Projects:

- Remove a portion of the northwest boundary fence and then rebuild the fence to incorporate about 100 acres of BLM administered lands currently included in the Knox allotment pasture #3.

Administrative:

- Incorporate the 100 acres of BLM administered lands and the associated 30 AUMs of authorized grazing from the Knox allotment pasture #3 into the Bull Heifer Creek allotment.

Table 2.4: Current Terms and Conditions for Bull Heifer Creek allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Bull Heifer Creek	06/01	9/30	63	78

Table 2.5: Proposed Terms and Conditions for Bull Heifer Creek allotment

Allotment/ Category	Year	Begin Date	End Date	% Public Land	Active AUMs
Bull Heifer Cr.	1	06/01	9/30	63	108*
	2	Rest	Rest		0
	Repeat Rotation				

*Includes 30 AUMs previously found in Knox allotment

Dell #20620 (Map #8)

Grazing Management:

- Historically, the allotment was grazed for 60 days annually. Under alternative B, grazing management would follow the Huntsman allotment grazing management objectives listed under the Huntsman allotment.

Projects:

- Remove the northeast boundary fence of the Dell allotment, so there is no boundary fence between the Dell and Huntsman allotment.

Administrative:

- Eliminate the Dell allotment. All BLM administered acres and the AUMs associated with the Dell allotment would be incorporated into the Huntsman allotment.

Table 2.6: Current Terms and Conditions for Dell allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Dell	05/01	11/30	66	15

Table 2.7: Proposed Terms and Conditions for Dell allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Eliminate Allotment				

Huntsman #10123 (Map #8)

Grazing Management:

- The authorized begin date would be moved from May 6th to May 25th.
- The permittee would be authorized to graze the allotment for a maximum of 31 days each year during the authorized grazing period of May 25 to July 15.

Projects:

- Remove a portion of the northwest boundary fence to incorporate the Dell allotment into the Huntsman allotment. The BLM administered 40 acres and associated 15 AUMs found in the Dell allotment would then be added to the Huntsman allotment active AUMs.

Administrative:

- Incorporate the BLM administered acres and AUMs from the Dell allotment into the Huntsman allotment.

Table 2.8: Current Terms and Conditions for Huntsman allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Huntsman	05/06	7/15	75	331

Table 2.9: Proposed Terms and Conditions for Huntsman allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Huntsman	05/25	7/15	75	346*

*Includes 15 AUMs previously found in Dell Allotment

Knox #10136 (Map #7 and 9)

Grazing Management:

- Pasture #2 and #3 would be rested every other year and grazed for a maximum of 14 days during grazing years.
- Pasture #1 would be rested once every third year during the growing season.
- Pasture #6 and #7 would be grazed up to 30 days during the period of October 1 to November 30.

Projects:

- Construct a riparian exclosure fence around the wetland area #1152 in pasture #5 (Approximately two acres).

- Remove a portion of the east pasture fence in pasture #3 and rebuild it so it excludes riparian reach #1148 and most of riparian reach #1117.
- From an existing well on private land in T11s, R8W, section 12, extend a pipeline in an easterly direction and install a 1,000 gallon trough on either private or State DNRC lands pending engineering review. The pipeline would be placed along an existing disturbance corridor or in unsuitable sage grouse habitat to the extent possible.
- Obliterate and rehabilitate approximately 0.77 miles of illegal primitive road crossing East Creek along the section line between Section 1 and Section 6, T11S, R7W to reduce sediment impacts to WCT habitat related to unauthorized motorized use and associated road runoff.

Administrative:

- Remove 100 acres and an associated 30 AUMs from the Knox allotment pasture #3.

Table 2.10: Current Terms and Conditions for Knox allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Knox	06/01	6/30	57	901
	10/1	11/30		

Table 2.11: Proposed Terms and Conditions for Knox allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Knox	06/01	6/30	57	871
	10/1	11/30		

Table 2.12: Proposed Terms and Conditions for Knox allotment

Allotment/ Category	Year	Begin Date	End Date	% Public Land	Active AUMs
Knox	1				
		06/01	6/30	57	871
		10/1	11/30		
	2*	06/01	06/30	57	605
		10/1	11/30		
	Repeat				

*Rest pastures #2 and #3.

Mayberry #10143 (Map # 10)

Grazing Management:

- No livestock grazing would be authorized in the newly constructed riparian pasture for four years. After that, the riparian pasture could be grazed for 5-7 days once every third year. Continue grazing management as stated in the No Action alternative for the remainder of the Mayberry allotment.

Projects:

- Construct a riparian pasture fence around reach #1501 (approximately 200 acres).

- Develop a new source of water for the existing pipeline called "Mayberry Pipeline" developed in 1994. A new water source on private land in T13S, R7W SE1/4 of the SE ¼ of Section 30 would be used to provide the water to the pipeline. This water source would travel for about 6,000 feet with about 3,000 feet on BLM administered land and 1,500 feet on private lands. The remainder of the pipeline would remain unchanged.
- Construct a riparian exclosure around reach 1197.
- Up to 6 acres of wetland restoration along a Little Basin Creek tributary (Reach 1501, Map 10). Please see description under the heading *Wetland Restoration* in Section 2.2.3, *Features Common to All Action Alternatives*.

Table 2.13: Current Terms and Conditions for Mayberry allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Mayberry	07/01	11/30	62	2,372

Table 2.14: Proposed Terms and Conditions for Mayberry allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Mayberry	07/01	11/30	62	2,372*

*During years the riparian pasture is rested, AUMs would be reduced to 2,342.

Red Butte #20030 (Map #11)

Grazing Management:

- The BLM administered lands (40 acres) would be rested once every three years.

Projects:

- Place permanent fence posts at intervals along the BLM administered land boundary. Use these permanent posts to string electric fence to prevent livestock from grazing these BLM administered lands once every three years.

Table 2.15: Current Terms and Conditions for Red Butte allotment

Allotment/ Category	Begin Date	End Date	Active AUMs
Red Butte	04/01	10/31	14

Table 2.16: Proposed Terms and Conditions for Red Butte allotment

Allotment	Year	Begin Date	End Date	Active AUMs
Red Butte	1	04/01	10/31	14
	2	04/01	10/31	14
	3	Rest	Rest	0
	Repeat Rotation			

Red Butte SE #30615 (Map #11)

Grazing Management:

- The BLM administered lands would be rested once every three years.

Projects:

- Place permanent fence posts at intervals along the BLM administered land boundary. Use these permanent posts to string electric fence to prevent livestock from grazing these BLM administered lands once every three years
- Appropriate personnel will be notified to address the unauthorized landfill on BLM administered land.

Table 2.17: Current Terms and Conditions for Red Butte SE allotment

Allotment/ Category	Begin Date	End Date	Active AUMs
Red Butte SE	06/01	11/30	110

Table 2.18: Proposed Terms and Conditions for Red Butte SE allotment

Allotment	Year	Begin Date	End Date	Active AUMs
Red Butte SE	1	04/01	10/31	110
	2	04/01	10/31	110
	3	Rest	Rest	46*
	Repeat Rotation			

*No grazing on the 160 BLM administered acres on the west side of the allotment during year three of rotation.

Sage Creek AMP (30012 (Map #12)

Grazing Management:

- Continue the grazing management plan as specified in the no action alternative.

Projects:

- Develop a spring and short (100 meter) pipeline off the spring near reach #1129 in T13S R6W, Section 2 or 3. Install one to two 1,000 gallon troughs at the end of the pipeline for livestock water. Fence the spring source to exclude it from livestock grazing. The pipeline would be placed along an existing disturbance corridor or in unsuitable sage grouse habitat to the extent possible.
- Develop a spring on private lands in T12S, R7W Section 22 and run two, 3,000 foot pipelines in a west and south easterly direction. Install one to two 1,000 gallon troughs on the end of both pipelines. Fence the spring source to exclude it from livestock grazing. The pipelines would be placed along an existing disturbance corridor or in unsuitable sage grouse habitat to the extent possible.
- Develop spring near reach #1135 on private lands in T11S, R7W Section 27 or 28. Install a short pipeline that may be located on BLM administered lands pending

engineering survey. The pipeline should be placed along an existing disturbance corridor or in unsuitable sage grouse habitat to the extent possible.

- Work with MT DNRC to develop a spring on Montana DNRC lands near reach #1193 in T12S, R7W Section 1 and 12, and install a short pipeline with one or two 1,000 gallon troughs on BLM administered lands for livestock water. Fence the spring source to exclude it from livestock grazing. The pipeline would be placed along an existing disturbance corridor or in unsuitable sage grouse habitat to the extent possible.
- The following are wetland restoration projects as described under the heading *Wetland Restoration* in Section 2.2.3, *Features Common to All Action Alternatives*.
    - Up to 15 acres of wetland restoration along Clover Creek (Reach 1129, Map 12).
    - Up to 16 acres of wetland restoration along East Creek (Reach 1113, Map 12).
    - Up to 12 acres of wetland restoration along a Little Sage Creek (Reach 1135, Map 12).
- Install culverts at the following locations. For further description see the heading *Stream Crossings* in Section 2.2.3, *Features Common to All Action Alternatives*.
    - Install culvert on the crossing over Little Sage Creek upstream of Reach 1159 (Map 12). This reach is on private land and an agreement with the landowner to install the culvert is in place.
    - Install culvert on Little Basin Creek (Reach 1102, Map 12).
    - Install Culvert on crossing over Little Sage Creek tributary downstream of Reach 1124 (Map 12). This reach is on private land and an agreement with the landowner to install the culvert is in place.

Optional Projects:

- Extend/expand the exclosures on both Bog Hole Spring (T12S, R7W, Section 11) and reach 1124 (T12S, R7W, Section 2) to include more of the wetland/reach area.
- Replace the culvert on Little Sage Creek tributary immediately upstream of Reach 1121 with a larger capacity culvert (Map 12). For further description see the heading *Stream Crossings* in Section 2.2.3, *Features Common to All Action Alternatives*.

Table 2.19: Current Terms and Conditions for Sage Creek AMP allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Sage Creek AMP	5/15	12/10	51	5,933

Table 2.20: Proposed Terms and Conditions for Sage Creek allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Sage Creek AMP	5/15	12/10	51	5,933

Tallent #20027 (Map #9)

Grazing Management:

- Rest rotation – continuation of past grazing management (No action alternative).

Projects:

- As part of a larger pipeline system on private lands, build about 200 meters of new pipeline in T11S, R8W Section 19 on BLM administered lands with one 1,000 gallon livestock watering trough.

Table 2.21: Current Terms and Conditions for Tallent allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Tallent	05/15	12/10	50	331

Table 2.22: Proposed Terms and Conditions for Tallent allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Tallent	05/15	12/10	50	331

Aspen Protection/Restoration:

Alternative B would allow the construction of browse protection structures where aspen is currently regenerating but is being severely browsed by ungulates. On-site woody material, such as fallen trees and other debris would be piled or pushed together to create obstacles that deter both livestock and wildlife from browsing aspen regeneration. The structures would be constructed by hand or by utilizing low ground pressure, tracked equipment where sufficient woody material is nearby. The browse protection structures would be less than eight feet in height and resemble piles or short windrows of woody debris. The overall goal is to allow patches of aspen regeneration to grow through the woody debris, eventually growing taller than browse height. Vigorous aspen regeneration that is not being restricted in height growth by annual browsing would allow carbohydrate energy produced in the leaf canopy to be stored in the clone's root system. Energy stored in the root system would promote the persistence of the clone and enable future aspen regeneration.

See section 2.3.3, Features Common to All Action Alternatives for additional design features.

Figures 2.1 and 2.2 below demonstrate the effectiveness of an experimental aspen browse protection treatment conducted by the BLM in the Big Hole Valley. Following the Mussigbrod Fire salvage timber sale in 2003, residual slash from the timber harvest was pushed against the few remaining mature aspen trees. The photo in Figure 2.1 was taken in 2006, and the photo in Figure 2.2 was taken of the same aspen patch in 2009. Aspen regeneration had approximately doubled in height and abundance during this three year time period, and was experiencing low levels of browse pressure where slash protected the emerging aspen suckers.

Figure 2.1--October, 2006 **Figure 2.2—August, 2009**

Table 2.23 Aspen Protection/Restoration Treatments, Alternative B

Treatment Name	Stream Name	Length (miles)
Aspen 1118	Heifer Creek	1.45
Aspen 1147	Heifer Creek Tributary	0.37
Aspen 1164	Heifer Creek Tributary	0.30
Aspen 1115	East Creek	0.32
Aspen 1116	East Creek	Lower 0.50
Aspen 1185	East Creek Tributary	0.32
Aspen 1186	East Creek Tributary	0.37
Aspen 1161	East Creek Tributary	0.27
Aspen 1162	East Creek Tributary	0.30
Aspen 1117	Heifer Creek	Lower 0.30
Total Miles		4.5

Travel Management:
In addition to the management identified above for All Action Alternatives including the No Action Alternative, there would be adjustments to the designated routes identified in the amended RMP to correct mapping errors, and to address changes in access opportunities on surrounding lands. In light of ongoing issues regarding non-compliance with travel management designations, BLM would:

- install an informational kiosk at key access locations (see two starred locations on Map 4).
- obliterate or reclaim user-created routes by scarifying the route surface and planting live and placing dead brush within the linear disturbance to obscure the visual presence of the route from the adjoining route junction.
- barricade or obstruct access to closed routes that have been habitually traveled and/or routes that have been physically obliterated
- change authorization of snowmobiles, tracked OHVs, and any other over-snow machines to designated routes only, between May 15-December 2.

The recommended changes to travel management are shown on Maps 4 and 5. These changes would result in a net loss of approximately 5 miles of designated open routes within the watershed. Most of those miles are the result of a change in designated open routes to correct mapping errors, or where the general public cannot access those routes across adjacent private lands. The amended RMP Appendix P describes the Authorized Route Designation Principles used in the public process that was used to develop the original routes designations. Among other things, it suggested that, "BLM roads not accessible to the public should be closed except for BLM lease and administrative and emergency use." This criteria was established both to encourage private landowners to allow public access to public lands, and to prevent those landowners from having exclusive motorized use of those lands for hunting or other recreational purposes.

2.3.5 Description of Alternative C

Livestock Management:
There are some proposed administrative, grazing management and project features listed under alternative C that are carried over from alternative B. Please, refer to table 2.4, *Comparison of Proposed Livestock Grazing or Administrative Alternatives by Allotment*, to compare specific proposals under alternatives A, B and C.

<u>Armstead Mountain #30008 and Gallagher Mountain AMP #30013</u> (Map #6)
Administration: Insert three Gallagher Mountain AMP allotment pastures (Sheep Canyon, Sage Creek and Divide Creek) into the Armstead Mountain allotment to improve management of both allotments. Nine hundred and fifty AUMs of authorized grazing along with the associated acres would be removed from the Gallagher Mountain AMP allotment and 650 of these AUMs would be added to the Armstead Mountain allotment (See attached map).

Grazing Management:
There are two herds with <500 cattle each that would graze the Armstead Mountain allotment under this alternative.

For herd number 1, six pastures in the Armstead Mountain allotment that contain BLM administered lands, would be authorized for use. Each pasture would be limited to a specific number of grazing days as follows:
-Divide Creek….No Grazing
-Sage Creek….25 days
-Middle Creek…. 25 days
-Poison….15 days
-Sheep Canyon….25 days
-Freeman….25 days

All pastures would receive rest once every third year except Poison pasture. The Poison pasture could be grazed every year given that the pasture is grazed after August 15 annually as a deferred pasture. The Divide Creek Pasture would not be grazed for at least the next 10 years.

For herd number 2, six pastures that contain BLM administered lands in the Armstead Mountain allotment would be authorized. Each pasture would be limited to a specific number of grazing days as follows:

Spring Gulch 45 days
Buck Creek 45 days
High Field 25 days
Horseshoe Timber 25 days
Buckhorn (M. Canyon) 25 days
Armstead 25 days

In addition, Spring Gulch or Buck Creek must be rested every other year. Of the remaining pastures (High Field, Horseshoe Timber, Buckhorn, Armstead) one must be rested every year and all pastures must be rested once every four years. The grazing rotation must begin in a different pasture every year.

***The Buck Creek holding water gap is closed to livestock grazing except for trailing to and from Buck Creek pasture.

Projects:

- Same as Alternative B.

Table 2.24: Current Cattle Terms and Conditions for Armstead Mountain and Gallagher Mountain AMP allotments

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Armstead Mountain	7/11	12/10	43	1514
	06/01	7/10	63	580

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Gallagher Mountain AMP	05/01	11/20	52	4185

Table 2.25: Proposed Cattle Terms and Conditions for Armstead Mountain and Gallagher Mountain AMP allotments

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Armstead Mountain	7/11	12/10	43	1864 *no grazing in Divide Creek pasture (300 AUMs not available)
	06/01	7/10	63	580

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Gallagher Mountain AMP	05/01	11/20	52	3235

Dell #20620 (Map #8)

Grazing Management:

- Authorized grazing period for the Dell allotment would be from February 1 to April 15.
- Livestock trailing across the Dell allotment for the permittee to get their livestock to and from their private land would be authorized, but no overnight use except during the authorized season of use.

Table 2.26: Current Terms and Conditions for Dell allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Dell	05/01	11/30	66	15

Table 2.27: Proposed Terms and Conditions for Dell allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Dell	2/01	04/15	66	15

Knox #10136 (Map #9)

Grazing Management:

- Pasture #2 would be rested every other year and grazed for a maximum of 14 days during the grazing year. Pasture #3 would be rested two out of every three years and grazed up to 14 days during the grazing year.
- Pasture #6 and #7 would be grazed up to 30 days during the period of October 1 to December 31.

Projects:

- Construct a riparian exclosure fence around the wetland area #1152 in pasture #5 (Approximately two acres).

Table 2.28: Current Terms and Conditions for Knox allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Knox	06/01	6/30	57	901
	10/1	11/30		

Table 2.29: Proposed Terms and Conditions for Knox allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Knox	06/01	11/30	57	901
	10/1	11/30		

Table 2.30: Proposed Terms and Conditions for Knox allotment

Allotment/ Category	Year	Begin Date	End Date	% Public Land	Active AUMs
Knox	1*	06/01	6/30	57	635
		10/1	11/30		
	2**	06/01	06/30		738
		10/1	11/30		
	3***	06/01	06/30		738
		10/01	11/30		
	Repeat Rotation				

*Rest pastures #2 and #3.
**Rest Pasture #3
***Rest Pasture #2

Mayberry #10143 (Map #10)

Grazing Management:

- No livestock grazing would be authorized in the newly constructed riparian exclosure (200 acres).

Projects:

- Same as alternative B.

Table 2.31: Current Terms and Conditions for Mayberry allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Mayberry	07/01	11/30	62	2,372

Table 2.32: Proposed Terms and Conditions for Mayberry allotment

Allotment/ Category	Begin Date	End Date	% Public Land	Active AUMs
Mayberry	07/01	11/30	62	2,332*

*40 active AUMs removed from lands not available for grazing inside riparian exclosure

Aspen Protection/Restoration:

The ten aspen treatment areas identified in Alternative B would be carried forward in Alternative C. Two additional treatment areas located in the Crooked Creek drainage would also be included in Alternative C. The aspen protection/restoration treatment design features, narrative description and overall goal identified in Alternative B would also apply to Alternative C. Unique to Alternative C, mechanical aspen root disturbance would be implemented to promote aspen suckering. Mechanical aspen root disturbance would be considered within all 12 treatment areas on a case-by-case basis. Low ground pressure, tracked equipment, such as a skidsteer or tracked excavator, would be used to disturb the interconnected aspen root systems to encourage suckering. The following design features would apply to mechanical aspen root disturbance treatments:

- Soil disturbance would be limited to less than twelve inches in depth and be implemented with equipment-mounted ripping teeth, or other suitable equipment attachment.
- Treatment areas would be to relatively flat ground minimizing sediment transport potential.
- Maintain a strip of undisturbed soil and vegetation near stream banks to slow or dissipate overland flow to capture and retain sediment before entering the streams. If the vegetated buffer is deemed inadequate in width or vegetation density to properly filter runoff, structural erosion control (e.g.; straw wattles) would be temporarily installed until the site has vegetated.
- The direction of surface ripping will be parallel to the stream channel so the rows of soil left by the ripping teeth are parallel to the channel. These rows should capture and pond any overland flow dramatically reducing the likelihood of a concentrated flow path developing through the disturbed ground directly to an adjacent stream channel.
- Seeding of native grasses and forbs would be considered if natural revegetation is not occurring.
- Following aspen root disturbance treatments, browse protection structures or aspen exclosures would be constructed as described in Alternative B to protect regeneration from ungulate browse.

Table 2.33 Aspen Protection/Restoration Treatments, Alternative C

Treatment Name	Stream Name	Length (miles)
Aspen 1118	Heifer Creek	1.45
Aspen 1147	Heifer Creek Tributary	0.37
Aspen 1164	Heifer Creek Tributary	0.30
Aspen 1115	East Creek	0.32
Aspen 1116	East Creek	Lower 0.50
Aspen 1185	East Creek Tributary	0.32
Aspen 1186	East Creek Tributary	0.37
Aspen 1161	East Creek Tributary	0.27
Aspen 1162	East Creek Tributary	0.30
Aspen 1117	Heifer Creek	Lower 0.30
Aspen 1110	Crooked Creek	0.64
Aspen 1153	Crooked Creek	0.50
Total Miles		5.64

Travel Management:
In addition to changes to designated routes proposed in Alternative B, a recommendation from the MFWP area biologist would be considered, adding 94 miles of road closures to improve wildlife security and hunter opportunity. These routes would be physically closed using signing, barricades, or obliteration to deter unauthorized motorized use that occurs especially during the big game hunting season. The recommended changes are shown on Maps 4 and 5.

2.4 Summary Comparison of Alternative Actions

Nine of the twenty-two grazing allotments in the watershed have proposed grazing management changes. Up to three management alternatives are compared in Table 2.41 for these allotments.

Table 2.34: Comparison of Proposed Livestock Grazing or Administrative Alternatives

Armstead Mountain #30008	Alternative A (No Action)	Alternative B	Alternative C
Season of Use	07/11-12/10	07/11-12/10	07/11-12/10
	05/01 – 7/10	05/01 – 7/10	05/01 – 7/10
Active BLM AUMs	1514	2464	1864
	580	580	580
Grazing System	Rest Rotation	Same as alternative A	Same as Alternative A
Projects	None	None	None
Administrative Actions	None	Remove three Gallagher Mountain AMP allotment pastures and insert them into the Armstead Mountain allotment.	Same as alternative B
Gallagher Mountain AMP #30013	Alternative A (No Action)	Alternative B	Alternative C
Season of Use	05/01-11/20	05/01-11/20	05/01-11/20
Active BLM AUMs	4185	3235	3235
Grazing System	Rest Rotation Graze each pasture twice every three years for 15-30 days	Rest Rotation Rest Divide Creek pasture every other year, all other pastures once every third year	Rest Rotation - rest every pasture once every third yr. -Divide Creek pasture No grazing
Projects	None	Culvert installation on stream reaches 9 and 31.	Same as alternative B
Administrative Actions	None	Remove three Gallagher Mountain AMP allotment pastures and insert them into the Armstead Mountain allotment.	Same as alternative B
Bull Heifer Creek #10137	Alternative A (No Action)	Alternative B	
Season of Use	6/01-9/30	6/01-9/30	
Active BLM AUMs	78	108	
Grazing System	Short Term Grazing Graze allotment two out of every three years	Rest allotment every other year -Graze for < 21 days during grazing year	

Projects	None	Construct a mile of fence to incorporate about 100 acres of BLM administered lands from the Knox allotment into Bull Heifer Creek.	
Dell #20620	Alternative A (No Action)	Alternative B	Alternative C
Season of Use	5/1-11/30	Eliminate allotment – add acres and AUMs to Huntsman Allotment	02/1 to 04/15
Active BLM AUMs	15	0	15
Grazing System	Short-Term Grazing No rest period mandated	Would be grazed along with Huntsman Allotment – Short Term Grazing	Short-Term Grazing- No supplemental feeding allowed on BLM administered lands.
Projects	None	Remove about 2,000 feet of fence to incorporate the old Dell allotment administered lands into the Huntsman allotment.	None
Huntsman #10123	Alternative A (No Action)	Alternative B	
Season of Use	5/6-7/15	5/25-7/15	
Active BLM AUMs	331	346 – (15 AUMs from Dell Allotment)	
Grazing System	Short-term grazing	Short-term grazing	
Projects	None	Remove a portion of the boundary fence to incorporate acres from the eliminated Dell allotment.	
Knox #10136	Alternative A (No Action)	Alternative B	Alternative C
Season of Use	06/1-6/30	06/1-6/30	06/1-6/30
	10/1-11/30	10/1-11/30	10/1-11/30
Active BLM AUMs	901	871	901
Grazing System	Rest Rotation Pastures #2 and #3 rested once every three years and grazed up to 21 days.	Rest Rotation -Pasture #2 and #3 rested every other year up to 14 days -Pasture #6 and #7 grazed for 30 days during period of October 1 and November 30	Rest Rotation -Pasture #2 rested every other year up to 14 days - Pasture #3 rested two out of every three years for up to 14 days. Pasture #6 and #7 grazed for 30 days during period of October 1 and November 30

Administrative Actions	None	Remove about 100 acres from the Knox allotment pasture #3 and place these acres into the Bull Heifer allotment	None
Projects	None	Remove a portion of the East pasture fence in pasture #3 and rebuild this fence to exclude about 100 acres of land from Knox Allotment. Construct a riparian exclosure around wetland #1152.	Construct a riparian exclosure around wetland #1152.
Mayberry #10143	Alternative A (No Action)	Alternative B	Alternative C
Season of Use	07/01-11/30	07/01-11/30	07/01-11/30
Active BLM AUMs	2372	2372	2,332
Grazing System	Deferred Rotation	Deferred Rotation	Deferred Rotation- No grazing in riparian pasture
Projects	None	Construct a riparian exclosure fence around reach 1501. Redirect existing spring to provide water for the Mayberry pipeline. Build about 6,000 of new pipeline from spring to existing Mayberry pipeline. Wetland restoration along Reach 1501.	Same as Alternative B.
Red Butte #20030	Alternative A (No Action)	Alternative B	
Season of Use	04-10/31	04-10/31 (Rest the BLM administered lands once every three years).	
Active BLM AUMs	14	14	
Grazing System	Custodial Use No rest period mandated	Short Term Grazing- Rest BLM acres in allotment once every three years	
Projects	None	Build an electric fence around the BLM administered lands.	
Red Butte SE #30615	Alternative A (No Action)	Alternative B	
*Season of Use	6/01-11/30	6/01-11/30	
Active BLM AUMs	110	110	

Grazing System	Deferred/Rest Rotation	Deferred/Rest Rotation- Rest BLM acres in allotment once every three years	
Projects	None	Construct an electric fence to prevent livestock from grazing about 125 acres of BLM administered lands once every three years.	
Sage Creek AMP #30012	Alternative A (No Action)	Alternative B	
*Season of Use	5/15-12/10	5/15-12/10	
Active BLM AUMs	5,933	5,933	
Grazing System	Rest Rotation	Rest Rotation	
Projects	None	-Develop spring and pipeline (100 meters) with one trough. Fence off Spring source -Develop spring on private lands with two, 3,000' pipelines with one 1,000g trough at the end of each pipeline. Fence off Spring source -Develop spring on private lands with pipeline likely found on BLM with one 1,000g trough. Fence off Spring source -Develop spring in cooperation with Montana DNRC lands with pipeline and two troughs on BLM lands. Fence off Spring source. -Install culverts on reach 1102, upstream of reach 1159, and downstream of reach 1124. -Wetland restoration along reaches 1129, 1113, and 1135	
Tallent #20027	Alternative A (No Action)	Alternative B	
Season of Use	5/15-12/10	Same as Alternative A	
Active BLM AUMs	473	473	
Grazing System	Deferred/Rest Rotation	Deferred/Rest Rotation	
Projects	None	Construct about 200 meters of new pipeline and one, 1,000g livestock trough.	

***The grazing season and billing period for all BLM allotments begins on March 1 of the year and ends on February 28 the following calendar year. Accordingly, the number of AUMs harvested under Alternative B are calculated for each grazing season and billing cycle, and not based on a particular calendar year.**

Table 2.35 Comparison of Aspen Protection/Restoration Treatments

Treatment Name	Stream Name	Allotment Name	Length (miles)		
			Alt A	Alt B	Alt C
Aspen 1118	Heifer Creek	Bull Heifer	0	1.45	1.45
Aspen 1147	Heifer Creek Tributary	Bull Heifer	0	0.37	0.37
Aspen 1164	Heifer Creek Tributary	Bull Heifer	0	0.30	0.30
Aspen 1115	East Creek	Knox	0	0.32	0.32
Aspen 1116	East Creek	Knox	0	0.50	0.50
Aspen 1185	East Creek Tributary	Knox	0	0.32	0.32
Aspen 1186	East Creek Tributary	Knox	0	0.37	0.37
Aspen 1161	East Creek Tributary	Knox	0	0.27	0.27
Aspen 1162	East Creek Tributary	Knox	0	0.30	0.30
Aspen 1117	Heifer Creek	Knox	0	0.30	0.30
Aspen 1110	Crooked Creek	Little Spring Gulch	0	0	0.64
Aspen 1153	Crooked Creek	Armstead Mountain	0	0	0.50
Total Miles			0	4.5	5.64

Table 2.36: Comparison Travel Management Actions by Alternative

Travel Management (Designated Route changes, in miles)				
	Alternative A	Common to All Action Alternatives	Alternative B	Alternative C
Net change in designated open motorized routes	No change	N/A	-5 miles	-94 miles

Chapter 3

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing condition of specific environmental components that may be affected by the proposed action. The description of the affected environment is related to the specific issues and resource concerns identified in Chapter 1, but also encompasses the wider landscape of the SCW. This chapter is a summary of the baseline environment. A more detailed and comprehensive description of the current conditions in the watershed are provided in the SCW Assessment Report (December 2015) and is available for review at the Dillon Field Office or online at http://www.blm.gov/mt/st/en/fo/dillon_field_office.html.

3.1 General Setting

The Sage Creek Watershed is located in southeastern Beaverhead County, Montana on the eastern slopes of the Rocky Mountains. The watershed lies in Townships 10-13 South, Ranges 6-10 West Montana Principal Meridian (M.P.M). The assessment area covers public lands administered by the BLM from approximately I-15 on the west side of the watershed to the top of the Blacktail Range on the east and from Clover Divide on the south to the Blacktail Range on the north. The SCW roughly corresponds to the 5th level Hydrologic Unit (HU) also known as Sage Creek (1002000106) used by Montana Department of Environmental Quality (DEQ). A portion of Armstead Mountain allotment is located west of I-15. While the majority of the assessment area includes public lands within the Sage Creek HU, portions of other HUs are also included. The assessment area boundary shown on Map 1 follows grazing allotment boundaries and includes some allotments that are partially outside the watershed.

Sage Creek Watershed

Within the Sage Creek Watershed Assessment area boundary, there are approximately 203,629 acres of which the BLM administers 114,475 acres. This report addresses only public lands administered by the BLM within the watershed. However, approximately 41,312 acres administered by the State of Montana Department of Natural Resources (DNRC) and 47,842 acres of privately owned lands also occur within the watershed assessment area.

Elevations within the assessment area range from approximately 5,950’ along Sage Creek in the southwestern portion of the area to over 9,400’ along the top of Blacktail Ridge on the north end

of the assessment area. Topography varies from flat valley bottoms to steep mountainous ravines. Upland vegetation varies from low-sage (*Artemisia arbuscula spp. arbuscula*) and western wheatgrass (*Pascopyrum smithii*) or black greasewood (*Sarcobatus vermiculatus*) and bottlebrush squirrel-tail (*Elymus elymoides*) in the valley bottom to mountain big sagebrush (*Artemisia tridentata spp. vaseyana*) and Idaho fescue (*Festuca idahoensis*) or subalpine fir (*Abies lasiocarpa*) and limber pine (*Pinus flexilus*) at higher elevations. Riparian stringer habitat is very important within the watershed and includes primarily aspen (*Populus tremuloides*), willow (*Salix spp*.) and sedges (*Carex spp*.). Annual precipitation within the watershed varies from <10" in the lower elevations to >25" in the higher country. Because of the diverse landscape and vegetation within the watershed assessment area, it provides habitat for an abundance of wildlife.

3.2 Description of Affected Issues/Resources

3.2.1 Issue # 1: Riparian, Wetland, and Aquatic Habitat

Divide Creek, June, 2015

In Chapter 1 of this EA, the riparian, wetland and aquatic habitat objectives for the Sage Creek Watershed that are expected to be achieved over the ten year life of the EA were described. The goals and objectives for riparian and wetland condition are described in the Amended Dillon RMP. The goal is to initiate an upward trend in 20 years; the objective is to move resource conditions forward toward reaching Desired Future Conditions (DFC) in 20 to 50 years. Streams that are achieving Proper Functioning Condition (PFC) are not necessarily at DFC, however, PFC is a prerequisite to achieving desired condition (USDI 1998).

There are approximately 46 stream miles flowing through BLM administered land within the SCW. As surface water and/or groundwater they flow to Sage Creek which joins the Red Rock River north of Dell. A couple of reaches flow into Blacktail Deer Creek via Teddy Creek and Sheep Creek. Clover Creek reaches make their way to the Red Rock River at the east end of Lima Reservoir in the Centennial Valley south of SCW.

Riparian habitat is widely scattered within this large, dry watershed, making up 4% of the BLM administered lands in the SCW. There are few larger perennial streams, and most riparian habitat is associated with small tributary streams originating in springs, isolated springs with no downstream connections to other water sources, or intermittent drainages and wet meadows.

Riparian areas provide important habitat for moose, elk, beaver, songbirds, amphibians, and sage grouse. Riparian, aquatic, and wetland habitat offers habitat diversity and are crucial water sources for wildlife. Succulent forbs, largely found in riparian areas, are a key component of sage grouse brood diets. Wildlife and livestock concentrate in riparian habitat, as it provides green vegetation later into the summer and fall, resulting in a disproportionate amount of use in these areas.

Beavers have declined significantly region-wide, and the only active beaver dams found on BLM administered lands in the SCW were on Long Creek and East Creek. Private lands contain active beaver complexes in the SCW. Historic beaver activity was documented on BLM lands along East Creek, Bull Creek, Cattle Creek, Crooked Creek, Divide Creek, and a tributary to Little Sage Creek. The aspen is either no longer existent along these reaches, with the beaver having cut them all down, or colonies of mature aspen remain with little regeneration or browse reducing the vigor of the regeneration. Existing beaver colonies could provide beaver recruitment elsewhere into vacant streams and into adjoining watersheds but suitable habitat to sustain long-term occupancy is generally lacking, with many aspen communities transitioned into willow dominated systems.

Aspen in the SCW is also an important forage, cover, and nesting component for various species including elk, moose, and ruffed grouse. Riparian woodlands support the highest diversity of landbird species of all habitats. Riparian corridors are crucial to several northern-breeding Neotropical migrants and breeding or wintering species, even though they may not carry water year-round (Rich et al., 2004). Most species are summer residents that use habitats ranging from lower elevation wetlands to high elevation forests for breeding and raising young. Some species are migratory, but small populations may stay yearlong depending on seasonal conditions.

Aspen is found on many grazing allotments in the SCW including portions of the Knox, Bull Heifer Creek, Kent-Price Canyon, Long Creek, Armstead Mountain and Gallagher Mountain AMP allotments. Livestock are primarily grazers and rely on grass and some forbs during spring, summer and early fall to provide protein and nutrients for daily functions. However, riparian trees, primarily aspen, can be browsed by livestock during the fall and winter period (October 1 to March 15) when livestock seek forage that is higher in protein compared to ripened grass and forb plants. It is important for all grazing allotments that authorize fall and winter grazing and that have aspen and/or cottonwood within their boundary (Knox, Kent-Price Canyon, Armstead Mountain, Long Creek and Sage Creek allotments), to consider livestock's impacts to riparian trees when developing a grazing management plan (see SCW Assessment Report Table 1, page 13).

The National Wetland Inventory (NWI) was developed by the US Fish and Wildlife Service to conduct a nationwide inventory of wetlands. The Inventory was developed to facilitate conservation efforts by identifying various wetland types and their distribution throughout the United States. A wetland classification system (Cowardin et al. 1979) was developed that is now the Federal Standard (see glossary). The Montana Natural Heritage Program (MNHP), with financial assistance from the BLM, is in the process of mapping riparian and wetland resources to NWI standards. Wetland and riparian mapping within the SCW is progressing, but has not been completed. Current wetland mapping status is available on the MNHP webpage at:

http://mtnhp.org/nwi/NWI_Status_map.asp. The Cowardian wetland classification system is accessible at: http://mtnhp.org/nwi/Cowardin.pdf.

Eleven lentic (wetland) reaches totaling 56 acres were assessed in the SCW. Of the 11 lentic reaches assessed, 9 reaches, totaling roughly 48 acres, were rated PFC. One reach, totaling 5.4 acres, rated FAR with a static or no apparent trend and one reach, totaling 2.9 acres, rated FAR with a downward trend. Approximately 85% of the lentic acres were PFC. Riparian and wetland communities around springs and seeps are important contributors to habitat diversity as well as valuable water sources. Hydric soils are a small component of the landscape, but play an important role in ecological processes.

Observed wetland impacts which resulted in departures from PFC included: hummocking and soil compaction which lead to drying and alterations to hydrology as well as loss of the 'sponge.' Reduction in species diversity and composition, reduced vegetative cover, limited vegetative species recruitment and regeneration, reduced structural diversity, and/or decreased vigor of wetland vegetation were also observed. Generally, ungulate grazing and browsing were the most frequently observed causal factors.

Streams in SCW assessment area drain 203,628 acres of BLM, State and private lands. Of the total acreage, 114,475 (56%) are administered by the BLM. Some of the major streams within the SCW are Sage Creek, Divide Creek, Crooked Creek, East Creek, Basin Creek, and Little Sage Creek. Eighty one stream reaches, totaling 46 miles, were assessed for functional condition. Sixty two reaches, totaling 36.3 miles, were rated PFC. Six reaches, totaling 3.7 miles, were rated FAR with an upward trend. Ten reaches, totaling 4.7 miles, were rated FAR with a static or no apparent trend. Two reaches, totaling 0.7 miles, rated FAR with a downward trend. One reach, totaling 0.5 miles was rated NF. Riparian Standards were not met in two allotments: Gallagher Mountain AMP and Mayberry. See Maps 13 and 14 for riparian reach locations and calls. Figures 3.2 and 3.3 illustrate the 2015 percentage of lotic and lentic reaches in each PFC functional rating.

In 2005, 109,637 BLM administered acres, out of approximately 199,677 acres in the watershed, were assessed during the SCW assessment (2005 SCW EA, page 1). At that time, the ID team determined that 29 lotic stream miles (59%) met standards with a rating of PFC or FAR with an upward trend and that 20 lotic stream miles (41%) didn't meet standards with a rating of FAR with a static or downward trend or were NF (2005 SCW EA, page 38). Riparian Standards were not met in 2005 in these five allotments: Knox, Mayberry, Sage Creek AMP, Buck Creek AMP, and Tallent AMP. Buck Creek AMP was combined with the Armstead Mountain allotment following the 2005 assessment. A comparison between IDT findings in 2005 and 2015 of the percentage of the total lotic stream miles meeting or not meeting standards is illustrated in Figure 3.1.

Figure 3.1. Percent of Sage Creek Watershed Lotic Reach Miles Meeting/Not Meeting Standards in 2005 Compared to 2015

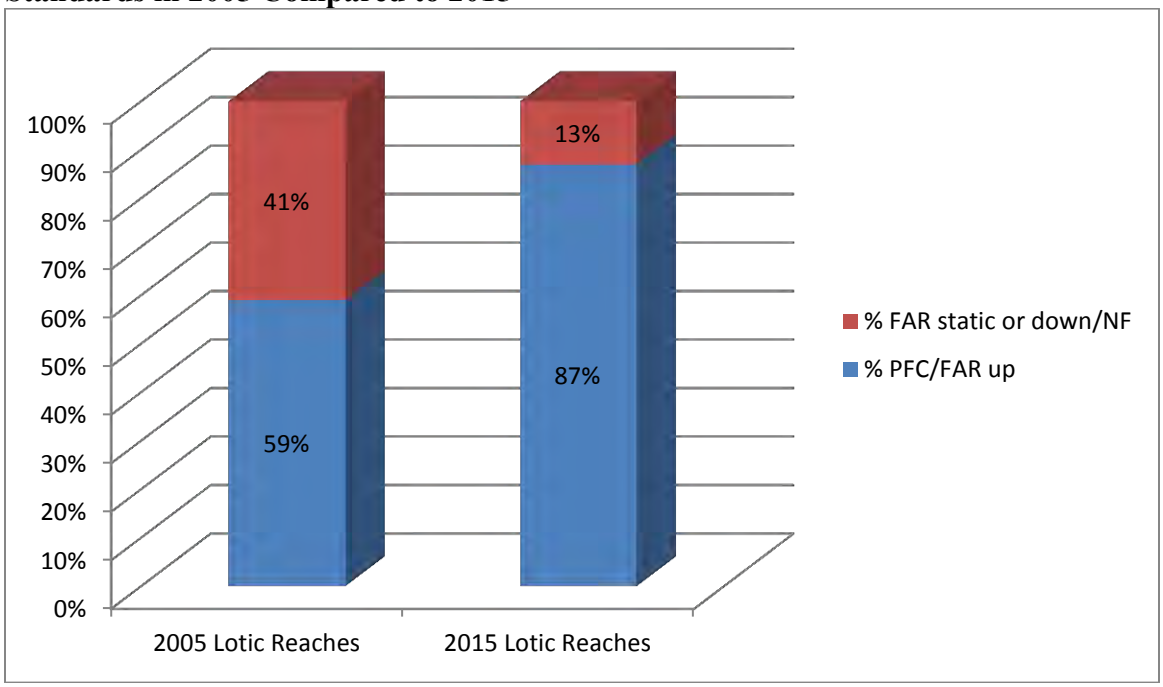


Figure 3.2. Sage Creek Lotic Reaches by PFC Functional Rating, 2015

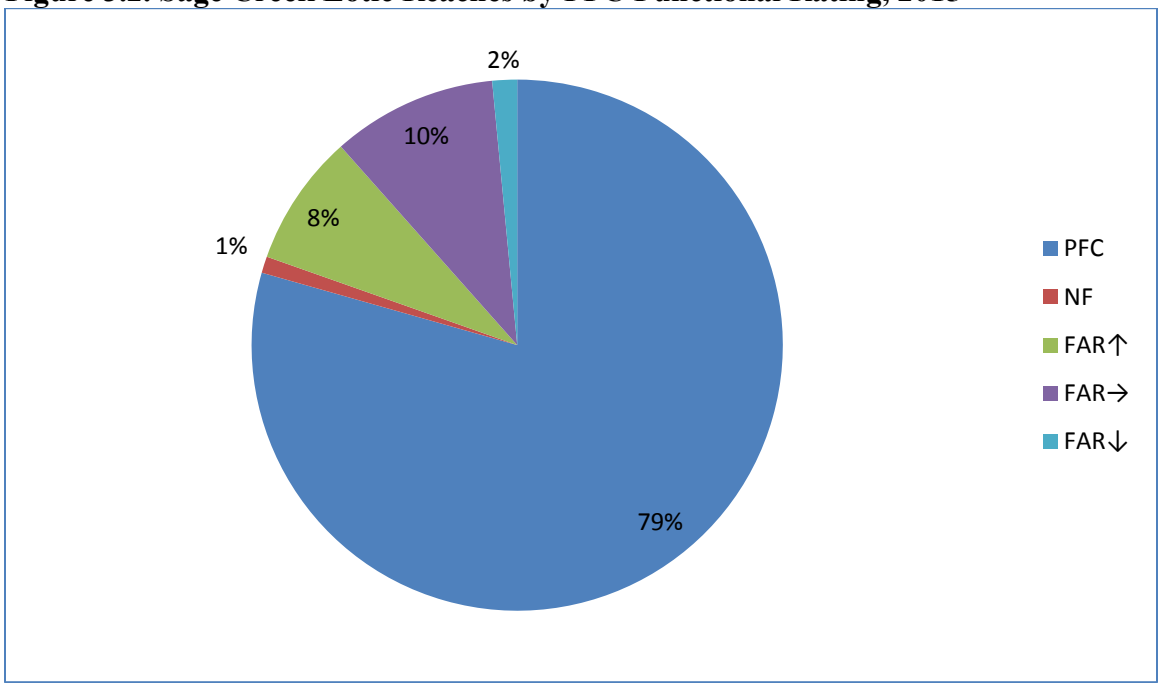


Figure 3.3. Sage Creek Lentic Reaches by PFC Functional Rating, 2015

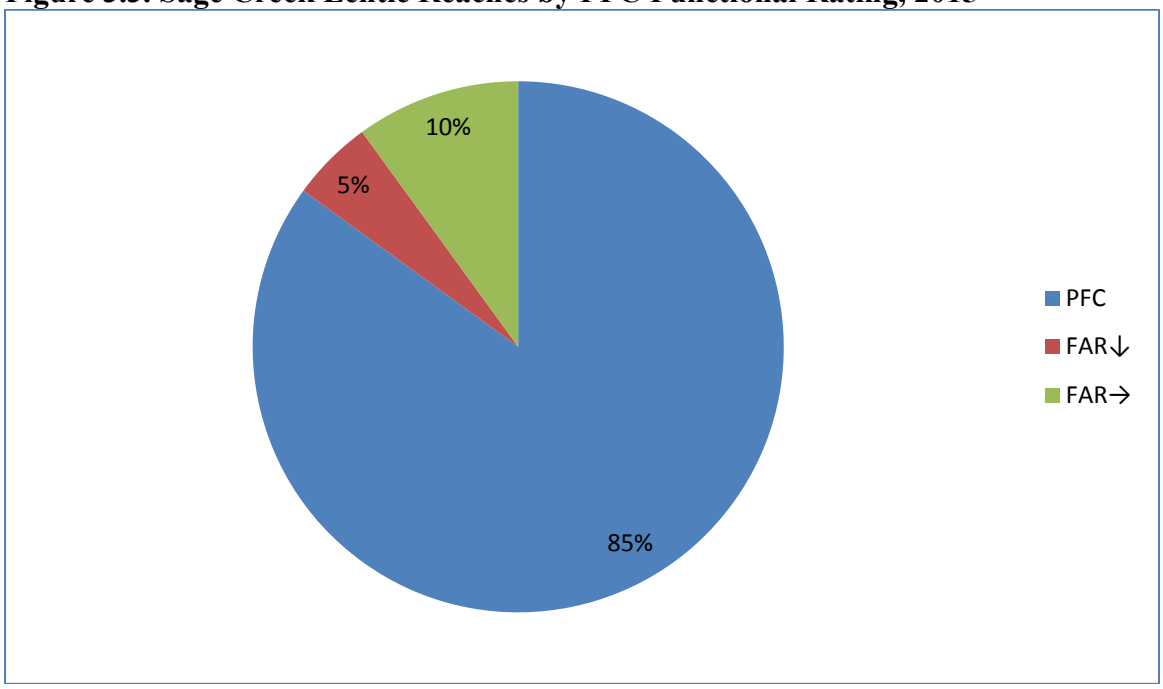


Table 3.1 summarizes the functional status of stream reaches and wetlands in the SCW that were evaluated.

Table 3.1. Functional Status of Lotic and Lentic Reaches within the Sage Creek Watershed

StreamWetland Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles/ Acres
Sage Creek trib	Armstead Mountain	1180	Shrubby cinquefoil/Tufted hairgrass	PFC	21.7 acres
Crooked Creek	Armstead Mountain	1153	Geyer willow/Beaked sedge	FAR-Up	0.5
Red Rock trib	Armstead Mountain	1107	Beaked sedge	PFC	0.43
Red Rock trib	Armstead Mountain	1111	Beaked sedge	PFC	0.3
Red Rock trib	Armstead Mountain	1127	Geyer willow/Beaked sedge	PFC	0.51
Red Rock trib	Armstead Mountain	1128	Geyer willow/Beaked sedge	PFC	0.33
Red Rock trib	Armstead Mountain	1168	Geyer willow/Beaked sedge	PFC	0.18
Red Rock trib	Armstead Mountain	1169	Geyer willow/Beaked sedge	FAR-Static	0.72
Red Rock trib	Armstead Mountain	1171	Kentucky bluegrass	PFC	0.29
Red Rock trib	Armstead Mountain	1172	Beaked sedge	PFC	0.06
Red Rock trib	Armstead Mountain	1173	Nebraska sedge	PFC	0.46
Sage Creek Upper	Armstead Mountain	1126	Geyer willow/Beaked sedge	PFC	3.1 acres

StreamWetland Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles/ Acres
Sage Creek Upper	Armstead Mountain	1182	Geyer willow/Beaked sedge	PFC	2.4 acres
Sheep Creek trib	Gallagher Mountain AMP	8	Carex	FAR-Static	0.2
Sheep Creek trib	Gallagher Mountain AMP	9	Carex	FAR-Static	0.51
Sheep Creek, WF	Gallagher Mountain AMP	31	Douglas fir	FAR-Static	0.57
Divide Creek	Gallagher Mountain AMP	42	Beaked sedge	PFC	1.3
Divide Creek trib	Gallagher Mountain AMP	0042	Beaked sedge	PFC	0.56
Sheep Creek trib.	Gallagher Mountain AMP	86	Carex	FAR-Static	0.45
Divide Creek trib	Gallagher Mountain AMP	87	Geyer willow/Beaked sedge	PFC	0.31
Heifer Creek	Bull Heifer	1118	Geyer willow/Beaked sedge	PFC	1.45
Heifer Creek	Bull Heifer	1147	Quaking aspen/Red-osier dogwood	PFC	0.36
Heifer Creek	Bull Heifer	1164	Geyer willow/Beaked sedge	PFC	0.29
Heifer Creek	Kent-Price	1119	Geyer willow/Beaked sedge	PFC	0.29
East Creek	Knox	1163	Geyer willow/Beaked sedge	PFC	4.5 acres
Heifer Creek bog	Knox	1187	Bog birch/Geyer willow/Beaked Sedge	PFC	10.4 acres
Beech Creek, WF	Knox	1103	Quaking aspen/Booth willow/Beaked sedge	PFC	1.55
Beech Creek	Knox	1104	Quaking aspen/sedge	PFC	0.08
Long Creek trib	Knox	1105	Geyer willow/Beaked sedge	PFC	.63
Beech Creek	Knox	1106	Geyer willow/Beaked sedge	PFC	1.13
Cattle Creek	Knox	1108	Booth willow/Beaked sedge	PFC	0.68
Cattle Creek	Knox	1109	Booth willow/Beaked sedge	PFC	0.37
Divide Creek	Knox	1112	Geyer willow/Beaked sedge	FAR Up	0.31
East Creek	Knox	1114	Geyer willow/Beaked sedge	PFC	0.97
East Creek	Knox	1115	Geyer willow/Beaked sedge	PFC	0.32
East Creek	Knox	1116	Quaking aspen/Red-osier dogwood	PFC	0.97
Heifer Creek	Knox	1117	Geyer willow/Beaked sedge	FAR-Up	0.93
Pistol Creek	Knox	1125	Quaking aspen/sedge	PFC	1.75
Bull Creek	Knox	1148	Shrubby cinquefoil/Tufted hairgrass	NF	0.55
Burnt Willow	Knox	1152	Geyer willow/Beaked sedge	FAR-Dn	2.9 acres
East Creek	Knox	1161	Quaking aspen/Red-osier dogwood	PFC	0.27
East Creek trib	Knox	1162	Quaking aspen/Red-osier dogwood	PFC	.0.29
Beech Creek	Knox	1184	Geyer willow/Beaked sedge	PFC	0.16
East Creek	Knox	1185	Quaking aspen/Red-osier dogwood	PFC	0.32
East Creek	Knox	1186	Quaking aspen/Red-osier dogwood	PFC	0.37
Long Creek	Knox non-AMP	1155	Geyer willow/Beaked sedge	PFC	0.29

StreamWetland Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles/ Acres
Crooked Creek	Little Spring Gulch	1110	Geyer willow/Beaked sedge	PFC	0.64
Sage Creek	Little Spring Gulch	1134	Beaked sedge	PFC	0.14
Long Creek	Long Creek	2100	Douglas fir	FAR-Up	0.49
Little Basin Creek trib	Mayberry	1140	Geyer willow/Beaked sedge	PFC	1.1 acres
Red Rock trib	Mayberry	1197	Geyer willow/Beaked sedge	FAR-Static	0.25
Little Basin Creek trib	Mayberry	1501	Geyer willow/Beaked sedge	FAR-Dn	0.54
Little Basin Creek	Sage Creek	1102	Geyer willow/Beaked sedge	PFC	0.25
East Creek	Sage Creek	1113	Geyer willow/Beaked sedge	FAR-Up	0.46
Little Sage Creek	Sage Creek	1120	Shrub cinquefoil/Tufted hairgrass	PFC	0.31
Little Sage Creek, trib	Sage Creek	1121	Geyer willow/Beaked sedge	PFC	0.75
Little Sage Creek	Sage Creek	1122	Geyer willow/Beaked sedge	PFC	0.34
Little Sage Creek	Sage Creek	1122B	Geyer willow/Beaked sedge	PFC	0.29
Little Sage Creek	Sage Creek	1123	Geyer willow/Beaked sedge	PFC	0.87
Little Sage Creek trib	Sage Creek	1124 (3 parts)	Geyer willow/Beaked sedge	PFC/FAR/ FAR-DN	0.52
Clover Creek	Sage Creek	1129	Shrubby cinquefoil/Tufted hairgrass	FAR-Static	0.68
Clover Creek	Sage Creek	1130	Geyer willow/Beaked sedge	PFC	0.29
Clover Creek	Sage Creek	1131	Shrubby cinquefoil/Tufted hairgrass	PFC	0.32
Clover Creek trib	Sage Creek	1132	Shrubby cinquefoil/Tufted hairgrass	PFC	0.55
Little Sage Creek, trib	Sage Creek	1133	Geyer willow/Beaked sedge	FAR-Static	0.3
Little Sage Creek	Sage Creek	1135	Kentucky bluegrass	FAR-Static	0.83
Little Basin Creek	Sage Creek	1136	SALPLA/CARAQU	PFC	0.23
Little Basin Creek	Sage Creek	1138	Shrubby cinquefoil/Tufted hairgrass	PFC	0.42
Little Basin Creek	Sage Creek	1139	Shrubby cinquefoil/Tufted hairgrass	PFC	0.51
Little Basin Creek	Sage Creek	1142	Beaked sedge	PFC	1.3 acres
Little Basin Creek	Sage Creek	1143	Geyer willow/Beaked sedge	PFC	0.64
Basin Creek	Sage Creek	1144	Beaked sedge	PFC	0.34
Basin Creek	Sage Creek	1145	Shrubby cinquefoil/Tufted hairgrass	PFC	1.36
Basin Creek	Sage Creek	1146	Kentucky bluegrass	PFC	0.23
Price Creek	Sage Creek	1149	Geyer willow/Beaked sedge	PFC	0.62
Price Creek	Sage Creek	1150	Geyer willow/Beaked sedge	PFC	0.32
Little sage Creek	Sage Creek	1159	Beaked sedge	PFC	0.91
Little sage Creek	Sage Creek	1160	Beaked sedge	PFC	1.44
Teddy Creek	Sage Creek	1165	SALPLA/CARAQU	FAR-Up	1.08
Teddy Creek	Sage Creek	1166	Shrubby cinquefoil/Tufted hairgrass	PFC	0.36
Heifer Creek	Sage Creek	1188	Geyer willow/Beaked sedge	PFC	0.73
Price Creek	Sage Creek	1189	Geyer willow/Beaked sedge	PFC	0.84

StreamWetland Name	Allotment	BLM Reach ID	Vegetative Community Type	Functional Rating & Trend	Miles/ Acres
Price Creek	Sage Creek	1190	Geyer willow/Beaked sedge	PFC	0.82
Clover Creek	Sage Creek	1502	Beaked sedge	PFC	0.36
Clover Creek	Sage Creek	1503	Geyer willow/Beaked sedge	PFC	0.55
Sage Creek Upper	Tallent AMP	1157	Geyer willow/Beaked sedge	PFC	.47

Authorized livestock grazing is a causal factor in the Riparian Standard not being met in two allotments: Gallagher Mountain AMP and Mayberry. Although Armstead Mountain, Knox, and Sage Creek allotments met the Riparian Health Standard overall, some site specific riparian concerns were noted in these allotments. Where streams and wetlands were not at PFC, some of the concerns included: alteration of stream morphology, reduced access to floodplains, reduced vegetative cover, limited vegetative species recruitment and regeneration, and/or decreased vigor of streamside vegetation. Generally, bank shearing, bare ground, ungulate grazing and browsing, over-widening, trampling, loss of deep binding roots, pugging and hummocking, sedimentation from roads, and trailing and stream crossings were the causal factors.

Allotments that met the riparian health standard and site specific riparian concerns were not noted by the IDT are not discussed in this section, but information on these resources is available upon request. Additional stream reach specific data for any of the riparian/wetland areas in the SCW is available at the Dillon Field Office. Gallagher Mountain AMP and Mayberry allotments did not meet the riparian health standard and are discussed in more detail below. Site specific riparian concerns found in Armstead Mountain, Knox, and Sage Creek allotments are also discussed.

Gallagher Mountain AMP

There are 3.9 stream miles in the portion of Gallagher Creek AMP that were included in the Sage Creek Watershed Assessment. Of this, 2.17 stream miles (Divide Creek) rated PFC, however 1.73 miles (Sheep Creek tributaries) rated FAR-static. Concerns on Sheep Creek tributaries (reach numbers 8, 9, 31, and 86) include over-widening, channel incisement, headcuts, inadequate riparian vegetation cover, and excess sediment. Reaches 9 and 31 are also impacted by the road crossing the stream.

Mayberry Allotment

Little Basin Creek tributary (#1501) rated FAR with a downward trend. Resource concerns include hummocking, edge of riparian area drying out, inadequate riparian vegetation cover, and excess sediment. A nearby water trough was not functioning. This dysfunctional water trough, along with the adjacent spring area (#1140) that has an exclosure around it, making it unavailable for livestock water, seems to have concentrated cattle use along reach 1501. Little Basin Creek tributary (#1515) rated NF. This dry ephemeral draw had only a few a spots of riparian vegetation, primarily rushes (*Juncus*). Large hummocks were created when water was present and trailing is evident along the fence. Red Rock tributary (#1197) is a short lentic system, impacted by ungulates congregating under the willows. This low energy system rated FAR from impacts including hummocking, alteration of flow patterns, and inadequate riparian vegetation cover.

Armstead Mountain Allotment
Buck Creek reach #1169 was rated FAR by the IDT. Concerns include: no willow regeneration and very little cottonwood regeneration, hummocking, road crossing and trailing, and excess sediment in the stream.

Knox Allotment
Bull Creek reach #1148 rated NF due to reduction of riparian-wetland vegetation (including recruitment for maintenance/recovery) and hummocking which has altered sinuosity, increased sediment, drying out of the wetland, and increased exposed soil surface. The Burnt Willow lentic area #1152 rated FAR with a downward trend due to drying out of the wetland from excessive pugging and hummocking, and lack of riparian-wetland vegetation recruitment. Although East Creek reach #1116 rated PFC, an undesignated, already closed route crossing the creek needs to be physically closed to stop the impacts this road crossing is having on the stream including excessive sediment, bank degradation, and loss of deep binding root mass vegetation.

Sage Creek Allotment
Little Sage Creek lentic area #1135 was totally dry except on private land at the lower end. Riparian-wetland vegetation is transitioning into more upland species as it dries out. Little Sage Creek tributary #1133 rated FAR. There is water 1/3 of the way down from Bog Hole Spring and the exclosure. The lower 2/3 of the reach is dry with over-widening a concern on this low-energy system. Little Sage Creek tributary #1124 (0.52 miles) had three ratings. At the top of the reach, above the exclosure, it rated FAR, within the exclosure it rated PFC, and below the exclosure it rated FAR with a downward trend. The reach section below the exclosure lacked riparian-wetland vegetation. Hummocking is a concern along the entire reach, however the channel has narrowed and the riparian area is widening within the exclosure. Clover Creek reach #1129 rated FAR due to channel incisement and over-widening, with a major concern being excessive hummocking.

Developed Springs
The BLM's Rangeland Improvement Project System (RIPS) database shows 15 spring developments in the SCW. BLM staff visited most of these developments to determine resource condition, condition of infrastructure, and water production (flow). Table 3.2 lists the spring developments on BLM administered land in the watershed.

Table 3.2: Developed Springs

Spring Name	Project Number	Allotment
HUNTSMAN 1 SPRING	476410	Huntsman
NINETEEN SPRING	470346	Mayberry
TWENTY FOUR SPRING	470347	Mayberry
ASHBOUGH LOWER SPRING	009613	Armstead MTN
DULCE AGUA SPRING	470462	Armstead MTN
HORSESHOE SPRING 1	476384	Armstead MTN
TWO DRIP SPRING	470349	Armstead MTN
MIDDLE CANYON SPRING	004806	Armstead MTN
ASHBOUGH UPPER SPRING	004779	Armstead MTN

Spring Name	Project Number	Allotment
BOG HOLE SPRING	004802	Sage Creek
LITTLE SAGE CREEK SPRING	475013	Sage Creek
NORTH SPRING	475015	Sage Creek
PASTURE 2A NW SPRING	004811	Sage Creek
SADDLE SPRINGS	004714	Sage Creek
SEDGE MEADOW SPRING	004524	Sage Creek

Maintenance of water developments was a noted concern on some developments in the watershed. Maintenance problems include lines not being drained, sediment in troughs, plumbing not properly working, lack of float valves or shutoff valves, and/or leaking troughs. These maintenance issues can negatively impact wetland hydrology and do not help attain the objective(s) that the development was originally intended to achieve (i.e., livestock distribution or mitigation of impacts to perennial streams). They may also impact water rights since water right holders are expected to conserve water. Though not related to maintenance per se, troughs may present wildlife hazards and escape ramps help mitigate the hazard. Properly maintained water developments are considered Best Management Practices (BMP) for riparian resources. The BLM must report on BMP effectiveness as part of our participation in Montana's Nonpoint Source Management Strategy. Permittee partnership and cooperation is critical to achieve these goals.

Fish Streams

There are 10 streams on BLM administered land within the Sage Creek assessment area that currently support cold water fish species. The westslope cutthroat trout (WCT), mountain whitefish, longnose sucker, white sucker, longnose dace and mottled sculpin are native fishes in the Sage Creek watershed. Rainbow, brown, brook and Yellowstone cutthroat trout were introduced, over the last century. As a result of this introduction, populations of native WCT within the watershed have declined due to competition and/or hybridization with rainbow and Yellowstone cutthroat trout. Land use practices within the Sage Creek watershed over the last century have caused a decline in riparian area condition, which have led to a loss of habitat for WCT and other native and non-native fish species.

Fish streams within the assessment area do not generally support popular recreational fishing. Portions of Sage Creek support a limited sport fishery for hybrid cutthroat, rainbow, brown, brook trout and mountain whitefish. Sage Creek provides on average approximately 67 angler use days per year (MFWP 2013). Several other streams likely support light fishing use as well.

Table 3.3. Sage Creek Watershed Fish Streams and Species

Stream	BLM Stream reach(s)	Fish Species Present on BLM Administered Land	BLM stream length (miles)
Sage Creek	1134,1157	Rainbow, brown and brook trout, cutthroat trout hybrids, long nose sucker, mottled sculpin, longnose dace and mountain whitefish	0.61

Stream	BLM Stream reach(s)	Fish Species Present on BLM Administered Land	BLM stream length (miles)
Basin Creek	NA	WCT (99%), brook trout mottled sculpin	0 (located on State and private land)
Little Basin Creek	1102,1138	WCT (92%), brook trout, mottled sculpin	0.67
Little Sage Creek	1123,1159,1135	Brook trout, rainbow trout and mottled sculpin	2.53
Bull Heifer Creek	1117	Brook Trout	0.93
East Creek	1114,1113,1115, 1116,1185	WCT (97 %), brook trout	3.41
Beech Creek	1106	Hybrid trout, brook trout	1.13
Cattle Creek	1109	WCT (unknown %)	0.23
Long Creek	2100,1155	WCT (99%), sculpin, brook trout	0.78
Divide Creek	42	Hybrid trout, brook trout	1.3

Overall, fish habitat conditions within the assessment area were found to be in good condition. Some streams exhibited localized impacts due to livestock or road use. Banks were found to be stable and exhibited low levels of bank disturbance. Within the SCW, sediment levels in streams were found to be within the natural range expected for channel type. The exception was Little Basin Creek. However, the high level of observed sediment within Little Basin Creek likely originates from the high levels of fines and clay found in the parent material in the basin. Stream banks on this stream are heavily vegetated with sedge and rush making bank disturbance unlikely as a significant sediment source.

Additional riparian/fish habitat information can be found above under the Riparian and Wetland Areas section and below under Special Status Fish.

3.2.2 Issue #2: Upland and Sagebrush Steppe Habitat

Uplands are defined as land at a higher elevation than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones (USDI 1996). Properly Functioning Condition (PFC) is defined as the condition in which vegetation and ground cover maintain soil conditions that can sustain natural biotic communities. The functioning condition of uplands is influenced by geomorphic features, soil, water, and vegetation (USDI 1994).

Soil development, formation, and stability are influenced by parent material, topography, local climate, plant cover and species composition, as well as historic and current uses. Information for the soils within the Sage Creek watershed was obtained from the Horse Prairie – South Valley, Part of Beaverhead County, Montana (NRCS 2015) and the Red Rocks Lake Area, Part of Beaverhead County, Montana (NRCS 2014) soil surveys. Soils on BLM administered lands in the SCW are formed primarily from colluvium, alluvium, or slope alluvium. The soils within the SCW occur on mountain slopes, ridge tops, hill slopes, and drainage bottoms. Slopes generally range from 5-30%, though there are smaller areas, generally in valley bottoms that are relatively flat (0-5%) and areas with slopes ranging from 30-45%. As a result of the underlying

geology, parent material and topography, soils within the SCW range from shallow to very deep. Surface texture of the soil map units are predominantly gravelly loam, gravelly sandy loam, cobbly loam, and loam.

Climatic conditions within the Sage Creek watershed have been generalized based upon the National Oceanic and Atmospheric Administration (NOAA) Climate Data Online, Grant 5, Montana, climate station (NOAA 2015). The Grant 5 climate station is located just west of the SCW at 1,762 m, and is the closest climate station to the project area. Table 3.4 summarizes the monthly precipitation data for the Grant 5, MT (NOAA, 2015) climate station from 1985-2014 (30-year average). There is no temperature data available for this site. Climatic conditions on BLM-administered land within the SCW vary from conditions recorded at the Grant 5 climate station; however the information provides general information about conditions and seasonal variation. These climatic conditions have resulted in soils that generally have a cryic or frigid temperature regime; the moisture regime varies greatly depending on proximity to groundwater and can vary from aquic to aridic.

Table 3.4: Average Monthly Precipitation (inches)

Month	Precipitation (in.)
January	0.35
February	0.30
March	0.63
April	1.02
May	1.76
June	1.70
July	0.99
August	0.94
September	0.77
October	0.87
November	0.51
December	0.36
Total	**10.20**

Soils on BLM-administered land within the Sage Creek watershed generally support forested, grassland, and shrubland ecological sites, including: Shallow Limy Droughty, Loamy Steep, Droughty Steep, Limy Droughty, Limy, Loamy, Thin Clay pan, Droughty, Shallow to Gravel, Shallow to Droughty, Saline Upland, Sub-irrigated, Riparian Meadow, Clayey, Wet Meadow, Loamy Steep, Meadow, and Saline Sub-irrigated (NRCS 2014, NRCS 2015).

As a result of parent material, topographic position and slope, local climate, and ecological communities, the soils within the SCW have developed distinct characteristics that affect what uses the soils can support and how the soils will respond to disturbances. One important use is for farmland. Prime and Unique Farmlands or Farmland of state or local importance should be protected to the extent possible. Within the SCW there are approximately 1,732 acres designated as Farmland of Statewide Importance, which accounts for approximately 1.5% of BLM-administered land within the watershed. There is also approximately 3,830 acres designated as Prime Farmland if Irrigated, which accounts for approximately 3.3% of BLM-administered land within the SCW.

Current vegetative cover was calculated using LANDFIRE (2013) existing vegetation type. Some acreage will be under or over estimated, but generally follow the amounts shown in Table 3.5.

Table 3.5. General Cover Types

Description	All Land Acres	% of Total	BLM Land Acres	%BLM	% BLM of Total
Agriculture	5853	3	531	<1	<1
Grassland	4327	2	1578	1	1
Sagebrush/shrub/steppe	190,200	87	106,428	93	49
Riparian	11,670	5	4062	4	2
Aspen-mix	208	<1	45	<1	<1
Forested	5288	2	1912	2	1
Water	8	0	0	0	0
Totals	**217,554**	**100**	**114,556**	**100**	**53**

% of Total = Percent of acreage for each land type for all land.
% BLM = Percent of acreage for each land type that BLM manages
% BLM of Total = percentage of acreage for each land type occurring on BLM land as compared to all lands in the watershed.

Most upland habitats on BLM administered lands within the SCW are dominated by sagebrush including three subspecies of big sagebrush; mountain big sagebrush, basin big sagebrush (*Artemisia tridentata ssp. tridentata*), and Wyoming big sagebrush (*Artemisia tridentata spp. wyomingensis*), also included are low sagebrush, black sagebrush (*Artemisia nova)*, three-tipped sagebrush (*Artemisia tripartita*) and silver sagebrush (*Artemisia cana*). The highest elevation shrub types support mountain big sagebrush/Idaho fescue.

Low sagebrush is present along lower benchland or valley bottom areas that receive less rain and have drier soils (silty-limey). Grasses commonly associated with the low sage and three-tip sage (*Artemesia tripartita* subsp. *tripartita*) sites include bluebunch wheatgrass (*Pseudoroegneria spicatum*), western wheatgrass, Sandberg's bluegrass (*Poa sandbergii*), and needle-and-thread grass (*Hesperostipa comata*). Three-tip sagebrush is found primarily along the southern and southeastern edge of the analysis area. It is also found intermixed with mountain sagebrush in upper Little Sage Creek and other small patches, but generally is not common in the SCW.

Black greasewood and Gardner's saltbush (*Atriplex gardnerii*) are found in salt affected and limey soils along some valley bottoms within the watershed. Grasses commonly associated with these shrubs are bottlebrush squirrel tail, Indian ricegrass (*Achnatherum hymenoides*), western wheatgrass and needle-and-thread grass.

Winterfat (*Krascheninnikovia lanata*) and gray horsebrush (*Tetradymia canescens*) are found in the limey soils along with Indian ricegrass, western wheatgrass and needle-and-thread grass.

Rubber rabbitbrush (*Chrysothamnus nauseosus*), green rabbitbrush (*Chrysothamnus viscidiflorus*), fringed sagewort (*Artemisia frigida*) and broom snakeweed (*Gutierrezia sarothrae*) are common native shrubs found on numerous ecological sites throughout the

watershed. If any of these shrubs have greater than 5% canopy cover on a site, it usually indicates that site has been subject to some kind of past disturbance.

Landfire vegetation data (Table 3.5) shows about 1,500 acres of BLM administered land in the SCW are grasslands. However, 160,000 BLM administered acres are classified as the sagebrush/shrub/steppe cover class. This sagebrush/shrub/steppe cover class figure essentially represents a combination of cover classes that have a herbaceous grass and forb understory, mixed with varying ages and sizes of sagebrush and shrubs with the overwhelming shrub being sagebrush. The dominant native grass species that are found in the SCW include: bluebunch wheatgrass, Idaho fescue, needle and thread grass, and basin wildrye. All four of these dominant grasses are palatable to livestock but only three (bluebunch wheatgrass, Idaho fescue, needle and thread grass) are used as key species to determine BLM's 50% herbivore grazing utilization threshold in a pasture and/or allotment in the watershed. More information is available for these four grasses in Appendix E.

Landfire vegetation data (Table 3.5) shows about 1,500 acres of BLM administered land in the SCW are grasslands. However, 160,000 BLM administered acres are classified as the sagebrush/shrub/steppe cover class. This sagebrush/shrub/steppe cover class figure essentially represents a combination of cover classes that have a herbaceous grass and forb understory, mixed with varying ages and sizes of sagebrush and shrubs with the overwhelming shrub being sagebrush. The dominant native grass species that are found in the SCW include: bluebunch wheatgrass, Idaho fescue, needle and thread grass, and basin wildrye. All four of these dominant grasses are palatable to livestock but only three (bluebunch wheatgrass, Idaho fescue, needle and thread grass) are used as key species to determine BLM's 50% herbivore grazing utilization threshold in a pasture and/or allotment in the watershed. More information is available for these four grasses in Appendix E.

In the 2005 Sage Creek Watershed Assessment, BLM evaluated 22 grazing allotments which totaled 109,637 acres of BLM administered land (2005 SCW Assessment Report page 16). Of these 22 allotments, eighteen allotments totaling 103,096 acres of public land within the watershed met the BLM upland health standard. This equaled 94% of the acres assessed for upland health within the watershed. Four allotments totaling 6,541 acres of public land within the watershed rated generally as FAR with static or downward trends and did not meet the upland health standard. This equals 6% of the acres assessed for upland health within the watershed. The four allotments that failed the upland health standard in 2005 included: Big Spring Gulch, Little Spring SGC, Orphan and Stanford.

During the 2015 Sage Creek Watershed Assessment, BLM evaluated 114,475 acres within 22 grazing allotments. The difference in acres from 2005 and 2015 was due to watershed boundary edits and/or allotment reconfigurations. Of these 22 allotments, all but three small allotments (Dell, Red Butte and Red Butte SE) met the upland health standard. The three allotments that did not meet the upland health standard included a total of 355 BLM administered acres and accounted for <1% of the acres included in the SCW. The remaining 114,120 acres met the upland health standard. When comparing 2005 and 2015, there were 6,541 acres that didn't meet

the upland health standard in 2005, yet in 2015 only 355 acres did not meet the upland health standard. The four allotments that did not meet the upland health standard in 2005 all met the standard in 2015 (SCW Assessment Report page 25). The allotment called Orphan in 2005 was consolidated and is now part of the Welborn Dell allotment in the 2015 SCW.

There are 40 acres of BLM administered lands in the Dell allotment. These 40 acres are found in a strategic location for the permittee and his historic livestock operation. Under current conditions, the permittee uses buildings found on his private land to calve pregnant cows and then after 10-14 days, he moves them to a series of small pastures heading in a westerly direction. The first pasture after the calves are born is a well brushed covered pasture where the winds are broken by the riparian shrubs and sagebrush. The second pasture after the calving pasture is about 70 acres with about 35 of it BLM administered lands. This pasture also has good cover from the elements due to the bluff in the pasture and the north facing slope that helps to block the prevailing winds from the southwest. After this BLM pasture, the calves and cows then continue west to three more small pastures that have less cover from the elements. Under the No Action alternative, this rotation which is important to the permittee's livestock operation would remain the same even though rangeland standards for uplands were not met on BLM administered lands.

Vegetative Treatments

In 1981 or 1982, the Bull Heifer prescribed burn was ignited with intentions to burn about 200 acres within the Bull Heifer Creek allotment. However, the fire escaped and burned approximately 720 acres, most of which was east of the originally planned burn and within the Sage Creek AMP allotment. In 2015, the IDT found the burned area to have fully revegetated with native grasses and shrubs.

According to BLM records, there have been five vegetative treatments in the sagebrush steppe areas on public lands in the assessment area during the past 40 years (Map 6). Between 1968 and 1970, approximately 4,300 acres were sprayed with 2,4-D to control sagebrush within the Armstead Mountain allotment in four separate spray projects. The mountain big sagebrush canopy cover has steadily increased since it was treated over 35 years ago. Figure 3.4 shows comparison photos from 1972 and 2015 of an area that was chemically sprayed in Gallagher Mountain AMP in 1969.

Figure 3.4. Gallagher Mountain AMP Photo Point 10S09W2301, Chemically Sprayed in 1969.

3.2.3 Issue #3: Recreation and Travel Management

The open habitat and relatively gentle topography of the Sage Creek watershed has allowed the development of an extensive road network. Most of these roads are simple two-track trails that are used primarily during hunting seasons, and to access rangeland developments and monitor livestock. Without any travel restrictions, many of these roads were extended as far as topography allows or until they connect with other roads, often resulting in multiple routes to the same place, and short-cut trails to reduce driving distances. Many of these routes were designated open to wheeled motorized vehicle use in the Dillon RMP, as amended. Unfortunately, most of the routes that were identified to be closed in the original travel designations have continued to be used despite extensive efforts to clearly sign open routes, and eventually sign closed routes as well.

In recent hunting seasons, complaints from landowners, hunters and law enforcement officials have made it clear that rampant off-road vehicle violations in this area are responsible for degrading the hunting opportunities and experiences. FWP's wildlife biologist has also studied the impacts of the road network on wildlife use of the area, particularly mule deer and elk, concluding that overall road densities, and particularly illegal motorized use is impacting wildlife use and hunting opportunities. Recent conversations with area landowners, game wardens, and other land management agencies have resulted in the identification of this area as the highest priority within the Dillon Field Office for improved management of motorized vehicle use during the hunting season.

Resource Concerns

3.2.4 Resource Concern #1: Special Status Species Habitat

Wildlife

In September, 2015 after reviewing petitions to list the greater sage grouse as Threatened on the Endangered Species List, the U.S. Fish and Wildlife Service (USFWS) announced that listing of the greater sage grouse was not warranted (USDI, 2015b). The BLM completed Resource Management Plan (RMP) amendments and revisions to demonstrate to the USFWS that protections for sage grouse have been improved. The Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions of Idaho and Southwestern Montana (USDI, 2015a) and Sage-Grouse Habitat Assessment Framework (HAF) (Stiver et al., 2015) are used as guidance for sage grouse habitat management.

At least seven active sage grouse leks occur within the watershed, two on private land and five on BLM administered land. Numbers of male sage grouse attending leks are relatively stable on these leks, with higher than average counts on a couple of the leks in 2016. Birds may also move to other leks in close proximity, which is likely the case with one lek gaining more male attendance around the same time that a lek within half a mile has lost numbers. Other leks are considered unconfirmed, with insufficient data to classify them as an active lek. Two of these unconfirmed leks have never had documentation of displaying males. Activity has been documented in 2016 at two other unconfirmed leks. Additional seasons of monitoring are required to determine the status. An effort to locate new leks and confirm activity at unconfirmed leks, in coordination with Montana Fish, Wildlife and Parks (MFWP) is ongoing in

the watershed and throughout the DFO. The DFO radio-collared sage grouse throughout the Field Office from 1999-2012. Based on the telemetry data gathered, sage grouse captured from leks within the SCW, Centennial Valley, and Sweetwater winter in the SCW, mainly in the Sage Creek allotment as well as the Armstead Mountain and Mayberry allotments.

BLM administered lands in the SCW provide year-round sage grouse habitat. The majority of the SCW is within a sage grouse priority habitat management area (PHMA) (see Map 2). There are 171,230 total and 94,261 BLM administered acres of PHMA in the watershed. There are also 38,881 total and 18,964 BLM administered acres of sage grouse general habitat management areas (GHMA) in SCW. Sagebrush is an important habitat component for sage grouse. It comprises nearly 100% of sage grouse winter diets and provides thermal, hiding, and nesting cover. Broods require a high protein diet of forbs and insects, usually found in riparian habitats. Sage grouse typically nest within 2-3 miles of leks. Habitat plots were completed during the 2015 brood rearing season, within three miles of leks in the watershed. All of the indicators, except shrub cover (32%), are within the "suitable" habitat range for sage grouse breeding habitat outlined in the Sage-Grouse Habitat Assessment Framework (June 2015). Suitable habitat guidelines for shrub cover are 15-25% shrub cover (marginal includes >25). It is important to remember that the SCW provides year-round sage grouse habitat and sagebrush cover ≥10% is considered "suitable" winter habitat.

West Nile Virus (WNV) has been linked to sage grouse mortality in multiple areas. The RMP Amendments for Greater Sage-Grouse provides guidance for West Nile Virus and required design features to reduce WNV. Management to reduce impacts of WNV focuses on eliminating man-made water sources that support breeding mosquitoes known to vector the virus. The primary mosquito species associated with WNV is the Western Encephalitis mosquito (*Culex tarsalis*). *Culex tarsalis* likes river drainages, extensive wetlands and areas irrigated for agriculture. Whether the water development is for livestock water, wildlife habitat, fish, or storm water management, potential habitat for mosquitoes may be increased. Incorporating applicable design and mitigation measures, described in Appendix C of the RMP Amendment, for water development projects can reduce mosquito production through modifying and eliminating mosquito breeding sites. More infected mosquitoes have been found in eastern Montana than western Montana. WNV has not been documented on BLM lands within the DFO, nor in sage grouse in Beaverhead County. Night-time temperatures at higher elevations in southwest Montana may preclude WNV transmission, as temperature drives WNV cycles. Under normal temperature conditions, the risk of WNV transmission to sage grouse in Beaverhead County is low (Johnson 2012, personal communication).

Sage Creek Watershed provides year-round pygmy rabbit habitat. Pygmy rabbits also require sagebrush for forage and cover, as well as deep alluvial soil to dig burrows. Sagebrush comprises nearly 100% of their winter diet and over half of their summer diet. Pygmy rabbits are endemic to sagebrush and are one of only two Leporids on the continent to dig their own burrows, the other being the volcano rabbit (*Romerolagus diazi*) found in central Mexico (USDI, 2003). Pygmy rabbits have been documented in Tallent AMP, Big Spring Gulch, Little Spring Gulch, Mayberry, and Sage Creek allotments. Active burrows were found in a variety of sagebrush communities, including areas where they hadn't previously been documented. Pygmy rabbits still occupy all of its historical range in Montana and the Dillon Field Office. Pygmy

rabbit populations that were documented by Rauscher (1997) as well BLM personnel (1992-1993 and 2004-2005) were still active in the SCW in 2015.

Ferruginous hawks summer in the DFO. The Sage Creek watershed lies within the Lima/Sweetwater Breaks key raptor management area (see Amended Dillon RMP Vol.1 p.174, ROD map 32). This area was designated because it had one of the highest concentrations of breeding ferruginous hawks in North America, along with prairie falcons, golden eagles and other raptors. Maintaining sagebrush steppe and mountain mahogany habitat and controlling disturbance of nest sites is important in this area. Ferruginous hawks construct nests on the ground on hill slopes or crests, on rocky outcrops and cliffs, and in trees and shrubs (usually mountain mahogany and juniper in the DFO). Nests are largely made with sagebrush stems and lined with cow dung, sod, and bark that the female strips from trees. Monitoring efforts during the 2014 and 2015 nesting seasons documented several active ferruginous hawk nests within the watershed, however the density of active nests has declined since survey efforts in the 1970s-1980s identified many of the nesting territories (although they were not all active at that time either). It has been noted throughout the DFO that ground nests are virtually never active, with active nests only found in trees and shrubs, on rock outcrops, or cliffs. However, ferruginous hawk numbers are stable or slightly increasing, according to the North American Breeding Bird Survey (Cornell Lab of Ornithology, 2016). Possible reasons for a reduction in concentration of breeding ferruginous hawks in the raptor management area are unknown but threats to the species include reduction in prey, competition from other hawks (mainly Swainson's and red-tailed hawks), loss of prairie habitat, nest site disturbance, or impacts in wintering areas. Active prairie falcon nest territories were documented near inactive ferruginous hawk territories during 2015 monitoring efforts. A couple of active golden eagle nests were also located during these monitoring efforts.

Fringed myotis occurs in a variety of habitats, from low- to mid-elevation grass, woodland, and desert regions (Foresman, 2012). Fringed myotis is found primarily in desert shrublands, sagebrush-grassland, and woodland habitats. They roost in caves, mines, rock crevices, buildings, and other protected sites (MNHP, 2015a). Townsend's big-eared bats are found in a variety of habitats from western mesic Douglas-fir forests to more arid Rocky Mountain juniper-limber pine-curlleaf mountain mahogany vegetative types (Foresman, 2012). Spotted Bats have been found in open arid habitats oftentimes dominated by sagebrush (*Artemisia tridentata* and *A. nova*), sometimes intermixed with limber pine or Douglas-fir. They roost in caves, and in cracks and crevices in cliffs and canyons (MNHP, 2015a). None of these species have been documented in SCW.

The Brewer's sparrow, sagebrush sparrow, and sage thrasher utilize sagebrush habitats. McCown's longspur and long-billed curlew nest in dry, shortgrass prairies. Burrowing owls may be found nesting and roosting in abandoned animal burrows in open grassland habitat. Great gray owl habitat consists of mature forests with clearings such as bogs, meadows, and wetlands for foraging. Loggerhead shrikes are associated with open woodlands, and have also been documented nesting in sagebrush, bitterbrush, and greasewood. Black-backed woodpeckers inhabit early successional, burned forest of mixed conifer, lodgepole pine, Douglas-fir, and spruce-fir. This burned forest habitat is lacking in the SCW. Western toads breed in any clean

standing water and may wander miles from their breeding sites through coniferous forests and subalpine meadows, lakes, ponds, and shoreline (Werner et al., 2004).

According to the Interagency Grizzly Bear Study Team (IGBST), the current Greater Yellowstone Ecosystem (GYE) grizzly bear population is roughly 757 individuals (Haroldson et al, 2014). SCW is within the Distinct Population Segment (DPS) boundary which distinguishes the population of grizzly bears in the GYE as distinct from the remaining populations in the lower 48 states. The DPS boundary includes all landscapes where genetically distinct Yellowstone grizzly bear occur and may occur given future range expansion, delineated along easily identifiable boundary features (i.e. Interstate 15 to the west). The Dillon Field Office is outside the Grizzly Bear Recovery Zone, which depicts an area surrounding Yellowstone National Park where inter-agency grizzly bear recovery efforts are concentrated for the long-term conservation of the distinct Yellowstone grizzly bear population (IGBST, 2014). Grizzly bear observations have occurred over the past two years within and surrounding the SCW. There have been no conflicts with humans or livestock reported in regards to grizzly bears in SCW. On March 3, 2016 the USFWS announced plans to remove the GYE grizzly bear population from the Federal List of Endangered and Threatened Wildlife (USDI, 2016). A news release from USFWS states that "*Determining recovery is based on more than just the number of bears in the ecosystem. It includes the quantity and quality of habitat, adequate regulatory mechanisms to maintain a healthy and viable population, and a good balance of male and female bears that are well-distributed throughout the ecosystem*."

In 2014 the USFWS withdrew a proposal to list the North American wolverine in the contiguous United States as a threatened species under the ESA (USDI, 2014b). Wolverines occur in coniferous montane forest types, preferring rugged, roadless, isolated habitats. Home range size in western Montana averages 150 mi^2 for females and 163 mi^2 for males (Foresman, 2012). Transient wolverines are more likely to occur at higher elevation forested habitat on the north side of Blacktail Ridge but limited suitable habitat is present within the analysis area and is not a sufficient size for supporting a female wolverine's natal territory.

The Northern Rocky Mountain population of gray wolves, including Montana wolves, was delisted from the list of Endangered and Threatened Wildlife in 2011 as part of the Appropriations Act. To avoid relisting, Montana will comply with federal regulations to manage wolves in a manner that will guarantee that the state maintains at least a minimum of 150 wolves and 15 breeding pairs (MFWP, 2013). Since delisting, a hunting season for wolves has been implemented in Montana. The combined maximum hunting and trapping bag limit is five wolves per person during the 2015 season. In 2014, a minimum estimate of 122 wolves in 23 verified packs were documented in southwestern Montana in the Montana Portion of the Greater Yellowstone Experimental Area (GYA), 11 of which qualified as a breeding pair. This number of breeding pairs increased from five last year. This represents a 33% increase in the minimum count compared with 2013, which had 92 wolves. Five new packs were documented in 2014 (Bradley et al., 2015). Conflicts between wolves and livestock are an issue in the GYA.

Although they are not a special status species, big game security is a concern in the SCW considering Issue #3: Recreation and Travel Management. The watershed provides winter range for up to 2,700 elk and is also important winter range for antelope and mule deer (pers. comm.

Waltee, 2016). MFWP biologist Dean Waltee determined that under the current designated route management plan, 46% of the watershed, 30% of BLM administered land, and 23% of big game winter concentration areas meets functional security standards as defined by Hillis et al. (1991). The use of designated and non-designated routes, occurring during fall hunting seasons, leaves 7% of the watershed, 6% of the public lands, and 6% of winter concentration areas within SCW meeting functional security standards. These standards identified elk security areas as contiguous forested blocks of land that are a minimum of 250 acres in size and ½ mile from a motorized route. Collectively, these blocks must equal at least 30% of the analysis unit. The authors of this standard caution that these minimums may be too conservative for non-forested habitats and minimums of 500 acre blocks, 1 mile from motorized routes may be more applicable. Considering that these security standards are for forested habitats, recommended to be at least 30% of the analysis area, and that these standards may be too conservative for the largely un-forested habitat in SCW, security habitat is not adequate in the watershed.

Elk security is important for elk population management, hunter opportunity, and elk displacement from preferred habitats. Hunter-harvest increases with increased road density, however hunter success rates are lower in highly roaded areas (15%) compared to areas with managed road networks or roadless areas (25%) (Gratson and Whitman, 2000). Although more elk are killed near roads, more elk are displaced by road traffic to areas with lower road densities. Elk use of habitat was reduced by up to 95% within ½ mile of a road (Perry and Overly, 1977). A study completed in southwest Montana during the fall hunting season found that, "female elk selection for areas restricting public hunting access was stronger than selection for security habitat, and the density of roads open to motorized use was the strongest predictor of elk distribution" (Proffitt et al., 2013). Addressing the travel management issues in SCW would likely enhance elk distribution on public lands, increase hunter opportunity under fair chase conditions, and make population management efforts more effective (pers. comm. Waltee, 2016).

Wildlife, including special status species, are discussed further under the Biodiversity section of the Sage Creek Watershed Assessment Report, pages 41-67. See the Biological Evaluation in Appendix C of this document for Threatened, Endangered, and special status species.

Special Status Fish

The native westslope cutthroat trout (WCT) (*Oncorhynchus clarki lewisi*) historically was wide spread throughout streams in western Montana. Genetically pure WCT are primarily restricted to limited habitats within headwaters of tributary streams where they occur in the Missouri River basin. It is estimated that WCT are genetically unaltered in only 2.5% (McIntyre and Reiman 1995) to 10% (Shepard et al. 2002) of their historical range. Many of these small populations have a high risk of extinction due to isolation and threats from hybridization.

WCT have been designated as a Sensitive Species by the BLM and USFS, and are listed as a Class A State Species of Special Concern by the Montana Department of Fish, Wildlife and Parks. Class A designation indicates limited numbers and/or limited habitats both in Montana and elsewhere in North America; elimination from Montana would be a significant loss to the gene pool of the species or subspecies.

WCT were petitioned for listing under the Endangered Species Act (ESA) and found "not warranted" by the USFWS in 2002. A court ordered review of that decision in 2003 again found them "not warranted". In Oct 2004, the USFWS received a 60 day notice of intent to sue based on hybridization levels and current status of WCT in its native range.
In May of 1999, the BLM entered into a Memorandum of Understanding (MOU) and Conservation Agreement (Agreement) with the MFWP, USFWS and the USFS. The purpose of the MOU and Agreement is to expedite conservation measures for WCT in Montana through a collaborative and cooperative effort among resource agencies, conservation and industry organizations, resource users, and private land owners. Threats to the WCT and its habitat continue to be reduced through implementation of this Agreement.

The management goal for WCT in Montana is to ensure the long-term self-sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana (Clark Fork, Kootenai, Flathead, upper Missouri, and Saskatchewan), and to maintain the genetic diversity and life history strategies represented by the remaining local populations.

As of 2010, the headwater reaches of Sage Creek still supported a genetically pure WCT population. However, during a 2010 survey, no fish were found on BLM. This is the only known pure population of WCT left within the Sage Creek basin.

There are four streams, Basin, Little Basin, East and Long Creek, which support populations of WCT with varying levels of hybridization and one stream, Cattle Creek, which supports WCT with unknown genetic purity. Genetic samples were collected from Cattle Creek in 2015. However, since there is no passage barrier between Long Creek and Cattle Creek, genetic purity is very likely to be the same between these two creeks.

WCT habitat surveys were conducted on BLM administered lands during the 2012, 2013 and 2014 field seasons. Surveys were conducted on random 500 foot reaches in selected streams. In-stream habitat was identified to type (pool, riffle, run) with habitat length, width and residual pool depth measurements taken. Stream substrate data was collected using a 500 point "zig zag" pebble count method in riffle habitats within each reach.

Using baselines identified in the "Beaverhead Sediment Total Maximum Daily Loads and Framework Water Quality Protection Plan" (Montana DEQ. 2012), streams < 15 foot wetted width would be expected to have a minimum of ≥ 90 pools per stream mile. Streams 15-30 feet bankfull width would be expected to have ≥ 52. Residual pool depth would be expected to be approximately 10 inches and % fines (<6mm) would be expected to be between 10% and 30% depending on stream gradient and channel type. Steeper gradient "B" channels would be expected to have slightly more or less than 10% fines < 6mm while lower gradient "E" type channels are expected to have up to 30% fines < 6mm. Stream size and gradient will affect pool number, residual depth and the percentage of fine sediment present. Generally, as stream size decreases pool frequency increases and pool depth decreases.

Several studies have indicated that cutthroat trout reproduction can be impacted by low levels of fine sediment (Ringler and Hall 1975; Irving and Bjornn 1984; Weaver and Fraley 1991; Horan et al. 2000; Ireland 1993). Bjornn et. Al (1977) found that as the percentage of fine sediment

exceeds 20% to 30% in spawning riffles, salmonid reproduction begins to decline. Bryce, et al. (2010) evaluated fine sediment impacts on fish and macro-invertebrates and found that sediment impacts begin at 13% for fish and 10% for macro-invertebrates. As indicated in Table 3.5 below, sediment levels in surveyed streams could be higher than optimum depending on stream characteristics. With the sediment levels observed, it is probable that salmonid spawning success and pool quality is being impacted some streams.

Table 3.6: Pool Frequency, Depth and Stream Bed Particle Size

Stream	Primary Channel Type	Average Stream Width (feet)	Pool Frequency (per mile)	Residual Pool Depth (inches)	% Fines (<6mm)	Riparian Habitat Condition 2015
East Creek	B	3.5	208	6.4	23	PFC
Little Basin Creek	E	3.4	87	9.4	90	PFC
Basin Creek	E	3	53	9	20	PFC
Pistol Creek	A	1.4	313	8.5	21	PFC
Cattle Creek	B	4	157	8.2	16	PFC
Long Creek	C	8	52	9.8	17	PFC
Divide Creek	B	4	87	10.8	9	PFC

East Creek

The East Creek WCT population was discovered during the 2005 watershed assessment. Prior surveys in lower portions of the drainage had only indicated brook trout and mottled sculpin were present. East Creek was genetically tested in 2005 and found to be 98% WCT. In addition to the WCT, a large population of non-native brook trout was found to be present within the drainage. In 2010 a non-native removal was initiated with backpack electrofishing gear to suppress the brook trout population. To date, over 2,500 brook trout have been removed from the BLM reaches in the headwaters of the drainage. The WCT population has responded favorably. In 2010 when suppression efforts began, the brook trout to WCT ratio was > 55:1, but it had improved to 12:1 by 2013. With no fish barrier within the drainage and limited suppression efforts only taking place on BLM lands, this ratio is probably about as low as can be expected.

Habitat conditions are in good condition overall. The channel type shifted between a B in higher gradient sections to an E in lower gradients. Most of the upper drainage consists of a long series of degrading beaver complexes which will continue to release sediment during high flows for some time. However, the old dams, lodges and downed aspen provide a large amount of cover for resident fish, as well as providing debris jam tail-out gravel spawning habitat.

Within the drainage there are two primitive road crossings located on closed roads. These unauthorized crossings incur substantial use during big game season and contribute additional sediment to East Creek.

A 2014 fishery habitat survey conducted upstream of most beaver activity found moderate sediment levels for the channel type within the survey reach. Stream banks were heavily vegetated with sedges, willows and herbaceous plants. Ocular surveys in lower reaches noted higher levels of sediment, which would be expected with the number of degrading beaver dams. The stream channel was found to be laterally shifting in several areas. This was related to the degrading beaver complexes in the reach. The drained complexes were rapidly re-vegetating with sedges and other early colonizing riparian plants. Limited aspen regeneration was noted, however heavy sprouting of new willow was noted throughout the areas previously flooded by beaver activity. As these willows begin to mature they should begin to stabilize the stream channels.

Basin Creek

Basin Creek supports a very small population of hybridized cutthroat trout and a population of non-native brook trout. Occupied habitat is found primarily on state or private lands. There is no occupied habitat on BLM. Since Basin Creek occurs within a BLM-administered allotment, temperature and habitat data was collected as part of general allotment monitoring.

A 2015 habitat survey found conditions in the surveyed reach to be very good. Banks were found to be stable and well vegetated with sedges. Riffle habitat was dominated by small 2-5" cobble. Sediment levels were low (~20%). Spawning habitat was not present within the surveyed reach but was present in reaches upstream.

Little Basin Creek

Little Basin supports a small population of hybridized WCT and a large population of mottled sculpin. Non-native brook trout are also found at low densities. Within the drainage there is approximately two miles of occupied habitat. Low summer flows and a high sediment load likely limit population size.

A fish habitat survey was conducted in 2014. Stream habitat was primarily an E channel dominated by long meandering runs. Stream banks were found to be stable and heavily vegetated with rush and sedges. The high level of observed sediment within Little Basin Creek likely originates from the parent material in the basin, which contains high levels of fines and clay. Stream banks on this stream are heavily vegetated with sedge and rush making bank disturbance unlikely as a significant sediment source.

With the exception of high sediment levels, habitat conditions were found to be good overall. There is one primitive road crossing over an upstream reach located on state land that contributes some sediment. Spawning habitat was not present within the BLM reach but was noted in upstream reaches.

During a 2010 fish distribution survey, the intact shell of a Western Pearl Shell Mussel (*Margaritifera falcate*) was collected. Based on the level of calcification on the shell, it was

judged that this shell was old and likely from many decades past. Several additional surveys specifically looking for a Pearl Shell population failed to turn up any live mussels or shells.

Divide Creek

This drainage supports a small population of hybrid trout, (88% WCT, 8% rainbow trout and 4% Yellowstone cutthroat) as well as a population of brook trout and in the lower reaches of the stream, mottled sculpin are present. This drainage is not managed as WCT habitat but could potentially be considered for WCT restoration in the future. Within the drainage there are ~5 miles of good quality fish habitat. A 2015 fishery survey found ~ 3 trout per 100 feet in the extreme headwaters. Considering the quality of fishery habitat within this headwater portion, these numbers are better than expected and should be considered a minimum. Fish distribution surveys indicate that fish numbers increase in downstream stream reaches.

A thermograph was placed on BLM administered land at approximately stream mile 1.7 in 2015 to collect temperature data. However, 21 days after placement stream flows in this area took a precipitous drop and the data indicates that by early July the stream channel was likely dry indicated by daily temperature spikes into the mid 80's which corresponded with daily air temperatures. When the thermograph was retrieved in early Sept, there was no water present within the stream channel. As such, this portion of stream is likely intermittent and only flows in the spring and possibly later in the fall in response to precipitation events and is not fish habitat.

Cattle Creek

In 2015, a fish habitat survey and a WCT genetic collection were conducted on Cattle Creek. Due to the lack of a fish barrier and close proximity between Long Creek and Cattle Creek, the genetics are very likely to be the same as Long Creek (~99%). Habitat conditions were found to be fair to good. This portion of the drainage is a higher gradient B channel that appears to have had historic heavy livestock use as well as experienced several high flow events in the past. Sediment levels were a little higher than expected based on channel type and gradient. Primary substrate was small to medium sized cobble (1"- 4"). Spawning gravel was noted throughout the reach. Stream banks were overall well vegetated with willow, aspen and sedges.

Long Creek

The BLM reach (#2100) located in upper Long Creek is at the upstream edge of seasonal WCT distribution. It may provide limited spring/summer habitat. Periodic, low, late season flows through most of this reach probably limit WCT use. Over winter use is unlikely. Depending on the water year, this reach may or may not provide habitat for WCT. The lower reach (#1155) supports a fishery, primarily brook trout and mottled sculpin. WCT may be occasionally found in this portion of the drainage in low numbers.

This reach (#1155) periodically supports active beaver, which typically are removed by the county related to road issues. The habitat in this reach is subjected to regular cycles of high and low water levels related to beaver presence. Stream bank vegetation is comprised of herbaceous, sedges and willows. Banks are overall well vegetated. With several beaver dams present and the variability in water levels, this reach carries higher sediment load than areas further upstream. This is offset by high quality pool habitat and security habitat the beaver dams provide. Spawning habitat is limited within this reach, but is present in areas upstream.

Throughout the west, the threat of increasing water temperatures on fisheries habitat due to climate change is a growing concern. Studies have linked water temperature with lower cutthroat performance in water temperatures >59F (DeStatso and Rahel 1994; Dunham et al. 1999; Novinger 2000). Water temperature monitoring within the assessment area was initiated in 2014 on Sage Creek Watershed streams to track potential changes in summer stream temperatures. Data collected to date shows that both average and summer peak temperatures have remained relatively consistent since temperature monitoring began (see Table 3.6 below). However, several streams experience a number of days where water temperatures exceeded 60 degrees. In most cases this can likely be attributed to variations in summer temperatures. With only a few years of temperature data, it's difficult to say whether this is normal climatic fluctuation or the beginnings of a long term trend. In most cases where temperatures exceeded 60 degrees F, it was for short periods of a few hours during the day with temperatures in most streams dropping back into the 40 or 50 degree range overnight. However in the case of Little Basin Creek, it would appear that the elevated stream temperatures within the drainage may be the norm rather than the exception. However, again with only two years of data it's difficult to determine.

Table 3.7. Sage Creek Stream Temperature Data

Stream/Year	Avg. temperature 6/1-9/1	Peak temperature 6/1-9/1
East creek 2014	53	66
East creek 2015	53	64
Running avg	**53**	**65**
Basin Creek 2014	52	64
Basin Creek 2015	54	64
Running avg	**53**	**64**
Little Basin Creek 2014	57	73
Little Basin Creek 2015	58	71
Running avg	**57.5**	**72**

SCW stream temperatures overall are within the expected range. All of these streams have more or less a south aspect and generally are not vegetated with tall shade type stream bank vegetation (Carex habitat type). Without the shading affect, these streams receive long periods of direct sun which results in slightly elevated temperatures. Overall, stream temperatures are within the desired range for native cold water species.

Special Status Plants

Chicken sage (*Sphaeromeria argentea*) prefers sparsely vegetated habitats with low competition. The known populations of this plant species, in the SCW, face no anthropogenic threats. They appear to tolerate and may benefit from disturbances that reduce competition such as livestock grazing.

Chicken sage (*Sphaeromeria argentea)*

Idaho sedge (*Carex idahoa*) is found in a few different riparian habitat locations throughout the SCW. It is found in wet to moist alkaline meadows, is palatable, and sensitive to intensive grazing, especially during spring and early summer. Repeated herbivory, particularly between mid-May and mid-July may lead to population declines. Rest-rotation grazing regimes may allow enough recruitment to maintain stable populations of these palatable sensitive plants. Kentucky bluegrass and common dandelion are present in most wet meadow habitat and along many stream reaches. Kentucky bluegrass may compete with Idaho sedge. Canada thistle and houndstongue are scattered throughout the SCW and were observed in many riparian and wetland habitats, especially along intermittent stream reaches. These noxious weeds may also compete with Idaho sedge which prefers these streamside and meadow habitats.

3.2.5 Resource Concern #2: Forest, Woodland, and Priority Species Habitat

Forest and woodland habitats comprise approximately 3% of all ownerships, and approximately 2% of BLM-administered lands within the SCW. Effective precipitation, aspect, and soils influence the establishment and composition of forests and woodlands. The widely scattered patches of mixed conifer forest and aspen woodlands adjacent to sagebrush and riparian habitats support a broad array of wildlife species. This habitat provides important thermal and hiding cover, including security habitat for big game. Forest and woodland habitat offers high protein browse species in the fall and winter, as well as year-round, for deer, elk, and moose.

Conifer Forests

Mid-elevation conifer forest stands are dominated by Douglas-fir and are primarily found on moist, north-facing aspects. Limber pine is more tolerant of warm, dry conditions and is found extending on to south-facing slopes, often mixed with Douglas-fir. Above about 7,500 feet in elevation, forest stands are comprised of a mix of conifer species, including lodgepole pine, spruce, and subalpine fir.

Many Douglas-fir stands have been influenced by past non-commercial timber harvest due to the relative scarcity of wood in the area, and the demand for building materials and firewood. Past

wildfires in the adjacent sagebrush and grasslands have burned into some timber patches, evidenced today by charred wood and fire scars on some relic Douglas-fir trees. Density and structure of these stands has shifted, in part due to more recent fire exclusion, resulting in slightly higher than historic stocking levels and some conifer expansion into sagebrush and grasslands. Douglas-fir expansion is evidenced by sagebrush remnants found beneath closed tree canopies and by comparing historic photos to current conditions. The relatively old age of the small diameter conifer expansion suggests the conversion of shrubland to forested cover is occurring slowly and generally only on the most productive sites. Conifer expansion within the SCW is minimal compared to other areas within the Field Office due to climate, elevation, and soils. Currently, very few forested areas in the analysis area display the structure associated with periodic fire, though fire scars found on Douglas-fir indicate that some stands may have been maintained as savannah-like in structure by natural and /or anthropogenic fire.

Douglas-fir bark beetle has been active in Douglas-fir stands throughout southwest Montana at varying levels over the past 10-15 years, killing many relic, large-diameter Douglas-fir trees as well as co-dominant trees stressed by drought and repeated spruce budworm defoliation. Douglas-fir bark beetle is usually present at endemic levels within stands dominated by Douglas-fir, though recent beetle-caused mortality was not noted during the 2015 assessment. Spruce budworm, a defoliator that affects Douglas-fir and spruce trees, is also present within forest stands but is currently not causing heavy defoliation.

Limber pine occurs on the harshest sites capable of supporting conifers. Much of the limber pine population has been killed by mountain pine beetle and/or white pine blister rust in the past 10-20 years. In 2005, the IDT noted limber pine stands dominated by red-needled trees; in 2015 the IDT found those stands are now in the grey-phase (standing dead) with a select few healthy limber pine trees that appear to have resisted the recent insect and disease outbreaks. Typically limber pine plant associations would consist of widely spaced limber pine dominating the canopy, with Douglas-fir and juniper co-dominant or in the understory. The coexistence of limber pine and Douglas-fir is common though soils, exposure, and other undetermined factors seem to limit which species dominates the other. The establishment of Douglas-fir beneath mature limber pine stands was noted in several areas, and a species conversion will likely occur as mature limber pine die and resources become available to young Douglas-fir trees. Whitebark pine may occur within the SCW, but it is not common and was not positively identified during the 2005 or 2015 watershed assessments.

The cones and seeds of five needle pines are a primary food source for several wildlife species due to their high caloric and fat content. They are important resources for wildlife food, snowpack retention, and watershed protection. Limber pine and whitebark pine seeds provide critical food for rodents and birds, including squirrels and Clark's nutcrackers, which also cache the seeds for later use. Other birds, small mammals, and bears benefit from these caches.

Within higher elevation mixed conifer stands, up to 80% of the mature lodgepole pine has been killed by recent mountain pine beetle activity. Beetle-caused lodgepole pine mortality appears to have increased greatly in the late 2000s, and the insect is still active where mature lodgepole pine trees are present. As suitable host trees decline, the beetle population also returns to endemic levels. Englemann spruce is found on moist sites, particularly on cool, shady aspects and in

stream bottoms. Subalpine fir becomes more common within mixed conifer stands at higher elevations. Historically, fire played a role in shaping these forest stands, though with less frequency and higher severity than within the lower elevation, drier Douglas-fir/limber pine stands. Consequently, many of the dense, multi-storied forest stands with heavy downed fuel accumulations are within the historic range of variation, but also subject to stand replacing wildfire.

Curl-leaf Mountain Mahogany Woodlands

Mountain mahogany plant associations are found throughout the analysis area in small scattered patches. Curl-leaf mountain mahogany is exhibiting declined vigor due to repeated, heavy wildlife browsing. Generally, conifer expansion into these sites, and the subsequent shading of mahogany plants, was not determined to be a factor in reduced vigor. During the 2005 and 2015 land health assessments, the IDT found very few curl-leaf mountain mahogany seedlings within the SCW.

Quaking Aspen Woodlands

Aspen stands within the SCW are found as isolated stands primarily near springs or seeps, and within the riparian corridors of some streams. Though aspen woodlands comprise a very small portion of watershed, aspen habitat contributes greatly to biological diversity. The high value of aspen to wildlife and the positive influences aspen stands have on hydrologic functions are just several reasons aspen is considered the most important deciduous forest type in western North America (Long and Mock 2012).

The IDT found all aspen stands in the SCW to be declining in vigor and extent, and most were not successfully regenerating past browse height. Dead or dying mature aspen trees with an absence of nearby regeneration suggests some stands are at risk of being eliminated in several areas of the watershed. Current beaver activity on BLM was noted on East Creek and Long Creek drainages, but evidence of past beaver activity is common in many stream systems. Currently, most stream systems do not have enough woody deciduous vegetation to support a viable beaver population. Where aspen regeneration is occurring, repeated ungulate browsing, primarily by elk, is preventing a young age-class of trees from replacing the mature age-class of trees as they die of old age, insects/disease, and/or lack of available water. In 1974 when the original Sage Creek AMP was written, approximately 100 elk wintered within the watershed. In 2005 when the watershed was assessed and currently, around 2,500 elk winter within SCW. Most aspen clones are responding to stressors by producing suckers, but very few are taller than knee-height and all show evidence of repeated browsing. How long the interconnected, clonal root system of an aspen stand will remain viable while under constant stress of browse, shading, and/or reduced groundwater availability is the subject of current research.

3.2.6 Resource Concern #3: Noxious and Invasive Species

Noxious weeds are defined in the Montana Weed Management Plan as "plants of foreign origin that can directly or indirectly injure agriculture, navigation, fish or wildlife, or public health." Currently there are 38 weeds on the statewide noxious weed list that infest about 7.6 million acres in Montana. Of these 38, there are two of major concern in the SCW (spotted knapweed and houndstongue). Canada thistle (*Cirsium arvense*), another state declared noxious weed, is

also found in the SCW. It is widespread throughout the Dillon Field Office and mostly found in riparian areas making treatment difficult.

Spotted knapweed (*Centaura maculosa*) is one of the more aggressive noxious weeds in the area administered by the Dillon Field Office. It is found scattered in small infestations throughout the watershed primarily along roads and in other disturbance areas. Because of where it is found, the potential is high for knapweed to be spread primarily by vehicles, but also by livestock, wildlife, recreation and other activities, wind and water.

Houndstongue (*Cynoglossum officinale*), a noxious weed that is toxic to animals due to high levels of alkaloids contained in the plant, is found scattered throughout the SCW in moderate sized infestations along roads, trails, and streams. Because of its seeds ability to cling to hair and clothing, the potential is high for it to be spread rapidly within the watershed.

There have been two infestations of leafy spurge (*Euphorbia esula*) found in the Sage Creek Watershed. Both were reported in 2010, one in the Mayberry and the other in the Sage Creek allotment. The infestation in the Mayberry allotment was made up of scattered plants over a 50 foot square area when first discovered. It has been treated every year by the BLM and in 2015 only four plants were found. The Sage Creek allotment infestation, which is about a quarter of an acre in size, is mostly located on private ground with a few plants on BLM managed land. This infestation is treated yearly by the landowner and the BLM and in 2015 only a few scattered plants were found.

Other noxious or invasive weeds present in isolated locations are cheatgrass (*Bromus tectorum*) hoary cress (Whitetop) (*Cardaria draba*), and black henbane (*Hyoscyamus nigar*).

Since 1989, BLM has been involved in cooperative control efforts with Beaverhead County. Private land owners in the Sage Creek area have also been involved in control efforts. Throughout this period, the goal has been to prevent new noxious weed infestations and control or eradicate existing infestations in Beaverhead County using Integrated Pest Management. Due to the small size of the weed infestation, no biological controls have been released.

The ID team noted substantially more weeds along roads accessible to the public and an increase in the amount of off road travel. This off road travel will help to increase the spread of noxious weeds throughout the watershed.

3.2.7 Resource Concern #4: Wilderness Characteristics and Wilderness Study Area

Roughly 2,900 acres on the northwest portion of the 17,479 acre Blacktail Mountains Wilderness Study Area (WSA) lies within the Sage Creek watershed boundary (Map 1). This portion of the WSA contains the only route within the WSA that is designated open to wheeled motorized vehicles since it was an inventoried 2-track vehicle route at the time of the wilderness inventory in 1980. This route accesses the top of the Blacktail Ridge, but is not open to the public across the private land below, and should therefore not be open to the adjacent landowner for recreational use according to the travel management policies in the amended RMP.

The Blacktail Mountains WSA contains 10,586 acres that were recommended by the BLM as suitable for wilderness designation (essentially the northern 60%), including that portion within the SCW. The entire WSA was determined to be in primarily natural condition with outstanding opportunities for solitude and primitive and unconfined recreation. Identified special features included outstanding panoramic views and scenic quality and features within the WSA.

Lands with Wilderness Characteristics

The planning area was inventoried for lands with wilderness characteristics in accordance with BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands, published in March, 2012. The purpose of an inventory is to determine the presence or absence of wilderness characteristics. Seven units within the planning area were inventoried from 2012 through 2015. All of these units were part of the original inventory from 1979. These seven units are #MT-076-004 Big Spring Gulch, 20,178 acres; #MT-050-004N Maurer Mountain, 11,913 acres, this unit was originally part of the Big Spring Gulch unit but was separated out as the two units are divided by a road; #MT-076-005 Heifer Creek, 5,260 acres; #MT-076-006 White Hills South, 8,850 acres; #MT-076-008 Basin Creek North, 10,255 acres; #MT-076-009 Antelope Flats, 18,037 acres; and #MT-076-010 Basin Creek South, 8,355 acres (see Map 2). A more complete discussion of these areas is available in the watershed assessment report, and complete inventory information is available on file in the Dillon Field Office.

Three of these units were found to possess wilderness characteristics; they are Big Spring Gulch, Maurer Mountain and Antelope Flats. These areas are of sufficient size, appear to retain their natural character, and provide outstanding opportunities for solitude or primitive and unconfined recreation.

The remaining four units were determined not to have wilderness characteristics. These four units, and why they were determined to not possess wilderness characteristics, are briefly described below.

The Heifer Creek unit, #MT-076-005, was determined to be of sufficient size and is predominantly natural, although the inventory noted that OHV routes are noticeable throughout the unit. Heifer Creek unit lacks outstanding opportunities for solitude and unconfined and primitive recreation; this is primarily due to the topography, overall size and land configuration of the unit.

White Hills South, #MT-076-006, is of sufficient size, but this unit lacks naturalness, as well as outstanding opportunities for solitude and unconfined recreation. The Montana Initial Wilderness Inventory Final Decision, August 1979 (MIWIFD, August 1979) stated "Moderate amounts of development combined with small size and lack of vegetative and topographic screening contribute to a lack of naturalness." This statement still holds true. There are opportunities for solitude and primitive and unconfined recreation but they are not outstanding, and due to the lack of naturalness this unit doesn't meet the requirement for wilderness characteristics.

Basin Creek North, #MT-076-008, is of sufficient size, and is predominantly natural although there are roughly 28 miles of vehicle ways within the unit. The lack of vegetative screening does not allow one to avoid the sight and or sounds of others in the area, there are not outstanding

opportunities for solitude available within this unit. There are primitive and unconfined recreation opportunities, but they are not outstanding.

Basin Creek South, #MT-076-010, is of adequate size and appears to be natural, although the impacts of cattle grazing are substantially noticeable within the unit. There are limited opportunities for solitude within the unit due to the lack of vegetative and topographical screening and uniform nature of the landscape. These opportunities for solitude are limited and are not considered outstanding. There are additional limits on the primitive or unconfined recreation in the frequency of fences and vehicle ways that crisscross the landscape. The uniform nature of the landscape would also impact the recreation opportunities. The opportunities exist for primitive and unconfined recreation but they are limited and not considered to be outstanding. In addition, the irregular configuration of this parcel of property does not lend itself to be managed for wilderness characteristics.

The documented presence of wilderness characteristics within this area does not mean that it requires these areas to be managed to preserve those characteristics. It simply means that any proposed activities that will impact these wilderness characteristics must be analyzed within the context of the upcoming EA to assess the impacts to those wilderness characteristics. Future land use planning may consider a longer term objective for the future management of this area, and may or may not identify it for long term protection of these characteristics.

3.2.8 Resource Concern #5: Socioeconomics

Although mining was an impetus in the region's development, cattle ranching was already established when the first miners found their way into Montana. The Grants and Orrs in the Beaverhead region and the Kohrs in Deer Lodge were grazing cattle and providing beef to local miners as well as to consumers in other parts of the west and east. These early ranchers faced difficult circumstances fighting with Blackfeet and other tribes over territory and initially competing with bison for range. Yet, through the 1870s the cattle and sheep business as well as farming continued to expand. By the end of the 1870s, bison were on the brink of extinction. Public lands became more accessible, facilitated by an "open range" policy that made available public lands for grazing. Cattle ranching in Montana became another means to "strike it rich" and spurred another rush of settlers and speculators.

Before the boom of the 1880s, most Montana cattle operations were partnerships or family affairs, but many of the new outfits were full-fledged corporations with access to plenty of capital and livestock. Dozens of corporate ranches held Montana charters by 1886; and many others, such as the Texas-based XIT, and Continental Land and Cattle spreads, were incorporated in other states or territories. By 1886, at the peak of the open range boom, roughly 664,000 cattle and 986,000 sheep grazed Montana rangelands. A large percentage of the animals belonged to the new corporate ranchers, whose managers packed them onto limited ranges with no provisions of winter hay, in hope of quick profits from minimal investments (Malone, Roeder, and Lang, 1991: 157).

A severe drought and hard winter in 1886-87 combined with overgrazing on public lands resulted in severe impacts to Montana's cattle business, with some estimates that half or more of the cattle died (Fletcher, 1960:89-94). Small operators who put up hay adapted better than the "get rich quick" operators did, and after 1887, the cattle industry settled into a period of

recuperation and ultimately further expansion as the value of hay for winter feed became apparent (Fletcher 1960).

The agricultural boom began to go bust in the post-war depression of the 1920s, and large numbers of Montana farmers moved out of state, leaving a demographic profile that is similar to that of present day Montana: larger numbers of older persons and younger persons with the middle-age demographic group showing sharp declines. Prior to World War II, ranching and farming continued under pressure, but various New Deal programs supported these industries into World War II, when once again there was a small boom. A combination of weather, world economics, and cultural changes in the United States have continued to influence boom and bust cycles in ranching and farming in southwest Montana. Today these activities remain important to the overall economy and culture of the region, but the face of agriculture and ranching are changing. Ranchers or their family members may also work as fishing guides or outfitters or in town to supplement their income. Fluctuations in cattle prices, other market forces, and increasing equipment and operating costs require some diversification in order to ensure the fiscal viability of present-day ranching operations. Some choose to lease their lands, or access through them for hunting or fishing and thereby supplement ranch income. It is common for wives and children to work for the cash needed to keep family and ranching life viable. Unfortunately, for many ranchers, children are not staying on to ranch, either because the isolation and lifestyle demands are not appealing or because financial realities do not allow it.

The SCW is sparsely populated with Dillon being the largest town near the watershed. Recreation and tourism are important components of the economy of the SCW. Most of this recreation occurs during the big game hunting season which provides substantial contributions to the local economy.

Of Montana's 56 counties, Beaverhead County is the largest livestock producer. The USDA 2012 Census of Agriculture Inventory (http://www.agcensus.usda.gov/publications) indicated that there were 230,742 head of cattle and calves and beef cattle in the county. In Beaverhead County there were also 16,191 sheep and lambs inventoried. Very few grain-fed cattle were produced. The focus was on calves and feeder steers along with beef cows or breeding stock. This type of ranching requires large expanses of grazing land. According to the National Agricultural Statistical Service (http://www.nass.usda.gov/mt/), overall cattle production in Montana has been relatively stable since 1986. The January inventories in 1986 and 2002 reported 2.45 million head with a peak of 2.75 million during 1996. Sheep production, on the other hand, showed a general decline across the state, reflecting a broader national pattern. The data from 2012 reports that, of Montana's 56 counties, Beaverhead county ranked 1st in total hay production, 1st in total cattle numbers; and 3rd in sheep and lamb numbers.

Several economic factors have changed since the early 1980s which might have affected ranching operations in southwest Montana, including rising real estate values, volatile commodity price fluctuations and rising overhead costs for agriculture. These factors along with state and national politics and changing livestock market conditions have affected the livestock industry over the last twenty years. Social factors include the rising popularity of southwest Montana as a place to live, work and play accompanied by related population growth and change.

BLM grazing fees are calculated using the formula required by 43 CFR 4130.8 and are considerably less than those charged by private landowners. In 2004, the average fee in Montana for grazing on private land was $16 per AUM based on Montana Agricultural Statistics Service, National Agricultural Statistics Service figures, and the minimum fee charged on Montana State Lands was $5.48 per AUM. In 2016, these same fees rose as the average fee in Montana for grazing on private land was $23.00 per AUM, and the minimum fee charge on Montana DNRC State Lands is $19.57 per AUM. The BLM and Forest Service used the same formula to derive a $2.11 per AUM fee in 2016, which makes federal land the least expensive grazing available to area ranchers. Federal grazing permits are desirable for area cattle producers as a source of inexpensive forage, even though additional management costs are generally incurred.

On page 252 of the Amended Dillon RMP/Final EIS, Table 48, Employment and Labor Earnings by Major Type and Sector in 2000, reports that private on-farm employment accounted for 17 % of total employment in Beaverhead County. Refer to Table 56 on page 286 of the Proposed Dillon RMP and Final EIS, as amended, which shows employment and labor income response coefficients related to livestock grazing, timber management and recreation use for the area influenced by the Dillon Field Office. In addition, page 251 of the EIS presents personal income statistics from 2000 that indicate that labor earnings are the largest source of income in Beaverhead County. The Proposed Dillon RMP/Final EIS, as amended is available at http://www.blm.gov/mt/st/en/fo/dillon_field_office/rmp/Final.html.

3.2.9 Resource Concern #6: Cultural and Paleontological Resources

In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resources inventory was conducted for a 10% sample of lands within the Dillon Resource Area. Results of the sample inventory indicated that cultural site densities in the Sage Creek Planning Area were lower than that observed in other planning areas, with archaeological sites located on 1.15% of BLM managed lands within the watershed.

An examination of existing records on file with the BLM Dillon Field Office has provided information on the number and type of known cultural resources and level of previous cultural resource inventories conducted on public lands within the SCW analysis area. Within the study area, approximately 2,241 acres of public land have been intensively inventoried for cultural resources at the Class III level. Inventories are subject to specific project compliance in advance of all proposed federal undertakings including: small range improvements (fences, water developments), road rights-of-way, fuels projects, and land exchanges. The inventory projects vary from as little as one acre, to as much as 280 acres in extent. Public lands within 15 grazing allotments have had no Class III cultural resources inventory at all.

As a result of past Class II and Class III cultural resource inventory, there are a total of 87 recorded cultural properties within the SCW study area. Of that number, 68% are prehistoric, 29% are historic, and 3% have a combined prehistoric and historic component. A total of 57 paleontological sites are known within the watershed.

3.2.10 Resource Concern #7: Visual Resources

The Blacktail Mountains Wilderness Study Area (2,895 acres), on the north end of SCW, will be managed as Class I. Preservation of the landscape is the primary management goal in Class I

areas. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Another 885 acres adjacent to the WSA will be managed as Class II. The objective of this class is to retain the existing character of the landscape. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape.

The remaining 110,776 acres will be managed under Class III guidelines. The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape may be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes caused by management activities may be evident but should not detract from the existing landscape.

The visual resource contrast rating system will be used during project level planning to determine whether or not proposed activities will meet VRM objectives. Projects will identify mitigation measures to reduce visual contrasts and prepare rehabilitation plans to address landscape modifications on a case-by-case basis.

3.3 Description of Relevant Non-Affected Resources

3.3.1 Air Quality

Air quality in the SCW is excellent. All of southwest Montana is in attainment, meaning that the air resource meets or exceeds all National Ambient Air Quality Standards. The closest Montana Ambient Air Quality monitoring sites are located in Butte. The BLM is a member of the Montana/Idaho Airshed Group and is in compliance with the Environmental Protection Agency's 1998 Interim Air Quality Policy for Wildland and Prescribed Fires (USEPA, 1998)

3.3.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use." (IPCC 2014). Climate change and climate science are discussed in detail in the Bureau of Land Management *Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota* (Climate Change SIR 2010). This document is incorporated by reference into this EA.

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen." (IPCC 2014) Global average temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC 2014). Warming has occurred on land surfaces, oceans and other water bodies, and in the

troposphere. A few of the many indications of global climate change include the following (IPCC 2014).

- Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere.
- Globally averaged atmospheric CO_2 concentrations have increased from approximately 285 ppm in 1850 to more than 380 ppm in 2010.
- Since the beginning of the industrial era, oceanic uptake of CO_2 has resulted in a 26% increase in ocean acidity.

As summarized in the Climate Change SIR, the Earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, carbon dioxide (CO_2), methane, and nitrous oxide (N_2O) absorb and retain heat. Without the natural greenhouse effect, the Earth would be approximately 60°F cooler. Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. The buildup of GHGs such as CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At elevated concentrations, these compounds absorb more energy from the Earth's surface and re-emit a larger portion of the Earth's heat back to the Earth rather than allowing the heat to escape into space as would be the case with lower background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from livestock production, fossil fuel development, large wildfires, activities using combustion engines, changes in land use, and changes to radiative forces and reflectivity (albedo) (UNFAO 2013). Each GHG has a different global warming potential that accounts for the intensity of its heat trapping effect and its longevity in the atmosphere. For example, methane has an average atmospheric lifetime of 12.4 years and N_2O has a lifetime of 121 years, but no single lifetime is given for CO_2 (IPCC 2014). Atmospheric GHGs will have a sustained climatic impact. Land use and/or land management activities that increase the ability of vegetation and soil to sequester carbon can help mitigate the effects of climate change. Such activities include improving/restoring riparian and wetland areas; improving age class diversity, health and resiliency of forests; mitigating the size and intensity of wildfires; and maintaining/improving livestock grazing management.

The USEPA published an inventory of U.S. GHG emissions reporting gross U.S. 2012 emissions of 6,526 million metric tons of carbon dioxide equivalent (CO_2e), and net emissions (considering carbon sinks) of 5,546 million metric tons (USEPA 2014). CO_2e emissions are determined by aggregating multiple types of GHGs by multiplying the quantity of each GHG by its global warming potential. Global GHG emissions during 2010 were estimated to be approximately 49 gigatonnes (10^9 metric tons) of CO_2e (IPCC 2014). The CO_2e quantities estimated by the USEPA and IPCC reflect conversion of GHGs to CO_2e based on 100-year global warming potentials from the IPCC Second Assessment Report published in 1995, which were 21 for methane and 310 for N_2O. In the IPCC Fifth Assessment Report, the 100-year global warming

potentials of methane and N_2O have been revised to 28 and 265, respectively. When warming over a shorter time period is considered, the 20-year global warming potentials of 84 for methane and 264 for N_2O may be more relevant. However, most GHG inventories used to determine GHG emission trends use 100-year global warming potentials.

Chapter 3 of the Climate Change SIR describes impacts of climate change in detail at various geographic scales. The following summary describes potential changes identified by the USEPA (USEPA, 2008) that are expected to occur within the Mountain West region.

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow will be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Ecosystems will be stressed and wildlife such as the mountain lion, black bear, westslope cutthroat trout, Montana arctic grayling, marten, and bald eagle could be further stressed.
- Large-scale shifts have occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP 2009). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to two weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Fires, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff increase fire risks.
- Insect epidemics and the amount of damage that they may inflict are also on the rise. The combination of higher temperatures and dry conditions has increased insect populations such as pine beetles, which have killed trees on millions of acres in the western U.S. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific projected changes associated with climate change in Montana include the following (Climate Change SIR (2010).

- Temperature increases in Montana are predicted to be between 3 to 5°F at mid-21st century and between 5 to 9°F at the end of the 21st century. As the mean temperature rises, more heat waves are predicted to occur. In the late 21st century, the number of days per year with temperatures above 100°F is predicted to be between 10 and 45, depending on the level of GHG emissions.

- Winter and spring precipitation may increase by up to 25 percent in some areas of Montana. Precipitation decreases of 20 percent or more may occur during summer, with potential increases or decreases in the fall.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could lead to more fishing closures.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C (1.8°F) global average temperature increase to be 241 to 515 percent.

While climate change will continue to occur within the analysis area, it is extremely difficult to predict the precise location, timing, and impacts of climate change.

Chapter 4

4.0 Environmental Consequences

4.1 Introduction

This chapter discloses the scientific and analytic basis for comparison of the alternatives and describes the probable consequences (impacts, effects) of each alternative on the issues and resource concerns. The environmental consequences are disclosed and analyzed by alternative for each issue. This chapter also discloses the cumulative, or combined, impacts of alternative actions with past, present and reasonably foreseeable actions within the watershed.

Not every key issue and/or resource concern is relevant under each specific heading and therefore will not be discussed. And not every component within the key issues and/or resource concerns will be affected by the alternatives (i.e. not every species of wildlife in the watershed will be affected). If key issues, resource concerns and/or specific components within an issue are not discussed, they were either not present or present but minimally affected.

For each alternative where management changes or administrative actions are proposed, the predicted effects of each applicable action alternative(s) are presented for each identified issue or resource concern in the following order:

Issue #1: Riparian, Wetland and Aquatic Habitat
Issue #2: Upland and Sagebrush Steppe Habitat
Issue #3: Recreation and Travel Management
Resource Concern #1: Special Status Species Habitat
Resource Concern #2: Forest, Woodland and Priority Species Habitat

Resource Concern #3: Noxious and Invasive Species
Resource Concern #4: Wilderness Characteristics and Wilderness Study Area
Resource Concern #5: Socioeconomics
Resource Concern #6: Cultural and Paleontological Resources
Resource Concern #7: Visual Resource Management

Carefully planned resource specific monitoring under all alternatives will provide data for adaptive management within the watershed. The monitoring plan for the SCW is attached as Appendix B.

4.2 Predicted Effects of Alternatives

4.2.1 Predicted Effects Common to All Alternatives, Including the No Action

Issue #1: Riparian, Wetland, and Aquatic Habitat
There are eleven grazing allotments that contain riparian habitat in the Sage Creek Watershed. Nine of the eleven are in compliance with the Riparian Health Standard. The allotments not in compliance are Gallagher Mountain AMP and Mayberry. Current livestock grazing management in these two allotments is contributing to these allotments not meeting the riparian health standard.

Depending on topography and timing of use, livestock are generally expected to utilize riparian and wetland areas more than upland areas. Domestic ungulates, livestock, are drawn to and tend to congregate in riparian areas for the forage and water availability as well as favorable topography which they prefer over drier and often rougher characteristics of upland areas (Clary and Leninger, 2000). In two separate studies in Oregon, cattle were found to use the riparian zone 12 to 20 times more than upland areas and 80% of the forage came from the riparian zone (Skovlin 1984). Ungulates will affect riparian and wetland vegetation, channel substrates, suspended sediment, and channel morphology under all alternatives including the no action alternative to some degree.

The long-term presence of ungulates in a riparian area can result in an undesirable shift in vegetative community as deep rooted species like sedges, may be replaced with shallow rooted species such as Kentucky bluegrass. Along a stream channel this can cause streambank instability which could induce physical changes to channel shape that diminish a streams ability to properly provide its major ecological function to route water, energy, sediment, and nutrients. Diminished riparian and stream function has a detrimental effect on the associated aquatic habitat attributes such as channel substrate composition and embeddedness, streamside vegetation, and stream temperatures (Clary and Leninger, 2000; Clary and Webster, 1989). The shift in vegetative community and the resultant described effects may be considered a direct and/or indirect effect to riparian function and channel morphology. Livestock can also have a direct effect on riparian health and channel morphology by inputting sediment through hoof action, trampling streambanks which may result in increased width/depth ratios (reducing the streams ability to process sediment), and create banks more susceptible to erosion (Bengeyfield 2004).

In wetland habitat, the long term presence or intense use of livestock can alter the attributes that define wetland condition including: water quality, water regime, soils, physical form, invasive flora, and vegetation health, structure, and composition (Morris and Reich, 2013). Livestock treading can physically damage wetland plants and soils which can affect all of the above. Saturated or near saturated soils associated with wetlands have low mechanical strength and easily breakdown under the intense use by ungulates. Pugging can often be the result and pugging depth will increase with repeated treading in wet soils. Pugging and the direct breakdown of plants through livestock treading can create bare ground and alter surface elevations which can adversely affect infiltration rates, duration of inundation, water holding capacity, vegetative health and composition, erosion of soils, and risk for invasive species (Morris and Reich, 2013).

When used, livestock supplement should be placed on ridges or terraces at least ¼ mile from the nearest livestock water source in areas naturally devoid of vegetation. Proper salting, and the efficient placement of supplements, like dehydrated molasses, improves cattle distribution and forage utilization away from sensitive riparian areas (Bailey, Welling and Miller 2001).

Herbivore grazing is a natural process that has shaped the evolution of plants for millennia (Hendrickson and Olson 2005). Grazing, along with fire, was the first vegetation manipulation tool ever applied by humans. Plants have evolved mechanisms to promote their growth after a single grazing event. At proper intensities, timing of use, durations and adequate rest before a repeated grazing event, livestock grazing can have a beneficial effect on plants found in riparian and wetland areas and every plant can prosper in a grazed system (Hendrickson and Olson 2005). Planned grazing management promotes healthy riparian plants and a healthy community by facilitating natural processes such as nutrient cycling and decomposition which often leads to a more diverse system (Laycock 1994). In wetland plant communities that have no grazing, plants can become choked or suppressed by the accumulation of litter (dead plant material) which slows plant decomposition and nutrient cycling and stifles plant diversity. Livestock grazing can be successfully used to reduce litter and promote new plant growth (Evans, 1986). Under a planned grazing management system, riparian and wetland plants can meet the riparian health standard as well as site specific objective.

Riding and herding will continue to be emphasized and utilized to improve livestock distribution, reduce the amount of time cattle spend in riparian areas and increase animal production. Where necessary to meet defined objectives, BLM will require riding as a term and condition of the Term Grazing Permit. BLM technical reference # 1737-20, *Grazing Management Processes and Strategies for Riparian-Wetland Areas* (2006) states: "Successful application of low-stress stockmanship enables the rider or range manager to control the duration that plants and soils are exposed to grazing animals. This controls overgrazing and over resting, both of which lead to deterioration of range health. Proper handling can thus improve livestock distribution and rangeland condition and trend, and lead to improved riparian conditions that benefit fisheries and wildlife while improving water quality."

Predicted effects of climate change relevant to all issues in this section are described in section 4.2.3.1.

Issue #2: Upland Habitat
The Upland Health Standard in 19 of the 22 allotments in the SCW is being met under current livestock management. Three allotments including Red Butte, Red Butte SE and Dell are not meeting the Upland health standard and current grazing management is contributing to them not meeting the standard. Because the upland health standard was met, no changes to the terms and conditions of 19 grazing permits will be implemented based exclusively on the condition of the upland habitat. The health of the uplands and associated upland species, including sagebrush obligate species, is expected to remain in PFC.

Temporary electric fence, livestock supplement placement (salt, protein block), riding and herding are encouraged, and may be required as a means of improving livestock distribution under all alternatives. Although strategic salt placement is an inexpensive and effective distribution tool, research has shown that it is not as persuasive in modifying livestock distribution patterns as other commonly used supplements such as low-moisture blocks. The use of dehydrated molasses supplements is an effective way to lure cattle into underutilized uplands. In a study conducted on two Montana ranches, cattle remained within 600 meters of supplements, even when located on steep rugged terrain and relatively far from water (Bailey, Welling and Miller 2001).

Issue #3: Recreation and Travel Management
Recreational uses will continue to occur as they have historically within this area under all alternatives. Although there would be some changes to certain designated motorized travel routes under the action alternatives, there would continue to be motorized access to all large blocks of BLM managed public lands within this area.

Resource Concern #1: Special Status Species Habitat
Removing, modifying, or rebuilding BLM fences and fences bordering BLM lands will enhance wildlife and bird movement through the area and reduce entanglement and collision hazards. Modifications will be made to existing fences not meeting BLM specifications, which will reduce barriers to wildlife movement and mortality. Modification of wildlife barrier fences will improve seasonal movements by elk, mule deer, moose and antelope in specific areas within the watershed, particularly for young of all species. Adjusting wire spacing, removing wires or providing gaps will allow animals to pass over or under these fences with a reduced risk of entanglement. Installing wildlife escape ramps in water developments enhances the ability of birds, bats, and other small mammals to get out of water developments and avoid drowning.

Herbaceous forage and cover would be reduced over winter and early spring on allotments that are grazed by cattle in the fall. However, removing decadent herbaceous foliage late in the season would improve the nutritional value and forage quality of grasses for wildlife the following spring. On allotments with big game winter range that are grazed following the cool season bunchgrass growing season, herbaceous forage may be reduced for wintering big game, however plants would not be grazed by livestock during the growing season and therefore able to complete reproduction and enter dormancy.

Likewise, on allotments that are grazed in the spring and summer, herbaceous nesting cover may be reduced for sage grouse and migratory birds. However, in both cases with big game winter range and nesting cover, a 50% annual utilization and 7-inch stubble height threshold would provide adequate residual forage and cover. Various migratory birds have different requirements for foraging and nesting, with some species nesting in shrubs and bunchgrasses while others nest on the ground, preferring more open habitat. Habitat heterogeneity across the landscape accommodates the numerous species' needs.

A review of published research found that livestock nest trampling is possible, however it's probably uncommon on sagebrush grassland habitats such as is found in SCW, compared to grasslands without sagebrush cover (Schultz, 2009). Balph et al. (1989) documented that the elevation of vegetation was the visual cue that cattle use to choose hoof placement, avoiding taller vegetation. This suggests that birds nesting beneath shrub canopy or in the crown of bunchgrasses have a low probability of being trampled if livestock stocking rates are not unacceptably high (Schultz, 2009). Incorporating rest and deferred seasonal use outside of the nesting season and bunchgrass growing season at least every couple years would improve plant vigor, benefiting nesting habitat and forage availability. Livestock tend to graze certain areas more regularly than other areas within an allotment, leading to more patchy grazing, which can increase forb availability and stimulate forb growth in uplands (Adams et al., 2004). Residual grass cover following grazing is important for sage grouse nesting habitat. Light to moderate cattle grazing or managed grazing systems can improve quantity and quality of summer forage (i.e. forbs) for sage grouse (MFWP, 2005). Although spring livestock grazing increases potential disturbance to nesting birds, impacts would be minimal to individuals and habitat, without contributing to a loss of viability to the population or species.

Treating noxious weeds will reduce their potential to dominate a site, retaining native vegetation for wildlife cover and forage.

Habitat data was collected during the 2015 sage grouse brood rearing season, within three miles of leks in the watershed. All of the indicators, except shrub cover, are within the "suitable" habitat range for sage grouse breeding habitat outlined in the Sage-Grouse Habitat Assessment Framework (Stiver et al., 2015). Average shrub cover (32%) is slightly higher than the suitable habitat guideline of 15-25% shrub cover (marginal includes >25). Based on this data and the IDT field inspections, none of the sagebrush obligate species that rely on sagebrush to fulfill all or part of their lifecycle would be impacted by the proposed alternatives.

Continuation of lek monitoring within the SCW will contribute to long-term population trend data for male sage grouse lek attendance. Marking fences to make them more visible in areas where sage grouse use may be more concentrated will reduce collisions with wires. While sagebrush cover was found to be in adequate amounts for sagebrush obligate species during the assessment, incorporating habitat guidelines from the Sage Grouse RMP Amendment (USDI, 2015a), relative to ecological site potential etc., will maintain and enhance sage grouse habitat in the SCW, including maintaining or increasing big sagebrush communities, sagebrush canopy cover, herbaceous height, and forb diversity. Maintaining these habitat guidelines will also provide vegetative composition and structure for sagebrush obligate species to fulfill all or part of their life cycle.

West Nile Virus has not been documented in the area administered by the Dillon Field Office. Management to reduce impacts of WNV focuses on eliminating man-made water sources that support breeding mosquitoes known to vector the virus. Whether the water development is for livestock water, wildlife habitat, fish, or storm water management, potential habitat for mosquitoes may be increased. Incorporating applicable design and mitigation measures, described in Appendix C of the Sage Grouse RMP Amendment (USDI, 2015a), for water development projects can reduce mosquito production through modifying and eliminating mosquito breeding sites.

There is potential for conflicts between livestock and large carnivores, especially when livestock are calving or have young offspring. Amending grazing leases to state that livestock losses may occur from wolves and grizzly bear would create awareness, and minimize conflicts between lessees and agencies responsible for managing the predator population. Notification by the permittee to the BLM, MT FWP, or Wildlife Services as soon as is practical of any grizzly bear depredation on livestock or conflicts between grizzly bears and livestock, even if the conflict does not result in the loss of livestock, would likely reduce the chance of livestock depredation and the possible removal of the grizzly bear. Posting and encouraging food storage recommendations would also reduce conflicts between grizzly bear and public land users.

The Biological Evaluation for Special Status Fish and Wildlife Species in Appendix C provides a summary of effects to special status fish and wildlife species from the proposed alternatives. None of the alternatives would impact BLM sensitive status wildlife species or T & E species in a way that would lead to a downward trend in populations and toward federal listing.

Continuation of the ongoing periodic nonnative brook trout removal in the headwaters of East Creek would allow the WCT population the opportunity to function without heavy pressure from this competing species. With the entire lower 2/3 of the drainage heavily populated with brook trout, the periodic suppression efforts in the upper mile of the drainage will never eradicate brook trout, only keep their numbers suppressed in this portion of the drainage to a level where the WCT population isn't overwhelmed by interspecies competition and predation.
Continuation of stream temperature, population and habitat monitoring will provide long term data on WCT streams. This data would be used to track any changes in stream temperature related to climate change or changes in land management. Additionally, temperature data would allow managers to identify drainages that could act as thermal refugia for cold water species should climate change alter stream temperatures beyond preferred thresholds.

See whitebark pine discussion in Section 4.2.1 Resource Concern #2 below.

Resource Concern #2: Forest, Woodland, and Priority Species Habitat
Public use of wood products on BLM administered lands will result in the permitted removal of dead/dying materials within 300 feet of existing designated open routes. Impacts of personal-use firewood gathering will be minimal.

Permits for Christmas trees will be issued for the removal of small size-class trees. Impacts to resources from Christmas tree harvesting will be minimal.

Mountain pine beetle and white pine blister rust activity will continue under all alternatives including the no action. As suitable host trees decline, the mountain pine beetle population will also return to endemic levels. Young, small-diameter lodgepole pine will not be susceptible to pine beetle attack until the trees reach maturity. Throughout the SCW, 5-needled pines (limber pine and whitebark pine) will continue to decline due to mountain pine beetle and/or white pine blister rust. Existing mixed conifer stands comprised of limber pine and Douglas-fir will shift towards becoming Douglas-fir dominated stands. As a result of this trees species conversion, calorie-rich limber pine seeds will become less common.

BLM manages habitat, not wildlife populations, so wildlife browse-related impacts to aspen and curlleaf mountain mahogany are outside the control of BLM's management.

Resource Concern #3: Noxious and Invasive Species
Human activities, such as road maintenance activities, recreation, off road vehicle use, mining, utility corridors and other disturbances and natural events, such as livestock, wildlife, wind, water and wildfire would continue to contribute to the spread of noxious and invasive species into and within the watershed. Noxious weeds would continue to be treated as resources allow through the existing cooperative effort between the BLM, Beaverhead County, private landowners and other partners. This would likely maintain noxious weed infestations at current levels or result in a slow decrease in plant densities. This continued treatment would reduce the spread of existing infestations and targeting new infestations for eradication would keep them from becoming well established.

Resource Concern #4: Wilderness Characteristics
There are no proposed projects within the Blacktail Mountains WSA or any of the areas identified as having wilderness characteristics. Wilderness characteristics are expected to be maintained in all areas where they currently exist under all alternatives including no action.

Resource Concern #5: Socioeconomics
The BLM does not have access to financial or business records for lessees authorized to graze livestock on allotments included in this EA. Therefore, it is impossible to provide a detailed or quantifiable discussion of individual ranch operations or economic conditions. The 2016 BLM AUM cost is $2.11 with a surcharge rate of an additional $7.31/AUM for running cattle owned by another operator. Private land lease rates in Montana for 2016 average $23.00/AUM. MT DNRC leases rates are currently $19.57/AUM.

Current trends in the livestock market and associated expenses will continue. Economic impacts to businesses and commercial outfitting operations in the area are not expected to be affected from recreation in the SCW by any of the alternatives.

Refer to Chapter 4 on page 302 and Table 56 on page 286 in the Amended Dillon Proposed RMP and Final EIS for further information.

Resource Concern #6: Cultural and Paleontological Resources
The BLM will continue to focus on preservation and protection of cultural and paleontological resources to ensure they are available for appropriate uses by present and future generations.

The BLM will also continue to reduce imminent threats from natural or human-caused deterioration, or potential conflict with other resource uses, by identifying areas for new field inventory. The BLM will also continue to ensure that all authorizations for land and resource use avoid inadvertent damage to federal and nonfederal cultural and paleontological resources in compliance with Section 106 of the National Historic Preservation Act and the Paleontological Resources Preservation Act of 2009.

Resource Concern #7: Visual Resources
There are no major projects proposed in any of the alternatives that would exceed visual resource management objectives for any of the areas within the watershed.

4.2.2 Predicted Effects of Alternative A - No Action (Continuation of Current Management)

Issue #1: Riparian, Wetland, and Aquatic Habitat
The No Action Alternative would not meet riparian, wetland, or aquatic habitat objectives along stream reaches and/or at springs where resource concerns were identified. Stream morphology (channel shape and gradient) which is essential to maintaining stream channel stability, would continue to be impacted. Vegetative composition, cover and vigor, would continue to be negatively impacted. Sediment inputs into streams, generated by human activities, would continue at the same levels. Negative impacts from ungulate trampling to wet meadows, spring sources, and spring brooks would continue, and ecological functions would continue to be degraded in these areas.

Under this Alternative, none of the livestock management or road related riparian issues or concerns identified by the IDT and documented in the SCW Assessment Report would be addressed. Site-specific objectives would not be met and some allotments would continue being out of conformance with the Standards for Rangeland Health (43 CFR 4180). Under Alternative A, no new AMPs or projects (fences, water developments) would be initiated to address concerns on 14 stream reaches (5.9 miles) that failed to meet the Riparian Health Standard. Some site specific riparian habitats would continue to be impacted by ungulate browsing on palatable woody species resulting in limited recruitment and regeneration.

Current trends and conditions of fish habitat would continue under the no action alternative. Habitat conditions on streams not meeting habitat requirements would not be expected to appreciably improve over the life of this plan. Fishery habitat in an upward trend or PFC condition such as found in the majority of fish habitat would be expected to continue to improve or stabilize in PFC condition. Habitat concerns such as sediment input from road crossings on several streams such as Little Basin and Little Sage as well as site specific issues related to livestock impacts such as those on identified Sheep Creek, reaches 9,8,31, would not be addressed and would continue to have impacts to fish and aquatic habitat.

Issue #2: Upland Habitat
Continuation of current grazing practices on the three allotments (Red Butte, Red Butte SE and Dell) that failed to meet the Upland Health standard would not address documented upland health issues. Some of the upland conditions noted in the SCW Assessment Report, December,

2015 (http://www.blm.gov/mt/st/en/fo/dillon_field_office.html) are: water flow patterns that are slightly longer than expected, minor erosion and soil instability, slight active pedestalling in the flow patterns, increased bare ground causing increased litter movement and/or presence of noxious and invasive species.

Issue #3: Recreation and Travel Management
The extensive off-road vehicle violations that were described in the Affected Environment section of this document would be expected to continue to some degree under the No Action Alternative. The Amended Dillon RMP already provided for a graduated method for implementing the travel management restrictions identified in order to achieve better compliance. Those additional measures would likely be implemented even under the No Action Alternative. The recent concerns and complaints that have been expressed regarding the extent of off-road vehicle violations would be addressed through some of the methods prescribed in the action alternatives regardless of this watershed process, and some level of improved compliance would likely occur.

Resource Concern #1: Special Status Species Habitat
Under the No Action alternative, wildlife habitat in allotments that didn't meet riparian/wetland standards would continue to be affected by reduced vegetative and woody cover, vegetative species composition, and structural diversity. Decreased aspen, willow and sedge dominated communities limit biodiversity by reducing habitat available for fish, amphibians, migratory birds, nesting waterfowl, and browse for wild ungulates. The quality and quantity of sage grouse brood rearing habitat may be reduced with the continuation of existing trends on the two allotments not meeting riparian standards (Gallagher Mountain and Mayberry), as well as site specific riparian concerns in Knox and Sage Creek allotments.

Suitable sagebrush habitat exists for sagebrush obligate species throughout SCW. These habitat conditions would not change appreciably under Alternative A. The continuation of current trends in the allotments that didn't meet the upland standard (Dell, Red Butte, and Red Butte SE) would limit native perennial forb and grass production and wildlife forage and cover in these allotments. These are all custodial allotments, with a small amount of BLM administered acreage (Dell, 40 ac; Red Butte, 40 ac; Red Butte SE, 275 ac).

Current trends in WCT habitat would continue under the No Action alternative. While the majority of WCT habitat was found to be PFC and/or improving, there were issues found on Little Basin Creek and East Creek related to primitive road crossings where WCT habitat is being impacted. Under this alternative, these road crossing issues would not be addressed and the impacts would continue.

Resource Concern #2: Forest, Woodland, and Priority Species Habitat
Under the No Action Alternative, no forest or woodland protection/restoration treatments would be implemented. Current conditions and trends in forest and woodlands would continue until interrupted by natural events (e.g. wildfire, windthrow), insects and disease, and/or changes in weather or climate.

Existing aspen will continue to succumb to drought, old age, and/or insects and disease. Aspen trees are relatively short-lived, and many stands or clones are near their natural life expectancy. As long as growing conditions are favorable, and sufficient below ground energy reserves are present in the roots, aspen will continue to respond to stressors (disturbance) by suckering. If growing conditions are unfavorable (drought), or individual aspen stands or clones deplete their below ground energy reserves, some persistent aspen clones may be lost from the landscape. The current population of elk, deer and moose that are browsing aspen regeneration during some portion of the year would continue to limit successful aspen regeneration watershed-wide. Potential livestock browsing on aspen during fall season of use or incidentally would also continue.

Curlleaf mountain mahogany is present in isolated patches throughout the SCW. Elk, deer and moose seek mountain mahogany as a highly palatable and preferred food source, often consuming all of the current year's plant growth within reach. Repeated browsing has restricted the growth form of most mountain mahogany plants in the SCW to low hedges or stunted bushes. Elk, deer and moose that are utilizing mountain mahogany as a food source are severely limiting the annual growth of most mahogany plants. Restricting wildlife browse by constructing exlosures around individual mountain mahogany patches or stands may temporarily allow those plants to maintain annual growth. However, when exclosures are removed or fail to exclude ungulates, those unprotected mahogany plants would again be targeted by wildlife as a highly desired and needed food source. Due to these considerations, the construction of exclosures around mountain mahogany to restrict ungulate browse was considered but eliminated from further analysis. Ungulate browsing will continue to limit the vigor and extent of mountain mahogany in the SCW.

Remaining mature lodgepole pine trees would continue to be killed by mountain pine beetle. Where lodgepole pine trees have died, understory vegetation is expected to increase in vigor due to more available sunlight, water, and nutrients. Beetle-killed trees would fall to the ground over the next five to fifteen years, contributing to the fuel load available to wildfire, soil nutrient cycling, and wildlife habitat. The behavior and effects of wildfire within stands of beetle-killed trees is the subject of current research. Time since the beetle outbreak affects the type and arrangement of fuel available to fire, and the corresponding surface fire properties and crown fire potential. Other environmental factors (i.e. windspeed, temperature, long-term drought) play an equally important role in influencing fire behavior and severity.

Resource Concern #3: Noxious and Invasive Species
Spread of noxious and invasive species outside of known infestations would be prevented or mitigated to the degree that resources allow. If there are resource constraints, density and/or size of current infestations may not be reduced. Noxious and invasive species would continue to affect vegetative composition and cover, causing increased run-off and soil erosion, reducing forage and affecting upland and riparian health in localized areas within the watershed.

Resource Concern #4: Wilderness Characteristics
Under the No Action Alternative, wilderness characteristics would continue to be maintained in both the Blacktail Mountains WSA and the four areas within the watershed that were identified as possessing wilderness characteristics.

Resource Concern #5: Socioeconomics
Under Alternative A, forage availability and number of authorized AUMs is expected to continue at current levels. Economic benefits attributed to livestock use of BLM lands would remain unchanged. Livestock grazing on 114,475 acres of public lands would provide about 15,705 AUM's of forage on 22 grazing allotments in SCW. The dependency of livestock operators on BLM forage would remain unchanged. Because authorized grazing use on public land allotments would remain static, real estate values of private base properties would not be influenced by BLM actions.

Existing economic trends and BLM expenditures would continue under Alternative A. Economic and social conditions were analyzed in further detail for the Field Office under Alternative A in Chapter 4 (p 314) of the Proposed Dillon RMP and Final EIS, as amended.

Resource Concern #7: Visual Resources
No major projects would be implemented under the No Action Alternative. Therefore, objectives for the various visual resource management classes within this watershed would not be exceeded.

4.2.2.1 Climate Change
Predicted effects would be the same as described in Section 4.2.3.1.

4.2.3 Predicted Effects Common to All Action Alternatives

Issue #1: Riparian, Wetland, and Aquatic Habitat
Livestock Management
Livestock grazing tools that are available and are proposed to be used by the BLM to address Rangeland Health standards that are not met are shown in the SCW Assessment Report Appendix B. Please refer to that document for further information. Revised grazing systems included in the action alternatives were generally developed in cooperation with the grazing permittees in order to increase support in implementation and success in meeting resource objectives. Ehrhart and Hansen (1997) selected 71 reaches on private land which were either functioning properly or functioning with problems, but exhibited an upward trend. Some general conclusions associated with successful management of riparian areas suggest that what operators do to encourage livestock not to loiter in the riparian zone is more important than either season of use or length of time in the pasture. Ehrhart and Hansen (1998) acknowledge that there are "numerous techniques available for developing and implementing an appropriate prescription to address any given riparian ecosystem." The only required ingredient which portends potential success was "serious commitment and personal involvement on the part of the operators and managers." Alternatives developed in consultation with affected permittees have an improved chance for success.

Revised livestock management is predicted to improve riparian vegetation, stream channel morphology and sediment transport and a decrease in sediment inputs into the streams generated by human activities at varying degrees and timeframes in relation to the No Action alternative. Grazing treatments proposed for managing livestock across allotments and alternatives in the SCW include: reduced livestock numbers, reduced duration of use, changes in timing of use, no

grazing in specific pastures, adding rest or deferment into the systems, changing the kind of livestock and/or structural projects (offsite water developments, fences). Each of these revisions or combination of treatments have been developed to address site specific concerns identified during the SCW assessment and are predicted to make progress towards site specific objectives in varying degrees and timeframes.

While different opinions exist within the scientific community regarding the best season of use, there is consensus that the length of time animals spend in a riparian area can be a significant factor in the condition of that area. According to Marlow and his colleagues (1991), "The most critical aspect in any grazing plan for the protection of riparian areas is the length of time cattle have access to a particular stream reach." Extended grazing during the hot summer season is generally considered most injurious to riparian zones (Ehrhart and Hansen 1997). Therefore, wherever the alternative includes reducing the amount of time that cattle have access to riparian areas, impacts are predicted to be reduced.

Utilizing use thresholds as tools to indicate livestock movements helps to improve overall watershed conditions along with the proposed management changes. This analysis is based on the assumption that these allowable use levels and associated livestock rotations are employed in a timely manner. A four inch sedge stubble height threshold would benefit stream channel morphology by reducing impacts to stream banks and bank-holding riparian vegetation in most areas, but is not expected to initiate significant progress toward meeting PFC on its own. Clary and Leininger (2000) recommend a four inch residual stubble height guideline as a starting point for improved riparian grazing management while acknowledging that six inches of stubble height may be required to reduce browsing of willows or limit trampling impacts to vulnerable stream banks. Annual use thresholds may reduce excessive wetland hummocking and drying. Improvements in stream channel morphology and reduced impacts to streamside wetlands would reduce sediment input associated with channel erosion.

Water development in upland areas is often a key factor in reducing livestock watering in riparian areas. Offsite water is recommended by the State of Montana as a Best Management Practice (MT DEQ 2007) for water quality and restoration of stream channels.
Fencing the source would protect the associated habitat in the immediate vicinity. Ehrhart and Hansen, (1997) state "The one quantifiable factor which was highlighted in successful riparian management was *the presence of off-stream water*. Case studies, controlled experiments, and common experience all confirm that, unless discouraged from doing so, cattle tend to spend a disproportionate amount of time in the riparian portion of any pasture. Alternate sources of water appear to be an important tool to encourage livestock to move away from the riparian area". Alternative water provides cleaner water for livestock. If off-site water is located a sufficient distance from streams encouraging livestock to spend less time loafing and grazing in riparian areas, there would be a reduction in waste inputs to streams, soil compaction, channel damage and grazing on riparian vegetation. Augmenting the water development with shade, such as placing the watering trough near existing trees, would also help to reduce the time livestock spend in riparian areas (TR-1737-20, 2006). Design features for spring developments, listed in Section 2.3.3, would mitigate the potential of drying up or shrinking wetland areas associated with spring sources.

Fencing spring sources and associated wet meadows would benefit the spring's ecological functions and hydrological processes, conserve habitat for rare plants, if they are present, and improve existing habitat for wildlife. Wetland exclosures would mitigate and prevent livestock induced hummocking, the compaction of moist wetland soil, and the subsequent raising of bumps or mounds. A common effect within riparian or spring exclosures is an increase in Canada thistle if it is present at the site prior to fencing (pers. comm. Dewey, 2007). New exclosures would be monitored for noxious weeds and treated where necessary.

Fishery habitat is closely tied to riparian habitat conditions. Implementing management changes with the goal of improving riparian conditions would, in nearly all cases, improve fishery habitat. For fish streams not in PFC, changes in management are expected to improve habitat. Improvements would include increases in riparian vegetative diversity and cover, a reduction in bare ground, stabilization of stream banks as well as a decrease in the level of localized sediment input via improved bank vegetative stability and cover. In-stream sediment issues may continue where point sources continue to contribute sediment.

Stream Crossings

Improvement of road/stream interactions would contribute to achieving properly functioning riparian areas and maintain or improve aquatic habitat conditions. Selection of the most appropriate stream crossings, i.e. culverts or hardened crossings, based on the site's geomorphic characteristics and use, would minimize the detrimental effects crossings can have on stream channel function and associated aquatic habitat.

Where applicable, and as identified in the action alternatives, culverts should be sized adequately for fish passage. All culverts should be sized with enough capacity to handle large flow events (2 year to 50 year return interval depending on site specific conditions and needs) so as not to restrict flow at the site. If a culvert is undersized it will have adverse effects on sediment transport, bank stability, and vertical stability due to manipulation of flow velocities. A culvert may not be appropriate if a channel has a broad floodplain and installation of the culvert would eliminate access to the floodplain or interrupt connectivity of floodplain flows (e.g.; channel types C & E, (Rosgen, 1996)). Restricting floodplain access can have a damaging effect to the riparian corridor and aquatic habitat by manipulating the streams natural scour and deposition patterns. This effect can induce erosion at the culvert site and may cause a chain reaction of accelerated erosion throughout the reach (Wargo and Weimann, 2006).

Hardened low water crossings or "fords" can often be the best fit for a site if the channel is well connected to its floodplain, carries high amounts of debris or sediment, has large flow fluctuations, or there is low frequency of use (USDA, 2006b). Low water crossings can be a direct source of sediment as wheeled vehicles transport material through the channel and can disturb the streambed and banks. If the streambed and/or approaches are comprised of fine grain material and the ford is not properly armored and stabilized, the site can be a chronic source of sediment with each passing vehicle. Compared to a natural (unimproved) ford, much less sediment appeared downstream of a hardened ford (streambed excavated and replaced with compacted rock and gravel) after vehicles crossed (USDA, 2006b). The longer-term effects of fords on water quality depends on factors such as type of surfacing on the ford and its approaches, vehicle type and use level, and time since disturbance for reconstruction or maintenance (USDA, 2006b). As vehicles cross through the water, there is also the potential for

chemical pollutants (e.g.; oil, grease, copper, and nickel from brake wear) but there is no evidence that these constituents cause detectable or significant water quality problems at fords (Hyman and Vary 1999).

During installation of a culvert or low water crossings there can be and usually is a short spike in sediment concentration downstream. The same is true following the first high flow event following installation as disturbed soils are washed into the channel. Within an evaluation of numerous studies that measured change in sediment concentrations downstream during installation of either structure; Taylor et al. (1999) determined the contribution is typically a fraction of the total amount of sediment produced by a stream during a regular high flow event.

As stated initially, the improvement of stream crossings would have a positive effect on riparian and aquatic resources within the assessment area. If selection of the type of crossing is based accurately upon the sites geomorphic characteristics, with adequate design, the stream reach and watershed should experience a reduction in sediment introduction from stream crossings. It is difficult to quantify the reduction at this time as exact site selection and final design at each site is not complete.

Wetland Restoration

Four wetland areas (up to 50 acres) are identified for potential restoration. The purpose of the proposed restoration is to expedite the wetlands progression to proper functioning condition by physically eliminating wetland hummocks induced by historic livestock grazing. Wetland meadows degraded by livestock exhibit hummocks and micro-channels that can drain the wetland and lower the water table (Booth, 2014). Cattle can form hummocks through wetlands by compacting organic wetland matter into trails that dewater the wetland so that drying and erosion create and maintain hummocks (Corning, 2002). In contrast a properly functioning wetland, absent of channels caused by trailing of livestock, will slow, spread, and store water and are highly effective at sequestering carbon (Booth, 2014). Restoring surface elevations across a wetland area would eliminate inter-hummock channels and encourage the area to slow, spread, and retain water at a rate that matches local topography, thus expedite the wetlands return to properly functioning condition or desired future condition. The improvement of water storage would have beneficial effect on aquatic habitat and the hydrograph downstream as water may be released later into the summer. Reduction in concentrated flow paths would also eliminate erosion around the base of hummocks which would reduce the long term contribution of sediment to downstream aquatic habitat and reduce loss of productive soils.

The use of tracked equipment during dry or partially frozen conditions would minimize surface disturbance and soil compaction. A piece of tracked equipment exerts less ground pressure than that of cattle. For example, a D8 dozer weighing almost 90,000 pounds exerts half (13 pounds per square inch) the force than that of a cattle hoof (CAT, 2016; Higgins et al., 2011). It is also expected that the next season's freeze-thaw action would act as means to loosen and "de-compact" the soils as mitigation for any minor superficial compaction that occurs. There are no expected adverse effects to soils due to compaction.

The exposure of bare soil is expected to be minimal as vegetation would not be removed but possibly redistributed as hummocks are leveled into surrounding low spots. There would

therefore not be large contiguous area of bare soil following construction, only patches and spots throughout. The existing vegetation is expected to quickly colonize any available bare soil created. These wetlands sites do not have a high gradient from one end to the other and in some cases may be concave in vertical relief. Without channelized flow, this reduces the opportunity for surface flow to have the energy to maintain velocities to transport soils offsite. Regardless, seed and structural erosion control measures would be applied if needed to reduce or eliminate erosion and sediment transport offsite as a result of these projects.

Issue #2: Upland Habitat

Sagebrush mixed with upland grasses and forbs is found in all allotments in the Sage Creek Watershed. Of the total 114,556 BLM acres in the SCW, sagebrush mixed with upland grasses is found on 106,400 acres (SCW AR pp 18). In most allotments, sagebrush is the dominant shrub and accounts for the largest canopy of any plant type. Sagebrush cover is often the heaviest in areas of historically high livestock use. In areas where palatable rangeland plants have historically been grazed heavily (>60% utilization) for consecutive years, sagebrush will take advantage of the reduced vigor of the overgrazed palatable rangeland plants and increase onto these areas. As a result, more sagebrush will be found near watering sources and along fences. Livestock usually will avoid eating herbaceous vegetation that is found under or intermixed with sagebrush because cattle dislike the taste of sagebrush and the course, woody nature of the plant. Overtime, sagebrush plants will persist in historically high grazing use areas and palatable rangeland plants that had been overgrazed will re-establish under or around sagebrush plants because livestock are avoiding grazing within the canopy of sagebrush. As a result, vegetation located under or around sagebrush acts as a refuge for sage grouse. These herbaceous refuges increase the average height of upland vegetation found in the allotments in Sage Creek.

Utilization of key forage plants (e.g. bluebunch wheatgrass, Idaho fescue, needle and thread grass) on the majority of BLM lands in the SCW was found to be <50% on primary range and <10% on secondary range. The <50% and <10% utilization figures do not take into account that almost all allotments in the Sage Creek Watershed which have >125 AUMs authorized for livestock grazing have at least one pasture that is rested from livestock grazing for the entire year (See SCW AR pp 13 and 14). Mayberry and Long Creek allotments are the only allotments in this category that don't have a pasture that is rested each year but no livestock grazing is authorized on the allotments each year until after July 1 and September 1, respectively.
Many of the allotments in the Sage Creek Watershed have 10-50% of the BLM administered acres classified as secondary range due to the distance of forage to water and steep topography. It is common during a year to not graze a pasture due to insufficient livestock water availability. BLM's annual goal for each allotment is to have a 7" stubble height minimum of upland plants across the entire allotment to meet the critical habitat needs (nesting/brood cover) for sage grouse. Based on historic data and observations from the IDT staff, this 7" stubble height threshold is almost always achieved. Although some localized areas nearby watering locations and along fences may not always meet the 7" height threshold, the allotment does meet the 7" threshold when plant height is averaged across the allotment (rest pastures, primary and secondary range, under the canopy cover of sagebrush).

For those locations where site specific concerns were identified, limiting use of upland forage to a 50% threshold on primary range during the growing season would benefit water infiltration,

plant vigor, reduce soil loss from erosion and leave adequate residual cover and forage for wildlife. Moderate use (30-50% annual utilization) would also enhance herbaceous plant community cover and composition. Increased cover improves precipitation infiltration and subsequently decreases soil lost via wind and water erosion. Sediment delivery to nearby streams would also be reduced. Grazing earlier in the season would allow sufficient time for plant re-growth while later deferred treatments enhance seedling establishment and species composition. Deferring livestock use until after the growing season mitigates grazing impacts to cool-season bunchgrasses and reduces trampling of forbs. These figures often reflect how sagebrush canopy protects palatable grasses from being grazed.

Water troughs, mineral placement, and trailing along fences would cause some localized impacts to vegetation and soil compaction. The proposed water developments are designed to improve livestock distribution and are expected to change utilization patterns so that more use occurs on upland forage plants and less in the riparian areas. New livestock water troughs may also provide increased water for wildlife if they are available when livestock are not present. Soil compaction and loss of vegetation is expected in the immediate vicinity of the new water trough and increased forage utilization can be expected within ¼-mile of the troughs due to concentrated livestock use within close proximity to these watering locations.

BLM proposes to have a 7 day earlier or later grazing flexibility provision based on annual weather conditions. This ability to start grazing up to seven days earlier or later as shown on the permittees'/lessees' permit would provide the BLM and affected producer tools to more efficiently manage the herbaceous resources on public lands. Having the ability to respond to annual variations in weather and forage production would be practical and ecologically sensible. Flexibility is the hallmark of successful range management in arid regions. Strict adherence to animal numbers and livestock movement dates without regard to variations in precipitation and forage production can be counterproductive to both rangeland and livestock production. Adjusting stocking rates and rotation dates so that livestock numbers are in balance with forage supply is recommended (Howery, 1999). Upland health would benefit with more appropriate timing of resource use.

Where rest is added into grazing systems, cool season bunchgrasses are expected to increase in vigor, cover and composition over time. Increased cover would reduce overland flow and increase infiltration.

Issue #3: Recreation and Travel Management

Most recreation uses would continue to occur as they have historically within this area under all action alternatives. Changes in travel management across the different action alternatives vary enough that they require analysis that is specific to each alternative.

Resource Concern #1: Special Status Species Habitat

Restoring riparian health is expected to have a beneficial impact on wildlife and fisheries habitat by increasing forage and thermal and hiding cover as well as reducing sediment input into streams. Forbs are an important summer food source for sage grouse broods. Later in the summer, as palatability of forbs declines, sage grouse move into moist areas that still support succulent vegetation, including wetland and riparian areas. Revising livestock grazing to

improve riparian conditions, building exclosures around springs, as well as implementing the wetland restoration projects, would benefit all wildlife species that utilize riparian habitats. This is especially true for sage grouse during brood-rearing when forbs and insects are essential to their diet. The wetland restoration projects would occur outside of nesting and brood-rearing seasons, reducing the likelihood for disturbance to sage grouse and migratory birds. If restoration was implemented between February 15 and April 1, within antelope winter range, the project is short duration and small-scale in relation to available winter range, making impacts to wintering antelope unlikely and minimal.

Revising livestock grazing on Dell, Red Butte, and Red Butte SE allotments, that didn't meet the upland health standard, to increase native perennial grass and forb cover and composition, would improve forage available for wintering antelope, as well as nesting cover for migratory birds.

Construction of new fences may impede movement and be an entanglement and collision hazard for wildlife. Following BLM Handbook H-1741-1 specifications for constructing wildlife friendly fences and livestock exclosures would reduce the risks to birds, elk, mule deer, antelope, and moose. Marking new fences with a high risk of collision will increase visibility for sage grouse and other wildlife, reducing the risk for collisions with the wires.

Where applicable, actions to protect and enhance 5-needle pines, including cone collection and pheromone application, would promote these tree species and their seeds which are an important food source for wildlife species, such as squirrels, Clark's nutcrackers, and bears.

Quaking aspen stands provide important breeding, foraging, and resting habitat for a variety of birds and mammals (Howard, 1996). Elk browse aspen year-round in much of the West, however it is more utilized during the winter in certain areas. Mule deer also use aspen year-round in many areas (Brinkman et al., 1975). Aspen comprised up to 27 percent of the summer diet of mule deer in central Utah (Mueggler, 1985). Aspen provides valuable browse for moose throughout much of the year, including on summer and winter ranges. Bark, leaves, buds, twigs, and sprouts are all browsed by big game. Black and grizzly bears forage on forbs and berry-producing shrubs in aspen understories. Rabbits, hares, squirrels, mice, voles, pocket gophers, porcupine, and beaver also feed on aspen. A diversity of bird species use aspen stands for foraging and nesting. Aspen provide important foraging, courting, breeding, and nesting habitat for ruffed grouse that eat buds, catkins, and leaves year-round (Brinkman, 1975; Gullion, 1972).

Fostering the potential for aspen production and regeneration to exceed browse height, resulting from the aspen protection/restoration treatments, would increase forage and nesting, thermal, and security cover for wildlife. Aspen stands provide greater plant species richness and diversity than meadows and conifer forests (Kuhn et al., 2011). Various wildlife species benefit from this vegetative species heterogeneity. Enhanced and improved aspen stands would benefit large carnivores, ungulates, and migratory birds which use this habitat. The browse protection structures and temporary exclosures would limit or eliminate ungulate access to these aspen sites, reducing browse availability. Migratory birds, raptors, grouse, and small mammals would still be able to access and utilize the aspen stands. Current browsing impacts to aspen regeneration are reducing the amount of aspen on the landscape. Although this browse species would be unavailable until exclosures can be removed or protection structures breakdown, in the long-term

aspen habitat would be retained compared to the current intense browsing, as well as conifer expansion into aspen stands, that is inhibiting aspen regeneration.

If aspen protection/restoration treatments are implemented during migratory bird nesting season, activity around aspen stands may disturb nesting birds. The treatments would be completed at a localized scale, not along entire stream reaches. Not all treatments would be completed during nesting season, or during the same time period or year. Potential impacts to individuals and habitat would not lead to a loss of population or species viability, and the benefits of aspen protection and restoration would likely improve population viability in the long-term, with increased foraging, nesting, hiding, and thermal cover on the landscape.

Changes in management on streams supporting fisheries that were found to be in less than PFC condition would likely result in improvements to fishery habitat. Improvements will generally be seen as an overall improvement in riparian vegetative and stream bank condition. This condition would lead to a decreased level of localized sediment input. In stream sediment issues related to channel formation may continue because in some cases riparian conditions outside the specific management area being addressed will continue to contribute sediment to the stream. As that sediment moves through the stream system it will continue to influence stream conditions downstream of the point source.

Installing culverts at primitive stream crossings located on open routes crossing fishery streams such as Little Basin Creek, would reduce the sediment associated with the existing crossings. A high proportion of sediment within the basin can be related to natural sources; however the primitive crossings proposed for culverts are identified point sources of sediment related to road use.

Incorporating the utilization threshold on WCT streams that requires maintaining a 6” vegetative buffer along the greenline and/or a 3” vegetation standard within the flood plain would provide a vegetation buffer to reduce sediment from entering the stream as well as indirectly reduce stream bank impacts associated with excessive livestock use. This threshold provides a vegetative use trigger to the permittee to indicate when livestock use is reaching maximum allowable use within the riparian area and livestock need to be moved.

Overall there is likely to be little to no negative impact to WCT habitat in East Creek from the proposed aspen restoration so long as there is no topsoil disturbance from heavy equipment in close proximity to the stream channel. In the long term, WCT habitat is expected to improve as aspens re-establish mature stands. Currently there is little in the way of stream shading in the proposed aspen restoration reach on East Creek. Past beaver activity removed mature trees from the proposed treatment areas on East Creek proper. Post beaver, heavy utilization by deer, moose and elk, and livestock is currently suppressing new growth preventing establishment of mature trees. If mature aspen becomes re-established, there is high likelihood for re-colonization by beaver back into the upper 1/3 of the drainage. This would once again provide high quality pool habitat for WCT.

The ongoing monitoring of the two sensitive plants in the SCW would/will provide baseline data for future trend monitoring and provide BLM the information to appropriately manage the habitat associated with these rare plant species.

Resource Concern #2: Forest, Woodland, and Priority Species Habitat
The SCW is comprised of 217,554 acres, of which approximately 2% are classified as forest cover type. Isolated, mixed-conifer stands make up the majority of forest cover in the watershed and are valuable sanctuaries for many wildlife species. Aspen woodlands make up a relatively small percentage of the watershed by area, but they receive a disproportionately high level of use by a wide variety of wildlife, and by people.

Protecting aspen from ungulate browsing and promoting successful aspen regeneration in riparian corridors would improve or maintain habitat diversity, hydrologic function and aesthetics. Alternative B would include the construction of browse protection structures or ungulate exclosures (fences) to protect aspen on up to 4.5 miles of riparian corridor habitat. Alternative C would include the same 4.5 miles of browse protection treatment(s) identified in Alternative B, plus an additional 1.1 miles along Crooked Creek.

Whether constructed by hand or by equipment, browse protection structures made of downed trees, branches and slash would temporarily prevent ungulates from utilizing the protected aspen suckers as a food source. Kashian and others, 2007, found aspen stands inaccessible to elk due to natural barriers (boulders and talus) were free of the detrimental effects of browsing on aspen regeneration. Manipulating logging slash to deter ungulate browsing has shown to be an effective treatment to protect regenerating aspen suckers (Rumble and others 1996).
The BLM Dillon Field Office found similar results in the Big Hole Valley where logging slash was pushed against mature aspen trees that were regenerating with suckers. Aspen suckers have the potential to grow taller than browse height within 8-10 years (Shepperd and others 2006), provided they are not browsed and adequate energy reserves are present in the clonal root system. When aspen regeneration has grown beyond browse height, the leaf canopy can effectively convert sunlight to energy, contributing to the long-term persistence of the aspen clone. The construction of browse barriers to protect aspen would also temporarily reduce food readily available to elk, moose and deer. Wildlife would be forced to seek forage elsewhere, putting additional browse pressure on aspen in untreated areas and/or on other plant species.

The construction of traditional fence exclosures around some portions of existing aspen clones within riparian corridors would restrict all ungulates from browsing aspen regeneration for as long as the fence is functional and maintained. The intent of the exclosure would be the same as constructing browse barriers made from on-site woody materials: to allow aspen regeneration to develop a leaf canopy that can convert sunlight to energy. Deep snow and fallen trees may allow elk, moose or deer to enter the exclosure and browse aspen, defeating the purpose of an exclosure. Fences constructed of any type of wire are also inherently a wildlife entanglement hazard.

The use of tracked equipment to construct browse barriers or exclosure fences would result in localized soil surface disturbance and compaction within treatment areas. Operating tracked equipment under dry or frozen conditions would lessen soil disturbance and/or compaction

impacts. Soil disturbance within treatment areas has the potential to facilitate the spread and/or introduction of noxious and invasive plant species. The presence of weeds or other invasive plants may preclude the use of equipment in some portions of the identified treatment areas. Monitoring and treatment of weeds or other undesirable plants would occur before and after project implementation. All equipment would be pressure washed prior to entering the project area.

Maintaining existing aspen and promoting regeneration would benefit streams and adjacent riparian systems by influencing hydrologic function. The deep binding root masses of aspen hold together stream banks during high stream flow events, reducing sediment input and channel widening. A healthy aspen leaf canopy also provides shade to streams and other riparian vegetation, reducing evaporation rates, water temperature, and increasing flow available for downstream uses.

Though conifers are not common in existing aspen stands, cutting conifers from within aspen stands would reduce conifer shading effects and benefit aspen regeneration.

Collecting cones from individual five needle pine trees (limber and/or whitebark pine) that are suspected of being blister rust resistant would contribute to the genetic breeding program, and could help the long-term sustenance of these species on the landscape. Applying pheromones to select trees or groups of trees will deter mountain pine beetles from attacking mature trees. This would protect valuable individual trees, as well as their genetics, to persist on the landscape as an important feature of forest and woodland habitats.

The action alternatives would make varying amounts of progress toward fulfilling goals and actions of the Forest and Woodland Vegetation section in the Record of Decision and Approved Dillon Resource Management Plan, as amended.

Resource Concern #3: Noxious and Invasive Species
Power washing of equipment before entering a project area would reduce the probability of a new invader being introduced into an area.
Limiting the utilization on upland forage to 50% in the spring and summer as well as use on sedges to four inches along the greenline on non-fisheries or non-native fisheries streams and six inches on WCT streams would increase the competitiveness of the native vegetation and reduce the spread of noxious weeds. Livestock management revisions designed to improve riparian/wetland health would increase the competitiveness of native vegetation and reduce the opportunity for spread of noxious and invasive species.

Reseeding disturbed areas after a project is completed would reduce the risk of the area being invaded by noxious weeds or cheatgrass.

Improving compliance to travel management within the Sage Creek Watershed would substantially reduce the probability of introducing new noxious and invasive species as well as reducing the spread of noxious and invasive species into and within the watershed.

Surveying for noxious weeds and cheatgrass before any Riparian or Wetland project and incorporating the results into the project would reduce their spread.

Addition of the three new herbicides would allow more options for noxious weed control and increase the effectiveness of application in some cases.

Resource Concern #4: Wilderness Characteristics
Under all action alternatives, the one designated motorized route that goes into the Blacktail Mountains WSA would be closed to motorized vehicle use. This route is currently accessible only to the adjacent private landowner and those they might allow to cross through their property. The general public has not had access to this route for many years. Officially closing this route to motorized vehicles would make it clear that it is closed to everyone, including the adjacent landowners and those with permission to pass through their lands. The effect of this on the WSA would be to eliminate the final route where motorized use has been authorized since its designation as a WSA around 1980. This portion of the WSA is recommended to be designated as wilderness, and closure of this route would eliminate a use that would be eliminated should the area ever be designated as national wilderness.

Resource Concern #5: Socioeconomics
The economy of Beaverhead County is highly dependent on agriculture. Jobs and tax revenue generated by livestock associated activities are important economic components of southwest Montana. The alternative or combination of alternatives selected by the BLM Authorized Officer may have a financial impact on an individual grazing lessee and cumulatively on the economic and social fabric of the larger community.

Modifications of use periods in specific pastures or within an allotment, incorporating additional rest or deferment, reducing AUMs and/or reducing numbers of livestock would economically impact ranchers who rely on public land grazing. Operators may have to use private pastures or other areas for longer periods of time and/or may be required to reduce herd size. Additional range improvement projects would increase construction and maintenance expenses for the permittees and the BLM in the short term. In addition, thresholds in the uplands and riparian areas may necessitate increased labor inputs (riding) by the permittees in order to harvest authorized AUMs.

Providing flexibility in the period of use to adjust to seasonal weather conditions, affecting forage production, may benefit grazing permittees economically by increased weight gain of calves on mother cows grazing more nutritious forage.

A variety of projects are proposed on BLM-administered lands to improve land health. Completion of these projects would affect socioeconomics in various ways including, but not limited to: changing use authorizations, purchasing supplies, providing materials and/or labor, and hiring employees or contractors to complete work as well as completing annual maintenance. Table 4.1 summarizes the proposed projects on all BLM administered grazing allotments by alternative.

Table 4.1: Summary of Proposed Projects on All Grazing Allotments by Action Alternative

Proposed Project	Alternative B	Alternative C
AUMs changes over 10 year period	Minus 1,233*	Minus 3,031**
New fence construction, including riparian exclosures/ pastures (miles)	3	0
Fence removal (miles)	0.5	0
New Spring Developments (units)	4	0
New 1,000g troughs (units) associated with new developments	5-9	No projects planned for alternative C.
New 1000g troughs (units) associated with existing developments	0	0
New stock water pipelines on BLM (miles)	3	0
Spring exclosure reconstruction (units)	5	0
New wetland exclosures/pastures (units)	2	2
Stream crossing installation/replacement (number)	6	6
Browse barrier or exclosure construction (miles)	Up to 4.5	Up to 5.64
Mechanical aspen root disturbance	0	Up to 5.64
Travel management actions (miles)	Minus 5 miles	Minus ~94 miles

*Rest required for Red Butte, Red Butte SE, Mayberry and Gallagher Mountain AMP (Divide Creek Pasture) allotments

**No Livestock grazing for a 10-year period in the Gallagher Mountain AMP (Divide Creek pasture) allotment and Mayberry riparian pasture.

BLM expenditures would temporarily increase under both action alternatives during the implementation period. Socioeconomics was fully analyzed under Alternative B in Chapter 4 pp. 331-332 of the Final EIS for the Dillon RMP, as amended.

Resource Concern #7: Visual Resources

There would be no noticeable changes to the visual resources as a result of the proposed actions in any of the alternatives.

4.2.3.1 Predicted Effects of Action Alternatives related to Climate Change

The assessment of Green House Gas (GHG) emissions and climate change is in its formative phase. As summarized in the Climate Change Supplementary Information Report (SIR), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty predicting temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (Climate Change SIR 2010).

It is currently not possible to know with certainty the net changes to climate caused from activities related to improving land health in the Sage Creek Watershed. The inconsistency in results from scientific models used to predict climate change at the global scale coupled with the

lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at the HUC 5 watershed level. It is therefore beyond the scope of existing science to relate a specific source of greenhouse gas emission or sequestration with the creation or mitigation of any specific climate-related environmental effects. Although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently impossible to determine what specific effect GHG sequestration or emissions resulting from a particular activity might have on the environment.

Healthy forests with a diversity of age classes sequester more carbon than mature, even age, decadent and/or unhealthy stands (overstocked, insects, disease). (Millar et. al, 2008). Salvaging forest products from dead/dying timber stands, also adds to our carbon storage capability. "Focusing solely on forest's sequestration benefits misses the important (and substantial) carbon storage and substitution GHG benefits of harvested forest products, as well as other benefits of active forest management" (Malmsheimer et. al. 2011). "Unmanaged forests do not provide additional climate benefits indefinitely. The age when annual forest carbon storage increment begins to decline varies but generally occurs in the first 100 – 150 years as tree mortality losses increase. In most of the American West, fire and insects pose a very immediate threat of catastrophic loss of live tree carbon, turning affected forests into carbon emitters" (Malmsheimer et. al. 2011). "For more than 70 continuous years, US forest cover has increased and net growth has exceeded removals and mortality. Therefore, carbon storage is increasing in the United States. In some forests (e.g. old-growth), other considerations and other benefits will outweigh carbon benefits. However, forests will change with or without management, and choosing not to manage has its own carbon consequences. Young, healthy forests are carbon sinks. As forests mature, they generally become carbon-cycle neutral or even carbon emission sources because net primary productivity declines and the decay of trees killed by natural disturbances – windstorms, fire, ice storms, hurricanes and insect and disease infestations – emits carbon without providing the carbon benefits available through product and energy substitution" (Malmsheimer et. al. 2011). "In the long-term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stock, while producing an annual sustained yield of timber, fiber or energy from the forest, will generate the largest sustained mitigation benefit" (IPCC 2007a p.543).

Overall, research studies agree that carbon storage is enhanced in wet systems. Also, evidence suggests more carbon is sequestered by a richer mix of native species. Species-rich ecosystems are more stable over time and may provide a faster, stronger response to future changes in atmospheric carbon dioxide concentration. (Lennon, Megan and E.A. Nater. 2006.) Improving and/or restoring riparian and wetland systems is predicted to increase their carbon storage capability.

Healthy native rangelands are also carbon sinks and properly managed livestock grazing at moderate levels can increase the soils capability to sequester carbon. (Liebig, Gross, Kronberg, Phillips and Hanson, 2010). Benefits of livestock grazing include increased litter incorporation into the soil and higher productivity of grazed vs. un-grazed grasses (varies with timing, intensity and frequency of grazing). Within allotments in the SCW that are proposing adding rest into the grazing systems, predicted effects are increased vigor, production and composition of cool season bunchgrasses.

The proposed action alternatives are expected to incrementally increase carbon sequestration in the soil and vegetation within the SCW by improving/restoring riparian/wetland areas, continuing and improving livestock grazing on rangelands which is expected to maintain or improve upland conditions, and promoting the persistence of healthy aspen woodlands on the landscape. The amount of increased carbon sequestration across the watershed cannot be quantified with current technology and its effect on climate change would be undetectable.

4.2.4 Predicted Effects of Action Alternatives B and C by Grazing Allotment

Introduction:
Headings are omitted under those allotments within which certain issues are not present, are present, but not affected, or were previously addressed under section 4.2.3, Predicted Effects Common to All Action Alternatives.

Separate sections below discuss the predicted effects of alternatives B and C for: Aspen Protection/Restoration Treatments, and Recreation and Travel Management. Refer to Appendix C for a more in-depth Special Status Species (SSS) analysis.

<u>Armstead Mountain #30008</u>
Alternative B:
Issue #1: Riparian, Wetland and Aquatic Habitat
Lotic reach #1169, which is found in the 400 acre Buck Creek Water Gap, failed to meet the riparian health standard. Under this alternative, the Buck Creek Water Gap would be closed to livestock grazing. However, the permittee would be allowed to trail through the area and livestock are allowed to drink water in the Gap, but no overnight use would be authorized.

Livestock exclusion from reach 1169, except for trailing, for greater than 10 years would have similar results as Hosten and Whitridge found in 2007. Their research showed that colonization of bare soil by grasses and sedges occurred after 10 years in areas that were bare or had little vegetation due to overgrazing. Eliminating most of the grazing impacts from reach 1169 also would result in increased cover and composition of deep rooted vegetation, along with a reduction in bare ground. Protecting the hydric soils from hoof impacts, except during periodic trailing, would ameliorate soil compaction, pugging and hummocking within the wetland and allow more effective ground water recharge within this area.

Installing culverts on Reaches 9 & 31 would reduce sediment input from these sources and therefore reduce sediment aggradation and deposition downstream.

Resource Concern #1: Special Status Species Habitat
Livestock grazing between 5/01-7/10 occurs during sage grouse nesting/early brood-rearing. Livestock grazing between 7/11-12/10 gets into big game winter range season and pastures that are grazed following the bunchgrass growing season would have reduced winter range forage available. Following a 50% annual utilization and 7” stubble height threshold would help ensure that adequate forage and nesting cover exists. These impacts are discussed above under section 4.2.1, Resource Concern #1.

<u>Armstead Mountain #30008</u>
Alternative C:
Issue #1: Riparian, Wetland and Aquatic Habitat
Impacts are expected to be the same as alternative B.

Resource Concern #1: Special Status Species Habitat
Impacts would be the same as Alternative B.

<u>Bull Heifer Creek #10137</u>
Alternative B:
Issue #1: Riparian, Wetland, Aquatic Habitat
The Bull Heifer Creek allotment met all five standards for a healthy rangeland. Alternative B proposes to include about 100 acres from the Knox allotment Pasture #3 that includes reaches 1117 and 1148, into the Bull Heifer Creek allotment's boundaries. The rational for including acres from the Knox allotment into the Bull Heifer Creek allotment is that the Bull Heifer allotment has been grazed much lighter in the past due to the steeper topography of the allotment including along riparian reaches which makes it more resistant to grazing. It also has more armoring with willows along the riparian areas making it more resilient to grazing. Another factor for the heavier historic grazing in the Knox allotment is the Knox allotment's pasture #3 is about half private and half BLM administered land while the Bull Heifer Creek has about 75% BLM administered land and 25% private lands. Because more of the Knox allotment is privately owned compared to Bull Heifer Creek allotment, a historically heavier stocking rate has been authorized within Knox allotment pasture #3.

By altering the fence and putting reaches 1117 and 1148 previously found in the Knox allotment pasture #3 into the Bull Heifer Creek allotment, the stocking rate is decreased and subsequently, grazing use would also decrease on riparian reaches 1117 and 1148 that did not meet the BLM riparian standard while found in the Knox allotment.

The Bull Heifer allotment will be rested every other year and grazed by livestock for <21 days during the grazed year for the authorized AUMs.
Resource Concern #1: Special Status Species Habitat
Expected improvements along reaches 1117 and 1148 would increase sedge and riparian woody species cover and forage for wildlife, including forbs for sage grouse broods. Grazing in June would overlap with sage grouse nesting/early brood-rearing. Following a 50% annual utilization and 7" stubble height threshold would help ensure that adequate nesting cover exists. These impacts are discussed above under section 4.2.1, Resource Concern #1.

Resource Concern #5: Socioeconomics
The BLM doesn't expect a measurable socioeconomic hardship to the permittee with the proposed grazing management changes. These management changes don't restrict the permittee from grazing BLM administered lands, it only requires them to be grazed in a different allotment. The proposed project to change fence boundaries would have some impact on the permittee because standard BLM policy is to have the permittee build the new fence that is proposed. However, the fence that would be removed is an older fence and it needs repair. So,

building a new fence would be equivalent of repairing the existing fence so it doesn't appear this would be a substantial new expense for the permittee.

<u>Dell #20620</u>
Alternative B:
Issue #2: Upland Habitat
The Dell allotment would be eliminated under this alternative. See predicted effects of actions under the Huntsman allotment alternative B.

Resource Concern #1: Special Status Species Habitat
Removing about 2,000 feet of fence would eliminate this barrier to wildlife movement, and collision and entanglement hazard from the landscape.

<u>Dell #20620</u>
Alternative C:
Issue #2: Upland Habitat
The allotment has been grazed from February 1 to May 31 every year with no rest and failed the BLM upland health standard. Under alternative C, the authorized grazing period would be shortened by 45 days and be authorized from February 1 to April 15 each year.

Consistent grazing during the spring and early summer (April 1 to May 31) is detrimental to forage plants that are initiating growth. Continued grazing without a rest year during the critical April 15 to May 31 period during consecutive years leads to reduced vigor of palatable native grasses and forbs and eventual loss of vigor and replacement by less palatable species such as increaser forbs (phlox, pussy toes) fringed sage and rabbitbrush. Alternative C proposes to have all livestock off the allotment by April 15th which would allow native plants to have the critical April 15 to May 31 period to grow without herbivory from livestock. This proposed restriction to grazing is expected to improve plant vigor and allow plants to recolonize areas of bare ground or where fringed sage, rabbitbrush and other increaser forbs have established.

Resource Concern #1: Special Status Species Habitat
Expected improvements would increase herbaceous forage and cover for nesting migratory birds and big game. Grazing would occur on antelope and mule deer winter range, however this 40 acre custodial allotment isn't a critical area for wintering and a vast amount of winter range surrounds this allotment. Following utilization thresholds is also expected leave adequate residual forage.

Resource Concern #5: Socioeconomics
The permittee would need to replace AUMs that have been lost due to management changes in the allotment. This management change would force the permittee to find additional pasture during certain times of the year depending on the specific annual rotation or reduce his livestock numbers. The permittee could either feed hay or rent other private pasture to replace these lost AUMs. With the standard Montana private land lease rate of about $23/AUM, the cost to replace these lost BLM AUMs could be substantial.

<u>Gallagher Mountain AMP #30013</u>
Alternative B:
Issue #1: *Riparian, Wetland and Aquatic Habitat*
Lotic reaches 8, 9 and 31, which are found in the Divide pasture, did not meet the riparian health standard. In the past, this pasture was rested once every third year and grazing for 21 days with about 500 animal during the grazed year. Under this alternative, this pasture would receive full years rest every other year or five years in ten. In addition, during grazing years use would be limited to 15 days for a maximum of 500 animal units. The most critical aspect in any grazing plan for the protection of riparian areas is the length of time cattle spend on a stream reach (Myers 1989). By providing complete rest every other year as compared to every third year as in the past, and limiting the grazing period to < 15 days every other year as compared to 21 days in the past would greatly reduce impacts to reaches 8, 9 and 31. A strong upward trend is expected on all three of these reaches with the reduction in time that livestock has access to the streams (e.g. 75 days in 10 years versus 147 days in 10 years currently).

Lotic reach 86 in Sheep Canyon pasture failed the riparian health standard. In the past the pasture was rested once every third year. During grazing years, the pasture was grazed between 21 to 31 days with 600-750 animal units. Under this alternative, the pasture would continue to be rested once every third year. However, it would be grazed a maximum of 25 days with no more than 500 animal units. A reduction in both days and animal units grazed during most years is expected to improve riparian reach 86. The proposed 25 day period twice every three years would allow the riparian reaches to improve, especially when the animal units are lowered to < 500. Total exclusion may not be needed to maintain a healthy riparian system or to restore riparian areas that need improvement (Elmore, Boone and Kauffman 1994).

Increasing the amount of rest in the Divide Creek pasture from once every three years to every other year would improve fisheries habitat on both Divide Creek and Sheep Creek through reduced utilization of herbaceous riparian plants as well as reduced associated stream bank disturbance impacts. This would allow stream banks to begin to stabilize as deep rooted green-line plants colonize exposed soil and stabilize degrading banks. Stream reaches 9, 8 and 31 on Sheep Creek would see the most notable improvements from the management change. Divide Creek was found to be PFC during the assessment. This management change would have less effect here, but improvements to riparian condition would occur and begin to move habitat conditions towards a higher functioning condition.

Resource Concern #1: *Special Status Species Habitat*
Increasing rest and reducing the grazing period in the Divide Creek pasture is expected to improve riparian conditions, including forbs and herbaceous forage and cover. Reducing the grazing period and AUMs in the Sheep Canyon pasture is also expected to improve forbs and herbaceous forage and cover. The grazing season between 7/11-12/10 is after the elk calving season, reducing disturbance during this time.

Resource Concern #5: Socioeconomics
The permittee would need to replace AUMs that have been lost due to management changes in the Divide Creek pasture. Because BLM is reducing the herd size, days grazed and/or rest intervals, less BLM AUMs would be available to the grazing permittee. This management

change would force the permittee to find additional pasture during certain times of the year depending on the specific annual rotation or reduce his livestock numbers. The permittee could either feed hay or rent other private pasture to replace these lost AUMs. With the standard Montana private land lease rate of about $23/AUM, the cost to replace these lost BLM AUMs could be substantial.

Gallagher Mountain AMP #30013

Alternative C:

Issue #1: *Riparian, Wetland and Aquatic Habitat*

The same effects are expected as alternative B, except that the Divide pasture would be rested for at least the next 10 years. Lotic reaches 8, 9 and 31, which are found in the Divide pasture, did not meet the riparian health standard. In the past, this pasture was rested once every third year and grazing for 21 days with about 500 animal during grazed years. Under this alternative, no livestock would graze the pasture for at least the next 10 years. The most critical aspect in any grazing plan for the protection of riparian areas is the length of time cattle spend on a stream reach (Myers 1989). By providing complete rest compared to every third year as in the past, a strong upward trend is expected on all three of these reaches.

Effects to fisheries habitat would be the same as predicted under alternative B, but conditions would be expected to improve at a faster rate under no grazing.

Resource Concern #1: *Special Status Species Habitat*

Impacts are the same as Alternative B, with a stronger response from forbs and herbaceous forage and cover in the Divide Creek pasture with ten years of no grazing.

Resource Concern #5: Socioeconomics

The permittee would need to replace AUMs that have been lost due to completely resting the Divide Creek pasture. The permittee could either feed hay or rent other private pasture to replace these lost AUMs. With the standard Montana private land lease rate of about $23/AUM, the cost to replace these lost BLM AUMs could be substantial.

Huntsman #10123

Alternative B:

Issue #2: Upland Habitat

The Huntsman allotment met the upland standard. Alternative B proposes to remove a portion of the northwest fence and incorporate the Dell allotment (40 acres of BLM administered land) into the Huntsman allotment. This 40 acre incorporation should have minor impacts to the Huntsman allotment.

The begin date for the Huntsman allotment is May 25th. This date change reflects the historical use by the permittee in the allotment. The BLM acres planned to be moved from the Dell allotment would benefit from the current grazing rotation in the Huntsman allotment because the Dell allotment authorized grazing period has historically began on February 1. Also, the Huntsman allotment is grazed for 30 days each year compared to the 75 days that the Dell allotment has been historically grazed each year. The reduction in grazing days coupled with the

later turnout date would improve the condition of the upland grasses and forbs in the BLM acres formally referred to as the Dell allotment.

Resource Concern #1: Special Status Species Habitat
Removing about 2,000 feet of fence would eliminate this barrier to wildlife movement, and collision and entanglement hazard from the landscape. Impacts from this alternative to nesting migratory birds are expected to be minimal, considering upland standards were met and changes to grazing management are nominal (see section 4.2.1, Resource Concern #1).

Knox #10136
Alternative B:
Issue #1: Riparian, Wetland, Aquatic Habitat
Two of the stream reaches (1117 and 1148) in the Knox allotment pasture #3 did not meet the BLM riparian health standard. However, the allotment next to the Knox allotment to the east, Bull Heifer Creek allotment, met all five standards for a healthy rangeland. Alternative B proposes to include about 100 acres from the Knox allotment Pasture #3 that includes reaches 1117 and 1148, into the Bull Heifer Creek allotment's boundaries. The rational for including acres from the Knox allotment into the Bull Heifer Creek allotment is that the Bull Heifer allotment has been grazed much lighter in the past due to the steeper topography of the allotment including along riparian reaches which makes it more resistant to grazing. It also has more armoring with willows along the riparian areas making it more resilient to grazing. Another factor for the heavier historic grazing in the Knox allotment is the Knox allotment's pasture #3 is about half private and half BLM administered land while the Bull Heifer Creek has about 75% BLM administered land and 25% private lands. Because more of the Knox allotment is privately owned compared to Bull Heifer Creek allotment, a heavier stocking rate has been authorized within Knox allotment pasture #3.

By altering the fence and putting reaches 1117 and 1148 previously found in the Knox allotment pasture #3 into the Bull Heifer Creek allotment, the use would decrease and subsequently, grazing use would also decrease on riparian reaches 1117 and 1148 that did not meet the BLM riparian health standard while found in the Knox allotment. Reaches 1117 and 1148 are expected to improve and meet riparian standards as did all reaches in the Bull Heifer Creek allotment.

Both Pasture #2 and #3 would be rested every other year and the riparian pasture would continue to be rested two out of every three years.

Reach #1152 in pasture #5 did not meet the BLM riparian standard. Alternative B proposes to fence the reach and exclude livestock from grazing inside the exclosure. Livestock exclusion has shown to be the most effective way to recover a riparian zone (Elmore and Kauffman 1994).

Resource Concern #1: Special Status Species Habitat
Increasing rest and reducing the grazing period in pastures #2 and #3, as well as resting pasture #1 once every third year during the growing season would improve forb and herbaceous production for wildlife forage and cover. Grazing pastures # 6 and 7 between 10/1-12/31 would

reduce disturbance to elk calving in these allotments. Impacts to nesting migratory birds between 6/1-6/30 are discussed under section 4.2.1, Resource Concern #1.

Constructing an exclosure fence around wetland #1152 and rebuilding a fence to exclude riparian reaches #1148 and a portion of #1117, would add a potential barrier and collision and entanglement risk to an area that is highly utilized by wildlife. Constructing this fence to wildlife-friendly specifications and marking the fence if collisions are a concern would reduce these risks. Protecting this wetland area would improve deciduous woody riparian species, forbs, sedges, and herbaceous production for wildlife forage and cover.

Changing the livestock grazing use in pasture #2 and #3 would not have a direct effect on WCT as nearly all WCT are found in the upper 1/3 of the East Creek drainage. However, improvements to riparian conditions in these pastures could have indirect positive effects to WCT habitat.

Improvement to riparian conditions on Bull Heifer Creek, which is a tributary to East Creek, in pasture #3, could improve downstream conditions in East Creek through decreased stream temperatures, improved stream flow and reduced sediment as riparian conditions and hydrologic functions improve.

The lower portion of East Creek, in pasture #2, currently supports only limited use by WCT. Average summer temperatures are within a favorable range for WCT at ~ 53 degrees; however summer stream temperatures spike into the mid 60's. These elevated stream temperature make this portion of the drainage less favorable to WCT and more favorable to non-native brook trout. The high numbers of nonnatives in the lower reaches of the drainage are the most likely factor for low numbers of WCT. Improving riparian conditions could potentially result in lower summer stream temperatures which would be more favorable to WCT and somewhat less favorable to brook trout.

Resource Concern #5: Socioeconomics
See Bull Heifer Creek socioeconomics explanation.

<u>Knox #10136</u>
Alternative C:
Issue #1: Riparian, Wetland, Aquatic Habitat
Two of the stream reaches (1117 and 1148) in the Knox allotment pasture #3 did not meet the BLM riparian health standard. Current management is to rest pasture #3 and #2 once every three years with a 15 day grazing period when grazed. Alternative C proposes to rest pasture #3 two out of every three years and Pasture #2 every other year and graze the allotment during grazing years for <14 days. Providing more rest in pasture #3 would allow riparian plants more time to grow without livestock herbivory. Riparian plants are expected to colonize areas of bare ground and stabilize streambanks.

Reach 1152 in pasture #5 did not meet the BLM riparian health standard. BLM proposes to fence the reach and exclude livestock from grazing inside the exclosure. Livestock exclusion has shown to be the most effective way to recover a riparian zone (Elmore and Kauffman 1994).

Resource Concern #1: Special Status Species Habitat
Alternative C would produce essentially the same effects for WCT but at a somewhat faster rate as a result of additional rest in in pasture #3.

Resting pasture #3 two out of every three years, with a <14 day grazing period, would likely result in riparian improvements on reaches #1148 and #1117 compared to alternative B which proposes to fence these reaches in with the Bull Heifer allotment and graze pasture #3 every other year. Alternative B and C propose to rest pasture #2 every other year so the results would be the same as alternative B such as increasing the number of years that bunchgrasses would not be grazed during the growing season and improving forage and cover for wildlife. Impacts would be the same as Alternative B for pastures #6 and 7, as well as wetland #1152.

Resource Concern #5: Socioeconomics
Under this alternative, the permittee would lose 33% of his AUMs by resting pasture #3 two of out every three years compared to historically grazing this pasture two out of every three years. These lost AUMs would have to be found either by purchasing additional hay or renting more private pasture if herd size stays the same. The permittee would also be asked to build the livestock exclosure on reach #1152 which would cost the permittee in his own labor or to hire a contractor to build the exclosure.
The proposed project to change fence boundaries would have some impact on the permittee because standard BLM policy is to have the permittee build the new fence that is proposed. However, the fence that would be removed is an older fence that needs repair. So, building a new fence would be equivalent of repairing the existing fence so it doesn't appear this would be a substantial new expense for the permittee.

<u>Mayberry #10143</u>
Alternative B:
Issue #1: Riparian, Wetland, Aquatic Habitat
Stream reach 1501 did not meet the BLM riparian health standard. Alternative B proposes to create a 200-acre riparian pasture and include reach 1501 inside this riparian pasture. The riparian pasture would be rested for the first four years. After four years, the riparian pasture could be grazed once every three years for 5-7 days. Under previous management, the entire allotment is grazed every year after July 1st in a deferred manner. Although no complete year's rest was scheduled, no livestock graze the allotment during the critical April, May and June months. This rotation would be continued under alternative B except for the grazing plan in the proposed riparian exclosure.

Stream reach 1197 did not meet the riparian health standard. Alternative B proposed to construct a riparian exclosure around reach 1197. No grazing would be allowed inside the riparian exclosure. Livestock exclusion has shown to be the most effective way to recover a riparian zone (Elmore and Kauffman 1994).

The permittee has asked to use a different private water source for the Mayberry pipeline. The current water source's quantity and quality is unpredictable so the new water source should alleviate this water source uncertainty. The proposed line would be about 6,000 feet with about 3,000 feet on BLM administered lands and the balance on private lands. This new water source

provides water for an existing pipeline that was installed in the 1990s and provides water for most pastures in the allotment. Without a good water source, grazing distribution would be reduced to a few small springs in the allotment. The upland health on the allotment met BLM standards so maintenance of the existing pipeline would continue to maintain uplands in good condition.

Wetland restoration along reach 1501 would improve wetland function by eliminating inter-hummock channels that may drain wetlands prematurely and erode organic soils. By restoring the hydrologic regime to the area it is expected to improve the quantity and quality of wetland plant species present.

Resource Concern #1: Special Status Species Habitat
Constructing a riparian pasture fence around reach #1501 and implementing four years of rest, after which this riparian pasture would be grazed once every third year for 5-7 days would improve sedge, forb, and herbaceous forage and cover for wildlife. Constructing this fence and the exclosure fence around reach #1197 to wildlife-friendly specifications would reduce collision and entanglement hazards in this area that is highly utilized by wildlife. Protecting reach #1197 would also improve deciduous woody riparian species production for wildlife cover and forage. Prior to pipeline construction, special status species surveys would be completed.
Effects of the wetland restoration are discussed above under section 4.2.3. Reach #1501 isn't within big game winter range and results from this project are anticipated to have a beneficial impact on wildlife habitat in the long-term.

Resource Concern#5: Socioeconomics
Considerable impacts to the grazing permittee are not expected due to alternative B because all lands are still available to be grazed, after the four year rest period in the riparian pasture.

The proposed new pipeline water source has been requested by the permittee. This pipeline project would be funded by the permittee so BLM would have no cost other than general administration. Although the pipeline cost would be a burden to the permittee, the new water source would allow him to continue to harvest the BLM, Montana DNRC and private AUMs in the Mayberry allotment. The permittee depends on these AUMs to continue to run his livestock operation.

<u>Mayberry #10143</u>
Alternative C:
Issue #1: Riparian, Wetland, Aquatic Habitat
Stream reach 1501 did not meet the BLM riparian health standard. Alternative B and C propose to create a 200-acre riparian pasture with reach 1501 inside the exclosure. No livestock grazing would be allowed in the newly constructed riparian pasture. Livestock exclusion has shown to be the most effective way to recover a riparian zone (Elmore and Kauffman 1994). The rest that the riparian area would receive under this alternative would allow plants to complete their life cycle each year and establish on areas of bare ground and recover the riparian area. Under previous management, the entire allotment is grazed every year after July 1st in a deferred manner. Although no complete year's rest has been scheduled, no livestock graze the allotment

during the critical spring and early summer months. This rotation would be continued under alternative C except for the proposed riparian corridor exclosure.

Wetland restoration along reach 1501 would improve wetland function by eliminating inter-hummock channels that may drain wetlands prematurely and erode organic soils. By restoring the hydrologic regime to the area it is expected to improve the quantity and quality of wetland plant species present.

Resource Concern #1: Special Status Species Habitat
Impacts would be the same as Alternative B, with sedge, forb, and herbaceous forage and cover for wildlife improving more quickly within the riparian pasture around reach #1501 without livestock grazing being permitted.

Resource Concern #3: Noxious and Invasive Species
Allowing cattle to graze the riparian pasture every third year for 5 to 7 days would help to keep the Canada thistle infestations at reduced densities.

Resource Concern #5: Socioeconomics
Under this alternative, the permittee would need to replace AUMs that have been lost due excluding grazing in the newly constructed 200-acre riparian pasture. Because BLM is eliminating grazing inside the exclosure, about 40 less BLM AUMs would be available to the grazing permittee. This management change would force the permittee to find additional pasture during certain times of the year depending on the specific annual rotation. The permittee could either feed hay or rent other private pasture to replace these lost AUMs. With the standard Montana private land lease rate of about $23/AUM, the cost to replace these lost BLM AUMs could be substantial.

Red Butte #20030
This allotment is comprised of mostly private lands with 40 acres of BLM administered land within the allotment boundary. The Red Butte allotment has 14 AUMs of authorized BLM use.

Alternative B:
Issue #2: Upland Habitat
The uplands in the allotment did not meet the BLM standard for a healthy rangeland. Historical management has been to graze the allotment during April, May and June for consecutive years with no rest. Alternative B proposes to provide growing season rest (April 1 to September 1) to the BLM administered land once every three years using electric fence. Under this alternative, allowing range plants to complete their life cycle with no livestock grazing once every three years would allow range plants to improve in vigor and establish plants on areas of bare ground. This periodic rest is expected to improve the condition of native rangeland plants found on BLM administered land in the allotment.

Resource Concern #1: Special Status Species Habitat
Incorporating rest is expected to improve native perennial grass and forb production, increasing these species for wildlife forage and cover. Grazing during migratory bird nesting season would reduce herbaceous cover available, however following utilization and stubble height thresholds

would reduce impacts and are discussed under section 4.2.1, Resource Concern #1. This allotment is 40 acres with private lands surrounding it, on the periphery of antelope winter range. Putting up an electric fence during rest years would create a potential collision and entanglement hazard, however this fence design is more wildlife-friendly than other wire designs (i.e. page wire or four-strand barbed wire). Using high visibility wire or tape would further reduce collision risks.

Resource Concern #5: Socioeconomics
One mile of electric fence would need to be put up to separate the BLM administered lands from the private lands every three years. Construction and maintenance of this fence would be the responsibility of the permittee. Construction and maintenance of this fence would be a financial burden for the grazing permittee. However, part of a BLM grazing permittee's responsibility is to maintain the grazing allotment boundary or interior fences and the electric fence would be considered an allotment interior fence.

Red Butte SE #30615
This allotment is comprised of three separate tracts of BLM administered land totaling 300 acres. The majority of the allotment is privately owned lands. The Red Butte SE allotment has 110 BLM AUMs of authorized grazing.

Alternative B:
Issue #2: Upland Habitat
The 160 acres of uplands on the west side of the allotment did not meet the BLM upland health standard while the 80 acre and 40 acre tracts did meet BLM standards. Historical management has been to graze the allotment during June, July and August for consecutive years with no rest. Alternative B proposes to provide growing season rest (April 1 to September 1) to the BLM administered lands that did not meet the upland standard once every three years using electric fence. This growing season rest would allow plants on BLM administered lands to complete their life cycle without any herbivory.

Resource Concern #1: Special Status Species Habitat
Incorporating rest is expected to improve native perennial grass and forb production, increasing these species for wildlife forage and cover. Grazing during migratory bird nesting season would reduce herbaceous cover available, however following utilization and stubble height thresholds would reduce impacts and are discussed under section 4.2.1, Resource Concern #1. The parcel proposed to be rested is 160 acres, with private lands surrounding it, on the periphery of antelope winter range. Putting up an electric fence during rest years would create a potential collision and entanglement hazard, however this fence design is more wildlife-friendly than other wire designs (i.e. page wire or four-strand barbed wire). Using high visibility wire or tape would further reduce collision risks.

Resource Concern#5: Socioeconomics
One mile of electric fence would need to be put up every third year to separate the BLM administered lands from the private lands. Construction and maintenance of this fence would be the responsibility of the permittee. Construction and maintenance of this fence would be a financial burden for the grazing permitee. However, part of a BLM grazing permittee's

responsibility is to maintain the grazing allotment boundary or interior fences and the electric fence would be considered an allotment interior fence.

<u>Sage Creek AMP #30012</u>
Alternative B:
Issue #1: Riparian, Wetland, Aquatic Habitat
Stream reach 1129 did not meet the riparian health standard. Alternative B proposes to develop a spring and short pipeline with one or two 1,000 gallon troughs near reach 1129. This off-site livestock watering source would help reduce the use on reach 1129 as a watering source for livestock. Livestock use on this reach is expected to be reduced and riparian vegetation to recover in high-use watering areas and areas where livestock had walked to water. The permittee would use this new watering source as a place to direct cattle when they are riding the riparian areas.

Stream reach 1135 did not meet the BLM riparian health standard. Alternative B proposes to develop a spring and short pipeline with one or two 1,000 gallon troughs near reach 1135 on either BLM administered or private land, pending engineering survey. This off-site livestock watering source would help reduce the use on reach 1135 as a watering source for livestock. Livestock use on this reach is expected to be reduced and riparian vegetation to recover in high use watering areas and areas where livestock had walked to water. The permittee would use this new watering source as a place to direct cattle when they are riding the riparian areas. Historically, when the permittee rode livestock off the riparian area, they had no place to move them to drink water.

Under alternative B, a spring on private land in T12S, R7W, Section 22 would be developed with two pipelines with 1,000 gallon troughs at the end of each pipeline for livestock water. Developing this spring with pipelines going in a southeast and westerly direction would improve livestock grazing distribution in both Pasture 2 and pasture 3. Although upland vegetation in both pasture #2 and #3 met the upland standard, these new watering sources would improve grazing distribution in both pastures.
Spring 1193 did not meet the riparian health standard but was found to be on Montana DNRC administered lands. Under alternative B, the BLM proposes, with approval by Montana DNRC, to fence off the spring and develop the spring. A short pipeline and 1,000 gallon trough would be placed at the end of the pipeline for livestock water. Fencing off this spring would improve the condition of the spring as plants would be able to complete their life cycle without grazing use by livestock. Livestock exclusion has shown to be the most effective way to recover a riparian zone (Elmore and Kauffman 1994). The livestock pipeline and trough would provide a clean source of drinking water without causing harm to the spring source.

Five off-site water sources are proposed under alternative B. These off-site water sources have been shown to improve riparian health because livestock prefer to drink from a trough compared to a stream. Miner and others in 1992 found that the presence of a water trough 100 yards from the riparian area reduced the time cattle spent at the stream by 90%. Clawson in his 1993 research found that cattle preferred to water out of a trough compared to a stream. He observed that cattle watered out of the trough near a stream about 74% of the time.

Under this alternative, BLM may extend or expand the riparian exclosure on both Bog Hole spring and reach 1124. Extending these exclosures would reduce streambank impacts and result in improved riparian plant condition and vigor in these areas.

Wetland restoration along Reaches 1129, 1113, and 1135 would improve wetland function by eliminating inter-hummock channels that may drain wetlands prematurely and erode organic soils. By restoring the hydrologic regime to the area it is expected to improve the quantity and quality of wetland plant species present.

Installing culverts on Reaches 1159, 1102, and 1124 and increasing the capacity of the culvert on Little Sage Tributary immediately upstream of Reach 1121 would reduce sediment input from these sources and therefore reduce sediment aggradation and deposition downstream.

Resource Concern #1: Special Status Species Habitat
Fencing the three spring sources as proposed under Alternative B would protect the spring and improve riparian vegetation within the exclosures, providing some forage and cover for wildlife species. These fences also add potential barriers to spring sources, as well as collision and entanglement risks. Constructing these fences to wildlife-friendly specifications would reduce these risks. Marking fences where a high risk for collision would increase visibility of wires. Constructing pipelines throughout the allotment would increase livestock grazing in the uplands, especially around the troughs, likely improving riparian conditions, including forbs for sage grouse broods. Pipelines and troughs would distribute cattle better throughout the uplands, leading to potential increased impacts to sage grouse and migratory bird nesting through herbaceous cover utilization and disturbance. Livestock grazing impacts during nesting season are also discussed under section 4.2.1, Resource Concern #1. Placing pipelines along existing disturbance corridors or in unsuitable sage grouse habitat would help mitigate potential impacts.

Impacts from the wetland restoration are discussed above under section 4.2.3. Reaches #1113 and #1135 are within antelope winter range, however the small scale of this project in relation to the vast acreage of winter range available make impacts to wintering antelope very minimal. If wetland restoration or culvert installation is implemented between March 1- May 15, operations would not occur between 6:00 pm and 9:00 am within two miles of a lek, to reduce disturbance to lekking sage grouse in the area.

Resource Concern #5: Socioeconomics
The permittee would be required to construct all pipelines and place all troughs on the projects. This would be a substantial cost to the permittee. However, the permittee agrees that building these short pipelines and additional troughs would benefit both the resource and their livestock operation.

<u>Tallent #20027</u>
Alternative B:
Issue #2: Upland Habitat
The Tallent allotment met the upland standard but limited water availability has been a chronic problem in several pastures in the allotment. As a result, as part of a larger pipeline system on private lands, BLM would build about 200 meters of new pipeline in T11S, R8W Section 19 on

BLM administered lands with one 1,000 gallon livestock watering trough. This larger pipeline system would provide and more reliable water source and better distribute livestock throughout the allotment. It would also allow BLM to follow the scheduled rotation since reliable water from the pipeline would be available.

4.2.5 Predicted Effects of Aspen Protection/Restoration Treatment

Headings are omitted for those issues or resource concerns which are not present, are present, but not affected, or were previously addressed under section 4.2.3, Predicted Effects Common to All Action Alternatives.

Alternative B:

Issue #1 Riparian, Wetland, and Aquatic Habitat

Aspen protection treatments would be implemented within the riparian corridors along Heifer Creek and several tributaries, and East Creek and several tributaries. Treatments would total up to 4.5 miles in length and vary in width, depending on where aspen currently exists or has the potential to regenerate. Where sufficient woody material is available for the construction of browse protection structures, young aspen are expected to grow through openings in the debris and be relatively inaccessible to ungulates. Aspen suckers that are not browsed for 8-10 years are expected to grow taller than browse height, develop a productive leaf canopy, and contribute energy to the clonal root system. Energy reserves in the root system are expected to allow the long-term persistence of the aspen clone, despite annual browsing of unprotected aspen regeneration. Constructing browse barriers by hand, rather than by using tracked equipment, would have fewer impacts to soil and other vegetation. However, constructing browse barriers by hand would also be very labor intensive and the treatment extent would be limited to small, high-priority areas. By using tracked equipment to construct browse barriers, the treatment extent could be much larger, if adequate downed trees, branches and slash are present. Equipment would not operate on saturated or soft soils to minimize potential for compaction. Equipment would not operate within the high water mark of streams to minimize streambank alteration, and other impacts to riparian and aquatic habitat. Whether gathered by hand or equipment, woody material would not be removed from adjacent stream channels for browse barrier construction. During the construction of browse barriers wildlife may be temporarily displaced due to human activity. The high cost of fence construction and maintenance, and the need to remove exclosures when aspen regeneration has grown past browse height, make browse barrier construction the preferred method to protect aspen.

Maintaining and promoting aspen within riparian corridors is likely to improve the hydrologic function of affected streams. Robust aspen root systems would stabilize streambanks, reducing sediment input during high streamflow events. Aspen leaf canopies would provide shade, reducing water temperature and evaporation.

Issue #2 Upland and Sagebrush Steppe Habitat
Aspen habitat requires deep, moist soils with shallow ground water available most of the year. Aspen typically grow in areas void of sagebrush. Aspen protection treatments would generally be located along riparian corridors, in between areas dominated by sagebrush and other upland vegetation. No impacts are expected in upland habitat as a result of the aspen restoration projects.

Resource Concern #1 Special Status Species Habitat
Overall there is likely to be little to no negative impact to WCT habitat in East Creek from aspen restoration so long as there is no topsoil disturbance from heavy equipment in close proximity to the stream channel. In the long term, WCT habitat is expected to improve as aspens re-establish mature stands. Currently there is little in the way of stream shading in the proposed aspen restoration reach on East Creek. Past beaver activity removed mature trees from the proposed treatment areas on East Creek proper. Post beaver, heavy utilization by deer, moose, elk, and livestock are currently suppressing new growth past the sapling stage preventing establishment of mature trees. If mature aspen becomes re-established, there is high likelihood for re-colonization by beaver back into the upper 1/3 of the drainage. This would once again provide high quality pool habitat for WCT.

Sensitive plant species surveys would occur prior to potential surface disturbing activities. If sensitive plants are discovered, those areas would be avoided during project implementation.

The construction of traditional exclosure fences to exclude all ungulates from browsing aspen regeneration would restrict elk, moose and deer from using that riparian habitat for food or cover. Fences add collision and entanglement hazards to the landscape. This restriction in browse availability and risk for collision and entanglement would continue as long as the exclosure is effective. Other birds and wildlife that are not restricted by fencing would continue to use the riparian habitat within the exclosure. The expected improvement in aspen habitat would benefit a diversity of wildlife species. Section 4.2.3, Resource Concern #1 discusses impacts from the aspen restoration treatments, as well as aspen's importance to wildlife.

Resource Concern #2 Forest, Woodland and Priority Species Habitat
Constructing aspen protection browse barriers and/or exclosure fences is expected to promote the successful reproduction of aspen. By protecting areas of existing aspen regeneration from repeated browsing, some aspen suckers would grow taller than browse height. Aspen trees that mature and develop a leaf canopy can return energy to the root system, making the persistence of aspen clone more likely. Refer to section 4.2.3, Predicted Effects Common To All Action Alternatives, for further details.

Resource Concern #3 Noxious and Invasive Species
Soil surface disturbance caused by equipment during browse barrier or exclosure construction has the potential to facilitate and/or introduce noxious and invasive species. Equipment would

be pressure washed prior to entering the project area(s), reducing the chances of introduction. Disturbed areas and access roads would be monitored for the presence or spread of invasive species, and treated if necessary.

Alternative C:

Issue #1 Riparian, Wetland, and Aquatic Habitat

Aspen Protection/Restoration treatments would be implemented within the riparian corridors along Heifer Creek, East Creek and Crooked Creek, as well as several tributaries to those streams. Treatments would total up to 5.64 miles in length and vary in width, depending on where aspen currently exists or has the potential to regenerate. In addition to constructing browse barrier structures and/or ungulate exclosure fences as described in Alternative B, Alternative C includes the option of using tracked equipment to disturb aspen root systems to encourage suckering. Equipment-mounted ripping teeth, or other suitable attachment, would be used to disturb the top 12 inches of soil, followed by the construction of browse barriers to protect aspen suckers. Mechanical soil surface disturbance would be limited to areas where aspen regeneration is currently lacking, but the mature aspen stand appears healthy enough to respond by suckering. If aspen regeneration cannot be effectively protected by browse barriers, soil disturbance would not be considered.

Mechanical disturbance to aspens stems and roots causes a shift in the dominance of growth regulating hormones. In response to root disturbance, aspen reproduce through prolific suckering from the existing root system. In an Arizona study, (Shepperd, 2001) a small, isolated aspen clone that was edge-ripped with a tractor stimulated aspen suckering into an adjacent meadow. This one-time treatment effectively tripled the size of this small clone without sacrificing any of the mature stems. Repeated efforts to reproduce through suckering, caused by repeated disturbances such as browsing, fire or mechanical damage, can deplete energy stored in the aspen clone's root system. As mature trees die from old age, lack of water, or insects/disease, and young trees can't adequately photosynthesize due to ungulate browsing or shading, entire aspen clones gradually fade and die. Numerous aspen stands in the SCW are near this point of decline. By utilizing equipment to mechanically disturb the root system of aspen stands that still have adequate energy reserves to reproduce, followed by protection from repeated ungulate browsing, a new age-class of aspen would help perpetuate the existence of the clone.

Soil compaction caused by equipment use would be mitigated by the ripping action of the intentional disturbance. Soil surface ripping is a commonly used technique to reduce compaction impacts, and infiltration rates will likely increase in disturbed areas. Vegetation that does not respond well to disturbance, or is damaged during project implementation would temporarily be reduced within the treated area. Noxious or invasive plants that thrive on disturbed soil may be introduced or spread, if a seed source is present.

The potential for increased sediment input into streams is possible until the disturbed soil is adequately vegetated. Design features described in Chapter 2, Description of Alternative C, including overland flow and sedimentation control measures, would mitigate or limit the potential of sediment mobilization into streams.

The predicted effects of browse barrier construction and ungulate exclosures are described in Predicted Effects Common to All Action Alternatives and Predicted Effects of Alternative B.

Issue #2 Upland and Sagebrush Steppe Habitat
See response to alternative B.

Resource Concern #1 Special Status Species Habitat
Potential impacts to WCT would be the same as alternative B. However the potential for more sediment related impacts is higher in areas of aspen root disturbance treatments. These impacts could be mitigated during the layout of the treatment area by resource specialists and incorporating the design features described in Chapter 2, specific to reducing potential impacts related to sediment.

Sensitive plant species surveys would occur prior to potential surface disturbing activities. If sensitive plants are discovered, those areas would be avoided during project implementation.

Impacts are expected to be the same as Alternative B, with the added impact of mechanical disturbance to the aspen clone root system. Ripping through the soil and root system may disturb ground nesting birds and small rodents that have burrows on these sites. Areas that would be mechanically disturbed are isolated to the aspen stands being treated, not along the entire riparian reach. It is most productive to rip/stimulate aspen roots in the spring, when the clone's energy is going towards leaf and stem production. This puts implementation during migratory bird nesting season. If possible, this treatment would occur outside of the nesting season (May 15-July 31). If implemented within this time period, individuals and habitat may be impacted, however a loss of population or species viability would not result from this treatment that would, in the long-term, benefit populations utilizing aspen stands in SCW. Section 4.2.3, Resource Concern #1 discusses impacts from the aspen restoration treatments, as well as aspen's importance to wildlife.

Resource Concern #2 Forest, Woodland and Priority Species Habitat
Mechanically disturbing the root systems of existing aspen clones is expected to cause prolific suckering. If protected from ungulate browse, the new age-class of aspen trees would contribute to the long term persistence of the aspen clone. Constructing aspen protection browse barriers and/or exclosure fences is expected to promote the successful regeneration of aspen. By protecting areas of existing aspen regeneration from repeated browsing, some aspen suckers would grow taller than browse height. Aspen trees that mature and develop a leaf canopy can

return energy to the root system, making the persistence of aspen clones more likely. Refer to section 4.2.3, Predicted Effects Common to All Action Alternatives, for further details.

Resource Concern #3 Noxious and Invasive Species
Soil surface disturbance caused by equipment during browse barrier or exclosure construction, or the intentional disturbance of aspen root systems, has the potential to facilitate and/or introduce noxious and invasive species. Equipment would be pressure washed prior to entering the project area(s), reducing the chances of introduction. Disturbed areas and access roads would be monitored for the presence or spread of invasive species, and treated if necessary.

4.2.6 Predicted Effects of Recreation and Travel management Alternatives B and C

Alternative B:
Proposed changes to the designated routes within the watershed would result in a net reduction of approximately 5 miles of routes currently designated open to wheeled motorized vehicle travel (out of a total of approximately 170 miles of designated open routes on BLM lands within the watershed). That constitutes a reduction of approximately 3% of the open route miles within the watershed. The proposed changes in this alternative are primarily corrections of mapping errors, and responses to changes that have occurred in the area (i.e. routes that were no longer accessible across private lands and other routes that were added to restore access where it was lost). One route of more than 3 miles in the north end of the Blacktail Mountains WSA that was identified to be "undesignated" or identified as closed is not accessible to the public through adjacent private land, and is identified to be closed to ensure that all of the public recreation users are treated equally with respect to motorized access to public lands. The designated open route in the Bull Heifer allotment is proposed to be undesignated since it is the main route providing access across this area, with off-road and motorized travel on undesignated routes ever increasing, especially in this part of the watershed. This is resulting in loss of big game security, riparian degradation, erosion, and spread of noxious weeds. Several other routes identified to be "undesignated" were determined not to actually exist on the ground, and are corrections of mapping errors. As in the No Action Alternative, additional efforts would be made to improve compliance with the travel restrictions within the area that would hopefully reduce violations and improve hunting opportunities.

Alternative C:
The Montana Fish Wildlife and Parks' proposal to modify travel management for the benefit of big game, as well as hunting opportunities, would reduce the routes designated open to motorized vehicles on BLM lands within the watershed by about 94 miles of routes that are currently designated open. This would close approximately 55% of the road miles currently open to wheeled motorized vehicles within the watershed.

This proposal would be very difficult to implement with a public very accustomed to conditions they have come to expect. However, dedicated signing, barricades, user education, and enforcement could make this possible at least over the long term. This proposal would substantially increase the availability of more secure areas for big game animals, and would provide better opportunities for hunters to locate game if they were willing and able to hike out from their vehicles. Hiking distances from the nearest road to the most remote locations on BLM lands would not exceed 2-3 miles anywhere within the watershed. For many hunters, this would be a welcome change, but for many others it would represent a significant inconvenience or in the case of disabled or unfit hunters, prevent them from reaching these locations. It would also reduce the availability of routes for summer OHV enthusiasts.

Resource Concern #1: Special Status Species Habitat
Although they are not a special status species, big game security is a concern in the SCW. The MFWP biologist determined that under the current designated route management plan, 46% of the watershed, 30% of BLM administered land, and 23% of big game winter concentration areas meet functional security standards as defined by Hillis et al. (1991). The use of designated and non-designated routes, occurring during fall hunting seasons (see map 5), leaves 7% of the watershed, 6% of the public lands, and 6% of winter concentration areas within SCW meeting functional security standards. Most all of the designated and non-designated routes were traveled during the 2015 fall big game hunting season. Addressing the travel management issues in SCW would likely enhance elk distribution on public lands, increase hunter opportunity under fair chase conditions, and make population management efforts more effective (pers. comm. Waltee, 2016). See Chapter 3, section 3.2.4, Resource Concern #1: Special Status Species Habitat for further discussion about big game security.

Resource Concern #3: Noxious and Invasive Species
Limiting access to closed routes would reduce the spread of noxious weeds within those areas, which is the most prevalent source of weed spread within the watershed.

4.2.7 Comparative Effects for All Alternatives by Issue or Resource Concern

Table 4.2: Issue #1: Riparian, Wetlands and Aquatic Habitat (only allotments not meeting the Riparian Health Standard, or site-specific riparian issues or projects included)

Allotment	Alternative A (No Action)	Alternative B	Alternative C
Armstead Mountain #30008	Causes and conditions affecting public land resources would be perpetuated.	Close Buck Creek Water Gap to overnight use. Trailing and watering livestock is permitted. The additional rest would improve the riparian condition in the Buck Creek Water Gap.	Close Buck Creek Water Gap to overnight use. Trailing and watering livestock is permitted. The additional rest would improve the riparian condition in the Buck Creek Water Gap.

		Installing culverts on reaches 9 & 31 would reduce sediment input from these sources and therefore reduce sediment aggradation and deposition downstream.	Riparian condition along all reaches proposed for aspen protection/restoration would improve in the long term. Increased root densities, canopy cover, and a source of large woody debris would improve stream channel function and available habitat. There would be increased risk of sediment input due to soil ripping. Sediment risk would be mitigated by design features included. Installing culverts on reaches 9 & 31 would reduce sediment input from these sources and therefore reduce sediment aggradation and deposition downstream.
Gallagher Mountain AMP #30013	Causes and conditions affecting public land in Divide Creek and Sheep Canyon would be perpetuated.	Inserting three pastures from Gallagher Mountain AMP into Armstead Mountain would facilitate moves for grazing permittee but have little to no impact on the rangeland resources. Increasing rest in Divide Creek and Sheep Canyon Pastures would improve riparian habitat health on reaches #8, 9, 31 and 86 that rated FAR.	Insert three pastures from Gallagher Mountain AMP into Armstead Mountain. Impacts the same as alternative B. Eliminating grazing for the next 10 years in the Divide Creek pasture would more quickly improve lotic reaches 8, 9 and 31 as compared to alternative B.
Bull Heifer Creek #10137	Causes and conditions affecting public land resources would be perpetuated.	Inserting 100 acres from Knox allotment pasture #3 into Bull Heifer Creek allotment would improve riparian condition of reaches #1117 and #1148. Allotment would be rested every other year and grazed for a maximum of 21 days. Riparian condition along all reaches proposed for aspen protection/restoration would improve in the long term. Increased root	Aspen protection is the same as B with increased risk of sediment input due to soil ripping. Sediment risk would be mitigated by design features included described in Chapter 2.

		densities, canopy cover, and a source of large woody debris would improve stream channel function and available habitat.	
Knox #10136	Causes and conditions affecting public land resources would be perpetuated.	See Bull Heifer Creek allotment. Knox allotment pasture #2 and #3 would be rested every other year and grazed for up to 14 days. Construct a riparian exclosure fence around wetland area #1112 which would improve riparian resource. Riparian condition along all reaches proposed for aspen protection/restoration would improve in the long term. Increased root densities, canopy cover, and a source of large woody debris would improve stream channel function and available habitat.	Pasture #2 would be rested every other year and pasture #3 would be rested two out of every three years and grazed up to 14 days during grazing years. Construct a riparian exclosure fence around wetland area #1112 which would improve riparian resource. Aspen protection is the same as B with increased risk of sediment input due to soil ripping. Sediment risk would be mitigated by design features described in Chapter 2.
Mayberry #10143	Causes and conditions affecting public land resources would be perpetuated.	Construct riparian pasture that would include reach #1501. Construct riparian exclosure around reach #1197. Improved riparian habitat health expected on reach #1501and #1197 that rated FAR. Wetland restoration along reach 1501 would improve wetland function and is expected to improve the quantity and quality of wetland plant species present.	Construct a riparian pasture that would include reach #1501. No grazing would be allowed in newly constructed riparian pasture. More quickly improved riparian habitat health expected on reach #1501 and #1197 that rated FAR compared to alternative B.
Sage Creek AMP #30012	Causes and conditions affecting public land resources would be perpetuated.	Develop four springs with livestock troughs to improve livestock grazing distribution within the allotment. Wetland restoration along reaches 1129, 1113, and 1135 would improve wetland function and the	

		quantity and quality of wetland plants. Improving the identified stream crossings on reaches 1159, 1102, 1124, and 1121 would reduce sediment input at the crossings and therefore reduce sediment aggradation and deposition downstream.	

Table 4.3: Issue #2: Upland Habitat (only allotments not meeting the Upland Health Standard, or site-specific upland issues or projects included)

Allotment	Alternative A (No Action)	Alternative B	Alternative C
Dell #20620	Causes and conditions affecting public land resources would be perpetuated	Removing the fence between the Dell and Huntsman allotments would eliminate the Dell allotment. BLM acres formally found in Dell allotment would be authorized to be grazed for 31 days beginning on May 25. The later grazing start date and reduced grazing period would improve upland health and vigor. Habitat responses anticipated include: the abundance and vigor of plants in key functional-structural groups would increase; bare ground and plant interspaces decrease; soil surface resistance to wind and water erosion would improve; litter would replace bare ground; total plant biomass production would increase and invasive species would decrease.	Authorized grazing period would be from February 1 to April 15. This grazing period would be a 6 week reduction from what has occurred for the last decade. This reduction in grazing period during the growing season would improve upland health and vigor. Habitat responses anticipated include: the abundance and vigor of plants in key functional-structural groups would increase; bare ground and plant interspaces decrease; soil surface resistance to wind and water erosion would improve; litter would replace bare ground; total plant biomass production would increase and invasive species would decrease.

Huntsman #10123	Allotment met all BLM rangeland standards. No new projects or management changes would be proposed.	Authorized start date moved from May 6 to May 25. Remove portion of northwest boundary fence to incorporate Dell allotment BLM acres. The later grazing date would allow upland plants a longer portion of the growing season to grow without herbivory. Anticipated positive affects to upland habitat attributes would include: reduction in the size of water flow patterns, decreased plant pedestals, reduced bare ground, less litter movement and an increase to biomass production.	
Red Butte #20020	Causes and conditions affecting public land resources would be perpetuated	Resting BLM lands once every three years would improve soil resistance to erosion, improved infiltration of soil, increase key plant species, reduce the size of water flow patterns, decrease plant pedestals and reduce bare ground.	
Red Butte SE #30615	Causes and conditions affecting public land resources would be perpetuated	Resting BLM lands once every three years would improve soil resistance to erosion, improved infiltration of soil, increase key plant species, reduce the size of water flow patterns, decrease plant pedestals and reduce bare ground.	
Tallent #20027	Allotment met all standards but shortage of water in pastures is a historic problem that has been unaddressed.	A large pipeline project is proposed of which about 200 meters of pipeline and one 1,000g trough are on BLM administered lands. This project would improve distribution of livestock on the allotment.	

Table 4.4: Issue #3: Recreation and Travel Management

Alternative A	Alternative B	Alternative C
170 miles of designated open routes for motorized vehicles	165 miles of designated open routes for motorized vehicles Snowmobile use limited to designated open routes Oct. 15 – Dec. 1	75 miles of designated open routes for motorized vehicles Snowmobile use limited to designated open routes from Oct. 15 – Dec. 1 Addressing the travel management issues would likely enhance elk distribution on public lands, increase hunter opportunity under fair chase conditions, and make population management efforts more effective.

Table 4.5: Resource Concern #1: Special Status Species Habitat
Habitats are expected to remain in the condition and along the same trends under the No Action Alternative.

Allotment	Alternative A (No Action)	Alternative B	Alternative C
Armstead Mountain #30008	No Change	Livestock grazing between 5/01-7/10 occurs during sage grouse nesting/early brood-rearing. Livestock grazing between 7/11-12/10 gets into big game winter range. Following a 50% utilization threshold will ensure that adequate forage and nesting cover exists.	Impacts would be the same as Alternative B.
Bull Heifer Creek #10137	No Change	Expected improvements along reaches 1117 and 1148 would increase sedge and riparian woody species cover and forage for wildlife, including forbs for sage grouse broods. Grazing in June would overlap with sage grouse nesting/early brood-rearing, however impacts would likely be minimal.	
Dell #20620	No Change	Removing about 2,000 feet of fence would eliminate this barrier to wildlife movement, and collision	Expected improvements would increase herbaceous forage and cover for nesting migratory birds

		and entanglement hazard from the landscape.	and big game. Grazing would occur on antelope and mule deer winter range, however this 40 acre custodial allotment isn't a critical area for wintering and a vast amount of winter range surrounds this allotment. Following utilization thresholds would also leave adequate residual forage.
Gallagher Mtn AMP #30013	No Change	Increasing rest and reducing the grazing period in the Divide Creek pasture is expected to improve riparian conditions, including forbs and herbaceous forage and cover. Reducing the grazing period and AUMs in the Sheep Canyon pasture is also expected to improve forbs and herbaceous forage and cover. The grazing season between 7/11-12/10 is after the elk calving season, reducing disturbance during this time.	Impacts are the same as Alternative B, with a stronger response from forbs and herbaceous forage and cover in the Divide Creek pasture with ten years of no grazing.
Huntsman #10123	No Change	Removing about 2,000 feet of fence would eliminate this barrier to wildlife movement, and collision and entanglement hazard from the landscape. Impacts to nesting migratory birds are expected to be minimal.	
Knox #10136	No Change	Increasing rest and reducing the grazing period in pastures #2 and #3, as well as resting pasture #1 once every third year during the growing season would improve forb and herbaceous production for wildlife forage and cover. Grazing pastures # 6 and 7 between 10/1-12/31 would reduce disturbance to elk calving in these allotments.	Resting pasture #3 two out of every three years, with a <14 day grazing period would likely result in riparian improvements on reaches #1148 and #1117 comparable to fencing these reaches in with the Bull Heifer allotment under Alternative B which proposes rest every other year, with a grazing period of <21 days. Resting pasture #2 every other year

		Impacts to nesting migratory birds between 6/1-6/30 are expected to be minimal. Constructing a small exclosure fence around wetland #1152 and rebuilding a fence to exclude riparian reaches #1148 and a portion of #1117, would add a potential barrier and collision and entanglement risk to an area that is highly utilized by wildlife. Constructing this fence to wildlife-friendly specifications and marking the fence if collisions are a concern will reduce these risks. Protecting this wetland area would improve deciduous woody riparian species, forb, sedges, and herbaceous production for wildlife forage and cover. WCT habitat would benefit through indirect effects of improved riparian habitat downstream of occupied habitat in East Creek	would increase the number of years that bunchgrasses would not be grazed during the growing season, improving forage and cover for wildlife. Impacts would be the same as Alternative B for pastures #6 and 7, as well as wetland #1152. WCT-Same as alternative B with somewhat faster rate of improvement in lower East Creek (pasture #3)
Mayberry #10143	No Change	Constructing a riparian pasture fence around reach #1501 and implementing four years of rest, after which this riparian pasture would be grazed once every third year for 5-7 days would improve sedge, forb, and herbaceous forage and cover for wildlife. Constructing this fence and the exclosure fence around reach #1197 to wildlife-friendly specifications would reduce collision and entanglement hazards in this area that is highly utilized by wildlife. Protecting reach #1197	Impacts would be the same as Alternative B, with sedge, forb, and herbaceous forage and cover for wildlife improving more quickly within the riparian pasture around reach #1501 without livestock grazing being permitted.

		would also improve deciduous woody riparian species production for wildlife cover and forage. Reach #1501 isn't within big game winter range and results from this project are anticipated to have a beneficial impact on wildlife habitat in the long-term.	
Red Butte #20020	No Change	Incorporating rest is expected to improve native perennial grass and forb production, increasing these species for wildlife forage and cover, including for wintering antelope. Grazing during migratory bird nesting season would reduce herbaceous cover available. Constructing an electric fence during rest years would create a potential collision and entanglement hazard, however this fence design is more wildlife-friendly than other wire fences. Using high visibility wire or tape would further reduce collision risks.	
Red Butte SE #30615	No Change	Incorporating rest is expected to improve native perennial grass and forb production, increasing these species for wildlife forage and cover, including for wintering antelope. Grazing during migratory bird nesting season would reduce herbaceous cover available, however impacts are not likely to be major. Building an electric fence during rest years would create a potential collision and entanglement hazard,	

		however this fence design is more wildlife-friendly than other wire designs. Using high visibility wire or tape would further reduce collision risks.	
Sage Creek AMP #30012	No Change	Fencing the three spring sources would provide some forage and cover for wildlife species. These fences also add potential barriers to spring sources, as well as collision and entanglement risks. Constructing these fences to wildlife-friendly specifications will reduce these risks. Marking fences where a high risk for collision will increase visibility of wires. Adding pipelines and troughs would likely increase utilization and disturbance to nesting sage grouse and migratory birds in the uplands in close proximity to the new developments. Riparian conditions, including forbs for sage grouse broods would also likely improve with better cattle distribution in the uplands. Reaches #1113 and #1135 are within antelope winter range, however the small scale of this project in relation to the vast acreage of winter range available make impacts to wintering antelope very minimal. If wetland restoration or culvert installation is implemented between March 1- May 15, operations would not occur between 6:00 pm and 9:00 am within two miles of a lek, to reduce disturbance to lekking sage grouse in the area.	

Table 4.6: Resource Concern #2: Forest, Woodland, and Priority Species Habitat (Aspen Protection/Restoration Treatments).

Treatment Type	Alternative A (No Action)	Alternative B	Alternative C
Browse Barrier or Ungulate Exclosure Construction	Causes and conditions affecting public land resources would be perpetuated	Protecting aspen from ungulate browsing would allow young trees to grow taller than browse height on up to 4.5 miles of riparian habitat. WCT habitat on East Creek would benefit over the long term with increased canopy cover of aspen. Mature aspens would allow for the return of beaver which through dam construction would provide high quality pool habitat.	Effects would be similar to those described in Alternative B, on up to 5.6 miles of riparian habitat.
Mechanical Root Disturbance	Causes and conditions affecting public land resources would be perpetuated	Not Applicable	Within select portions of 5.6 miles of riparian habitat, mechanical root disturbance would stimulate aspen suckering, and the protection of the young trees from ungulate browsing would allow those trees to grow taller than browse height. WCT-Same as B. Increased risk of sediment issues with ripping but treatment boundary layout and design specifications would mitigate concerns.

Table 4.7: Resource Concern #3: Noxious and Invasive Species

Alternative A (No Action)	Alternative B	Alternative C
No Change	Allowing cattle to graze the riparian pasture in the Mayberry allotment every third year for 5 to 7 days would help to keep the Canada thistle infestations at reduced densities. Soil surface disturbance caused by equipment during browse barrier or exclosure construction has the potential to facilitate and/or introduce noxious and invasive species. Equipment would be pressure	Soil surface disturbance caused by equipment during browse barrier or exclosure construction has the potential to facilitate and/or introduce noxious and invasive species. Equipment would be pressure washed prior to entering the project area(s), reducing the chances of introduction. Disturbed areas and access roads would be monitoring for the presence or spread of invasive species, and treated if necessary.

	washed prior to entering the project area(s), reducing the chances of introduction. Disturbed areas and access roads would be monitoring for the presence or spread of invasive species, and treated if necessary. Limiting access to closed routes would reduce the spread of noxious weeds within those areas, which is the most prevalent source of weed spread within the watershed. Improving land health through actions proposed in this EA would make these areas more resilient to invasion and more competitive with existing infestations.	Limiting access to closed routes would reduce the spread of noxious weeds within those areas, which is the most prevalent source of weed spread within the watershed. Improving land health through actions proposed in this EA would make these areas more resilient to invasion and more competitive with existing infestations.

Table 4.8: Resource Concern #5: Socioeconomics

Alternative A	Alternative B	Alternative C
The BLM no action alternative would perpetuate whatever influences current management activities are having on the local/regional socioeconomic environment.	Revising management by reducing duration of use, adding more rest, or reducing AUMs may increase costs to the permittee. Constructing the structural projects in this alternative would require an investment from the BLM and the lessees. Proposed projects may create job opportunities for local individuals.	The shortened seasons of use and increased rest proposed in this alternative would have a higher cost to grazing permittees. Fewer structural projects are proposed so the costs of materials and labor would be less than under Alternative B.

Table 4.9: Resource Concern #6: Cultural and Paleontological Resources

Alternative A	Alternative B	Alternative C
No Change	No predicted impacts to cultural resources. Conducting cultural and paleontological inventories prior to project construction and vegetation treatments would avoid or mitigate any potential impacts.	

Table 4.10: Resource Concern #7: Visual Resource Management

Alternative A	Alternative B	Alternative C
No management actions would occur that would require visual resource analysis.	No change	No change

4.3 Cumulative Effects for All Alternatives

Cumulative effects are those that result from adding the anticipated direct and indirect effects of the proposed action, to impacts from other past, present and reasonably foreseeable future actions. These additional impacts are considered regardless of what agency or person undertakes such actions. The cumulative impacts area for this EA is defined as all land, regardless of ownership, in the SCW assessment area (map 1) for all issues and resource concerns except Socioeconomics, for which the cumulative impacts area is Beaverhead County. Climate change is analyzed at the regional level. The temporal boundary when analyzing cumulative impacts is 10 years. Some past, present and reasonably foreseeable actions are discussed in Chapter 3 (Affected Environment) and/or Chapter 2 (Features Common to all Alternatives).

4.3.1 Past and Present Actions

Past or ongoing actions that are common to all alternatives and affect the same components of the environment as the proposed actions are:

Livestock grazing has occurred within the watershed since the 1860s. Until the passage of the Taylor Grazing Act in 1934, livestock grazing was unregulated and overgrazing on the public lands was rampant. Livestock grazing management has become increasingly more intensive as other resource values and uses have become more important over the years. Livestock grazing occurs on private, state and federally managed lands within the watershed.

Recreational use has occurred, will continue to occur and is expected to increase within the watershed in the future. Increased recreation has adversely impacted isolated areas within the watershed (camp sites, new trails and roads, spreading of weed seed, etc.).

The introduction of competing and hybridizing nonnative trout as well as changes in habitat within the watershed since European settlement has resulted in the loss of nearly all native WCT populations in the assessment area. Recent efforts have begun to re-introduce native WCT back into historic habitat within SW Montana.

Severe over-trapping of beavers and unregulated livestock use during the late 1800s and early 1900s changed the character (hydrologically and vegetatively) of most mountain streams in the Intermountain West (Elmore and Beschta, 1987; Elmore and Kaufman, 1999; Naiman, 1988). Although there are still active beaver colonies in the SCW, activity is substantially reduced from historical levels.

In the late 1890's and early 1900s, wolves and other large predators in the western United States were hunted, trapped and poisoned nearly to extinction. Ripple and Beschta (2005) indicate that the presence of top trophic level predators substantially affects herbivores and that this interaction alters or influences vegetation (aspen, willow, cottonwood). Over the past decade, wolves have moved back into the Sage Creek Watershed.

Watershed-wide under all management schemes on all land ownerships, there has been and continues to be a decline in aspen. This is a west-wide phenomenon that can be attributed primarily to a combination of successional processes including reduction (or elimination) of fire, changes in predator influence on herbivores, and long-term overuse by ungulates (Bartos and Campbell, 1998; Beschta, 2003; Ripple and Beschta, 2004).

Whitebark pine is declining rapidly across many parts of its range due to the combined effects of the exotic white pine blister rust, the native mountain pine beetle, and the exclusion of fires (Tomback et al., 2001).

Exclusion of fire from the landscape, coupled with fire suppression over the past century, has resulted in an altered fire return interval.
Moose numbers are down throughout MFWP Region 3, with parasites as a primary concern. Elk populations in southwest Montana have increased over the past 20-25 years, and numbers have returned to within objectives in the Gravelly Elk Management Unit, which the SCW is included.

Over the past several years it has become the pattern for up to a couple thousand elk to move onto private agricultural lands from SCW and the Blacktail watershed during archery and rifle hunting seasons. This makes population management difficult since the elk that utilize the watershed throughout the rest of the year are unavailable for hunter harvest during the hunting season.

The sagebrush steppe habitat within the SCW has remained relatively un-fragmented except for roads, mostly two track, throughout the watershed and a few residences near Dell.

The number of water developments, including pipelines, located on State School Trust, and private lands is unknown as is the condition and functionality. Historically water developments were designed with one objective, to provide water for livestock. Where sources were unprotected, designs were poor, or where the developments were not maintained, hydrology, hydric soils and hydrophytic vegetation were often impacted. Impacts frequently observed under such conditions include lowered water tables, conversion of hydric soils to upland soils and reduction in hydrophytic vegetation. Some of these historic developments and designs along with the described impacts may still exist in the SCW.

Road use and maintenance adjacent to or crossing streams have impacted some streams in the watershed by adding sediments and/or removing vegetation at the crossing or adjacent to the stream.

Roads in the uplands allow opportunities for noxious and invasive weeds to become established and in isolated areas (steep slopes) contribute to soil erosion.

Water has been used for irrigation and livestock watering since European settlement in the late 1800's. The use is continuing.

The economic situation of the grazing permittees/lessees is affected by changes in livestock prices, hay prices, fuel prices, interest rates, land prices, labor costs, labor inputs, equipment costs, equipment maintenance costs, facilities maintenance costs, costs of feed supplements, irrigation costs and availability of irrigation water, livestock loss, private land lease rates, veterinary costs, local weather and other miscellaneous factors. Cumulative economic impacts to permittees could add pressure to permittees to subdivide private land to maintain income.

4.3.2 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions that would cumulatively affect the same resources in the cumulative impact area as the proposed actions and alternatives are:

Livestock grazing

Livestock grazing is expected to continue on all land ownerships within the watershed. Stocking rates, kind of livestock and grazing systems are expected to be comparable to present numbers and management in the foreseeable future. Structural projects associated with livestock grazing are expected to remain constant or increase slightly in the foreseeable future within the watershed.

There are several pipeline projects based mostly on private and Montana DNRC lands that are being finalized in or around BLM grazing allotments including the Tallent #20027, Knox #10136 and Sage Creek #30012 BLM grazing allotments. These proposed pipelines found mostly on private and Montana DNRC lands will improve the grazing distribution in these allotments and should improve rangeland health on BLM administered lands.

Water Use
Water use and irrigation is expected to continue at comparable rates within the Sage Creek Watershed. Annual weather patterns and drought cycles will affect the quantity of water available on an annual basis.

Recreation
Recreation, especially hunting, is expected to increase in the SCW in the future.

Roads
Road use and maintenance will continue at comparable levels within the watershed.

Vegetation Changes
Vegetation changes will continue to occur due to natural succession as well as unnatural processes. Unnatural processes include altered fire return interval, presence of noxious and invasive species, anthropogenic disturbances (roads, development, etc.).

- Decrease in mountain big sagebrush habitat through Douglas-fir and Rocky mountain juniper expansion can be anticipated on a very localized basis within the watershed.
- Mortality in forested habitat due to epidemic insect infestations
- Aspen is expected to continue to decline within the watershed
- Mountain mahogany will likely continue to decline within the watershed.
- Noxious and invasive species will continue to be spread into and within the watershed

Wildfire
The potential for wildfire ignitions on all ownerships will continue. The appropriate fire management response will be implemented on federally-administered lands throughout the watershed based on relative values to be protected commensurate with fire management costs. The long-term benefits of fire will also be considered on case-by-case basis.

Economics
The economic situation of the land users is expected to remain relatively constant in the foreseeable future.

Development
Development and population growth in the Sage Creek watershed is expected to increase very slowly.
Special Status Species
The State of Montana has completed a Sage Grouse conservation plan. Other federal agencies also have sage grouse conservation plans (USFS, NRCS). The BLM intends to work

cooperatively and collaboratively with other agencies and landowners on sage grouse conservation.

The BLM will continue to monitor WCT habitat, populations and long term stream temperatures within the watershed. The BLM will continue to explore opportunities to work with private landowners, the State and other federal agencies to expand WCT populations within the watershed.

High probability habitats will be surveyed for sensitive plants prior to any ground disturbing activities on federal land but botanical surveys aren't required on private and state lands even on cooperative projects.

Conservation measures for five-needle pine will continue in a collaborative manner with other agencies and partners.

Travel Management
The BLM is working collaboratively with MT DNRC, MT FWP and private landowners to improve compliance to travel management within the Sage Creek Watershed.

Climate change
Climate will continue to change, however local changes are not predictable within the spatial and temporal scale of this plan.

4.3.3 Cumulative Effects of All Alternatives, Including the No Action

Livestock
Impacts resulting from livestock grazing can be beneficial or adverse depending on the location, stocking rate, timing and duration of use. Any reductions in AUMs on BLM administered lands would increase grazing use on private or state land within the watershed if herd numbers remain consistent. Fencing on other land ownerships and on BLM boundaries may lessen the benefit of fence modification efforts on public lands to improve wildlife movements.

The intermingling of private and state lands with public lands throughout the watershed ensures that activities outside the control of BLM will continue. Grazing on these lands at various times throughout the year will influence forage and cover availability, and distribution of seasonal wildlife uses.

A slight increase in structural projects (fences, water developments) within the watershed would change distribution of livestock in the immediate vicinity of the water development. Since livestock numbers are not being increased, impacts within the watershed as a whole from water developments would not measurably change. Livestock grazing in underutilized upland sites is not expected to have adverse effects on other resources or wildlife at the intensity and frequency that livestock grazing is proposed. Fences can affect wildlife movement or pose collision and entanglement hazards, but with the design features identified in Chapter 2, these effects would be mitigated. Improvements to riparian and upland conditions as a result of improved livestock management and control would outweigh the unmitigated risk of the fence.

Livestock production and sustainability will continue to be important in Beaverhead County and the State of Montana. According to the 2012 Revision of the official United Nations World Population Prospects, the world population of 7.2 billion in mid-2013 is projected to increase by almost one billion people within the next twelve years, reaching 8.1 billion in 2025, and to further increase to 9.6 billion in 2050 (UN 2013). Given this projection, food security is and will continue to be an important issue and livestock are integral to addressing food security. The United Nations Food and Agriculture Organization (UNFAO), on their Livestock and the Environment webpage project "growing populations, rising affluence and urbanization are translating into increased demand for livestock products, particularly in developing countries. Global demand is projected to increase by 70 percent to feed a population estimated to reach 9.6 billion by 2050" (UNFAO 2014). Livestock production and sustainability, as well as food security, will continue to be important issues locally, regionally and globally.

Water Use
Water use will continue to have similar impacts as is currently occurring. Other than changing places of use due to off-site water developments proposed in some of the action alternatives and changes in numbers of livestock on public land allotments in some of the action alternatives, the effects of water use within the SCW is not expected to measurably change as a result of this EA.

Recreation
Impacts expected from increased dispersed recreational use are new camp sites, spreading of weed seed, more use of roads (including driving on closed, undesignated roads), increased wildlife disturbance and increased users conflicts.

Roads
Roads will continue to contribute sediment to streams at crossings as well as loss of vegetation, compaction, soil erosion (specifically on steeper grades) and noxious and invasive species spread within the SCW. Planned culverts and crossings as well as improved compliance to travel management will result in a net benefit to impacts resulting from roads.

Vegetation changes
The loss forest canopy and cover, due to insect and disease mortality, is likely to continue across all ownerships in the limited forested habitat within the SCW resulting in the accompanying change in wildlife habitat.

The aspen restoration treatments would result in a net gain of aspen within the treated areas. With the exception of these areas, aspen is expected to continue to decline on all ownerships within the watershed in the absence of disturbance (wildfire).
On a very localized basis, and in the absence of any wildfires, areas of mountain big sagebrush will be converted to Douglas fir habitat over time within the watershed. This is not expected to affect sage grouse population or sagebrush obligate species in the watershed as a whole.

The decline in mountain mahogany will result in less of this important habitat available for wintering big game over time.

Continuing efforts by all landowners and partners is expected to keep noxious and invasive species from becoming well established or spreading measurably within the SCW.

Wildfire
Fire severity has increased during the past decades due to fuel loading resulting from altered fire return intervals and epidemic insect infestation in forested habitat. This trend is expected to continue until/unless the fire is returned to the landscape through either wildfire or prescribed burn treatments. More severe fires have greater and longer lasting impacts on vegetation, soils, sedimentation in streams (and therefore aquatic species). Since there is limited forested habitat within the SCW, this is not as much of a concern as in watersheds consisting of larger areas of forested habitat.

Economic situation of land users
The permittees economic situation is affected by changes in cattle prices, hay prices, fuel prices, interest rates, land prices, labor costs, labor inputs, equipment costs, equipment maintenance costs, facilities maintenance costs, costs of feed supplements, irrigation costs and availability of irrigation water, livestock loss, private land lease rates, veterinary costs, local weather and other miscellaneous factors. Cumulative economic impacts could influence grazing permittees to sell or subdivide private land to maintain economic viability. Actions in this EA may add result in adverse economic impacts to specific landowners or permittees within the BSCW, but will likely be minor in Beaverhead County as a whole.

Cumulative economic impacts on other segments of the population are not expected to be affected by any alternatives in the EA.

Development
Sub-dividing of private land within the watershed is occurring on a very limited basis, which is expected to continue or increase in the foreseeable future. Land use patterns on private and public lands in Beaverhead County are slowly changing. As traditional agricultural lands are converted to residential and recreational properties fewer large scale ranching operations will remain. Access to public land across private land is becoming more restricted and will likely continue as traditional ranches are subdivided into smaller parcels.

Development and population growth may fragment wildlife habitat. Other impacts may include: higher levels of vehicle traffic, newly established or expanded areas of noxious and invasive species, reduced open space, increased outdoor recreation, reduce access or difficulty in obtaining access to public land, visual impacts, and perhaps an increased demand for water.

Special Status Species
The cumulative effect of collaborative sage grouse conservation efforts within the watershed are expected to result in improvements to sagebrush steppe habitat and stable or increasing sage grouse populations within the area. Other sagebrush obligate species will also benefit from these conservation efforts.

West Nile Virus (WNV) has been linked to sage grouse mortality in multiple areas, however not in the Dillon Field Office. The BLM RMP Amendment provides guidance for West Nile Virus and Water Developments. Management to reduce impacts of WNV focuses on eliminating man-made water sources that support breeding mosquitoes known to vector the virus. Whether the water development is for livestock water, wildlife habitat, fish, or storm water management, potential habitat for mosquitoes may be increased. Incorporating applicable design and mitigation measures for water development projects can reduce mosquito production through modifying and eliminating mosquito breeding sites. While these mitigation measures will be applied on BLM administered lands where applicable, the potential for WNV may still exist, including on lands not managed by the BLM where mitigation measures may not be applied.

Collaborative efforts in managing WCT habitat and populations are expected to maintain or increase habitat and population of WCT within the SCW.

Collaborative conservation on five needle pine, specifically white bark pine is expected to slowly restore this important habitat type in SW Montana.

Completing clearances for special status plant species will help conserve and manage these species on BLM administered lands. On other land ownerships, these plant species may be affected by soil disturbance associated with land use.

The removal of large predators in the western United States in the late 1890s/early 1900s increased the level of impact that elk and moose had on riparian areas and aspen. The reintroduction of wolves into Yellowstone National Park in 1995 and subsequent increase in wolf numbers in southwest Montana may have an effect on reversing these impacts. Landowners have reported that the elk are staying in herds year round, even during calving, as a response to wolves occupying the area.

Travel Management

The effort to improve compliance to travel management and better educate public land users will be more effective due to the collaborative effort between state agencies, private landowners and the BLM. Improved compliance to travel management will reduce the spread of noxious weeds, improve wildlife security, improve hunter success and recreational opportunity and reduce soil compaction, loss of vegetation and soil erosion and reduce sedimentation in streams due to unauthorized road crossings. Less use of unauthorized routes will have a positive social impact on hunters that like to hike or ride horse back, but would likely have a negative social impact on hunters that favor motorized use because they feel they are being limited in the areas they can drive.

Climate Change

The projects and actions proposed by the BLM in this environmental assessment would have undetectable influences on climate change. There is growing scientific evidence that climate change is a reality and human activities are contributing. The recent *National Climate Assessment* (Melillo et al. 2014) (nca2014.globalchange.gov), compiled by over 300 experts on climate change states; "The majority of the warming at the global scale over the past 50 years can only be explained by the effects of human influences, especially the emissions from burning

fossil fuels (coal, oil, and natural gas) and from deforestation" (Gillett et al. 2012; Santer et al. 2013; Stott et al. 2010). "The conclusion that human influences are the primary driver of recent climate change is based on multiple lines of independent evidence. The first line of evidence is our fundamental understanding of how certain gases trap heat, how the climate system responds to increases in these gases, and how other human and natural factors influence climate. The second line of evidence is from reconstructions of past climates using evidence such as tree rings, ice cores, and corals. These show that global surface temperatures over the last several decades are clearly unusual, with the last decade (2000-2009) warmer than any time in at least the last 1300 years and perhaps much longer" (Mann et al. 2008). However, there is uncertainty about the local effects during the foreseeable future. While the long-term (100 year) trend clearly shows warming, local climatic records show great variability for any particular 15 year period. This would make any analysis of short-term impacts from climate change purely hypothetical. While it would be nearly impossible to accurately predict short-term climatic conditions, the land health standards remain relevant during either warm/dry or cool/wet periods. Climate change may also impact food production. The USEPA, citing papers published from 2007 through 2009, predicts several impacts of climate change on agriculture and food supply. Moderate warming and more CO_2 may help plants grow faster, however these effects may be offset by severe warming, floods and drought. Livestock production may be reduced. Livestock may be at risk directly by heat stress and indirectly from reduced quality of their food supply (USEPA, USGCRP 2009). Forage quality in pastures and rangelands generally declines with increasing carbon dioxide concentration because of the effects on plant nitrogen and protein content, reducing the land's ability to supply adequate livestock feed (USGCRP 2009).

4.3.4 Cumulative Effects of Alternative A – No Action (Continuation of Current Management)

Without grazing management changes and new range improvement projects cattle induced riparian health concerns identified in the SCW Assessment Report would not be addressed and objectives for improving riparian health would not be accomplished. Static or downward trends would continue on stream reaches on two grazing allotments which could affect riparian health, fisheries habitat and/or water quality downstream from BLM administered lands.

Aspen clones proposed to be treated under the action alternatives would not be treated and the aspen would continue to decline and likely be lost in these drainages within the next two decades.

Current impacts and trends to fish habitat would continue under Alternative A. Fish habitat in an upward, downward or static trend would likely continue. In situations where habitat conditions are limiting populations, habitat requirements for fisheries would not be met.
Predicted effects of climate change would be the same as described in section 4.2.3.1.

4.3.5 Cumulative Effects of All Action Alternatives

The proposed changes in livestock management would generally improve riparian function on BLM-administered land and other lands (private, state) within BLM allotments at varying degrees and timeframes. The expected effect to downstream riparian habitats and water quality would be improved sediment transport, better access to floodplains, dissipation of energy and, over time, improvements in channel morphology. The effects of implementation of the selected alternative would be quantitatively determined by monitoring physical and vegetative indicators of riparian and upland function, and monitoring vegetative components of habitat.

The implementation of the land health standards, site specific rangeland improvements, and site-specific mitigation would maintain or improve vegetative composition, diversity, vigor and cover, maintain or restore soil function and limit stream bank disturbance and associated soil loss where these concerns were noted. As areas not meeting the land health standards move towards proper functioning condition, the BLM anticipates an increase in vegetative cover, a reduction in bare ground, soil compaction, and soil erosion and an increase in stream bank stability. All lands included within allotment and pastures boundaries are expected to improve as described under the action alternatives, not just BLM administered lands.

If fewer AUMs were authorized on BLM-administered lands, livestock would have to be pastured elsewhere for part of the grazing season or the herd size would have to be reduced. Reducing authorized AUMs may increase livestock use on private property adjacent to or near public lands. When viewing the watershed as a whole, this may directly affect similar resources on private property and offset the benefits to public land. If private livestock numbers were permanently reduced, a decrease in Beaverhead County tax revenues may result.

It's possible that sensitive plant species could be accidentally or inadvertently impacted by construction or placement of range improvement projects on non-federal lands. Indiscriminate or random placement of livestock supplements could also cause impacts to individual plants or populations across all ownerships.

Slightly increased labor costs are assumed under Alternatives B and C to implement and check the allowable use grazing guidelines. During drought periods, total authorized AUMs may not be available. All reduced AUMs would be held in suspended non-use on the Term Grazing Leases.

4.3.5.1 Cumulative Impacts of Climate Change for Action Alternatives

As previously discussed, it is difficult, if not impossible to identify specific impacts of climate change on specific resources within the analysis area. As summarized in the Climate Change SIR (2010), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty predicting temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forces (such as changes from local activities to GHGs). Uncertainties in local forces and feedbacks also make it difficult to estimate the contribution of GHG changes to observed small-scale temperature changes (IPCC 2007b, as

cited by the Climate Change SIR 2010). Effects of climate change on resources are described in Chapter 3 of this EA (section 3.3.2) and in the Climate Change SIR (2010).

The BLM expects only minor changes in the form of increased carbon sequestration capability of vegetation and soil with regard to climate change from actions implemented by the BLM within the SCW. In fact, given current technology, any change would likely be undetectable. Regarding impacts from climate change, there is a great deal of uncertainty over what to expect during the life of the Watershed Plan (10 years). While the long-term (100 year) trend clearly shows warming, local climatic records show great variability for any particular 15 year period. This would make any analysis of short-term impacts from climate change purely hypothetical.

The implementation of the selected alternative would improve the ability of affected public land within the SCW to perform their physical and biological functions including carbon sequestration. As discussed above under 4.2.3.1, healthy forests and woodlands, riparian/wetland areas, and rangelands mitigate GHGs in the atmosphere by storing carbon in the soil and vegetation. Proper livestock management on rangelands increases carbon sequestration in these areas and decreases the number of livestock produced in feedlots that contribute to GHGs (at least for a portion of their life cycle).

The alternatives in this EA slightly reduce the number of livestock overall in the Sage Creek Watershed along with other actions expected to improve riparian/wetland, upland and forest health conditions. Therefore, the limited emissions associated with livestock digestion and excretion would decrease from current levels and carbon sequestration in the soil and vegetation would increase as land health conditions improve. The proposed alternatives and projects are not expected to cause negative impacts to climate change. Conversely, a reduction in net GHGs in the atmosphere are projected as land health conditions improve.

The application of the land health standards requires that they are met regardless of climatic conditions. While it would be nearly impossible to accurately predict short-term climatic conditions, the land health standards remain relevant during warm/dry or cool/wet periods. Progress towards meeting Land Health Standards is expected regardless of fluctuations in climate over the life of this plan. The Dillon Field Office's Watershed Assessment and planning process facilitates adaptive management over ten year increments. By reviewing land health across the watershed(s) and adjusting management to account for documented land health issues, impacts or effects from climate change (as well as other causes/uses) will be accounted for and alternatives developed to mitigate impacts and continue to maintain, or progress towards, site specific objectives and Land Health Standards.

4.3.6 Cumulative Effects of Alternatives B

Generally, additional impacts or predicted effects other than those described above in Chapter 4 are not expected on a landscape level. Because many allotments within the SCW are intermingled with state and private lands, improvements to resource conditions resulting from management changes and projects would produce benefits across all ownerships. Impacts resulting from grazing, vegetative projects and/or recreation on private and State lands, which are not subject to BLM Standards, would continue. This could impact wildlife migration and dispersal depending on timber harvests planned on State and private lands in the future. Any

reductions in AUMs on BLM lands would increase grazing use on private or state land within the watershed if herd numbers stay the same.

Managing for more vigorous and productive cool season grasses by changing the frequency, timing, duration and/or intensity of livestock grazing on specific allotments would leave more cover and forage for wildlife species and may slightly change patterns of use in specific areas within the watershed. Additional off-site watering locations would better disperse ungulate use in specific areas within the watershed.

No additive or cumulative effects are expected for special status plants under this alternative.

Socioeconomic impacts to livestock operators other than those discussed above are not expected.

The cumulative effects for recreation, wilderness, and visual resources of future actions on private or state lands would be similar to the effects discussed above in Chapter 4. The nature and scale of these activities would vary according to the objectives of the landowners or administrators.

Improving stream crossings and roads would reduce sediment inputs to streams from these sources thereby reducing sediment aggradation and deposition downstream on all land ownerships.

4.3.7 Cumulative Effects of Alternative C

Impacts in addition to those described in Chapter 4 above are not expected. The investment in projects is similar to that in Alternative B. Alternative C, generally, contains more intensive management practices and/or more structural projects to help mitigate resource concerns.

Impacts resulting from grazing and/or recreation on private and State lands, which are not subject to BLM Standards, would continue. This could impact wildlife migration and dispersal depending on activities planned on State and private lands in the future. Any reductions in authorized AUMs on BLM lands would increase grazing pressure on private and state lands within the watershed.

Chapter 5

5.0 LIST OF PREPARERS - CONSULTATION/COORDINATION

5.1 List of Preparers

Core IDT members:

Katie Benzel, Wildlife Biologist and ID Team Leader
Pat Fosse, Assistant Field Manager-Renewable Resources
Ryan Martin, Rangeland Management Specialist
Paul Hutchinson, Fisheries Biologist
Sean Claffey, Hydrologist (Soil, Water & Air)

Support IDT members:

Michael Mooney, Weeds Specialist
Kipper Blotkamp, Forester
Joe Sampson, Fuels Specialist
Jason Strahl, Archaeologist
Laurie Blinn, GIS Specialist
Rick Waldrup, Outdoor Recreation Planner
Kelly Savage, Rangeland Management Specialist (Special Status Plants)
Stephen Armiger, Hydrologist (Soil, Water & Air), Retired
Keith Johnson, Assistant Field Manager-Non-renewable Resources

Other resource members involved:

Dave Williams, Geologist, Butte Field Office
Joan Gabelman, Geologist, Butte Field Office
Brandy Janzen, Soil Scientist, Butte Field Office
LeeAnn Pallett, Soil Science Technician, Butte Field Office
Jennifer McAdoo, Hydrologic Technician, Butte Field Office
Berett Erb, Range Technician
Leea Anderson, Range Technician
Haleigh Stott, Range Technician
Cari Forsgren, Range Technician
Melanie Finch, Wildlife Technician
Tempe Regan, Wildlife Technician
Jed Berry, Fisheries Technician

5.2 Consultation/Coordination

Persons and Agencies Consulted:

Dean Waltee, Wildlife Biologist, MT Fish, Wildlife and Parks
Kerry Wahl, Game Warden, MT Fish, Wildlife and Parks
Matt Jaeger, Fisheries Biologist, MT Fish, Wildlife and Parks
Tim Egan, MT Department of Natural Resources and Conservation

Chris Carparelli, Beaverhead Conservation District
Vernon Krug
Todd Sawyer
Kyle Hardin
Ted Brackenberry
Louis Valasquex
Bob Dixon
Bill and Bonnie Huntsman
Mike Huntsman
Allen and Yvonne Martinell
Rulon Buhler
Maurice Wolfe
Max Yates

5.3 GLOSSARY OF TERMS

Animal Unit- A 1000-pound cow, with or without an un-weaned calf, with such a cow consuming 26 pounds of forage dry matter per day.

Animal Unit Month- The amount of forage needed by an "**animal unit**" (AU) grazing for one month**.**

Anticline: In structural geology, an anticline is a fold that is convex up and has its oldest beds at its core.

Anthropogenic: Caused or influenced by humans.

Bankfull stage: "The bankfull stage corresponds to the discharge at which channel maintenance is most effective, that is, the discharge at which moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing the work that results in the average morphologic characteristics of channels." Dunne and Leopold (1978).

Census County Division: Census county divisions (CCDs) are geographic statistical subdivisions of counties established cooperatively by the Census Bureau and officials of state and local governments in states where minor civil divisions (MCDs) either do not exist or are unsatisfactory for census purposes.

Channel stability: the ability of the stream, over time, to transport the flows and sediment of its watershed in such a manner that the dimension, pattern and profile of the river is maintained without either aggrading nor degrading.

Critical Shear Stress: For a fluid to begin transporting sediment that is currently at rest on a surface, the boundary (or bed) shear stress τ_b exerted by the fluid must exceed the critical shear stress τ_c for the initiation of motion of grains at the bed. This is typically represented by a comparison between a dimensionless shear stress (τ_b*) and a dimensionless critical shear stress (τ_c*). The nondimensionalization is in order to compare the driving forces of particle motion (shear stress) to the resisting forces that would make it stationary (particle density and size). This

dimensionless shear stress, $\tau*$, is called the Shields parameter. Critical shear stress: the Shields diagram empirically shows how the dimensionless critical shear stress required for the initiation of motion is a function of a particular form of the particle Reynolds number, Re_p or Reynolds number related to the particle.

Desired Condition: A desired condition is a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates (36 CFR 219.7(e)(1)(i)).

Diatreme: A diatreme, sometimes known as a maar-diatreme volcano, is a volcanic pipe formed by a gaseous explosion. When magma rises up through a crack in the Earth's crust and makes contact with a shallow body of ground water, rapid expansion of heated water vapor and volcanic gases can cause a series of explosions.

Ecological Sites: a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. (USDA Definition).

Entrenchment: the vertical containment of river and the degree to which it is incised in the valley floor.

Entrenchment ratio: a quantitative expression of the ratio of the flood prone width to the bankfull width.

Flood prone width: width measured at an elevation which is determined at twice the bankfull depth.

Forest land: land that is now, or has the potential of being, at least 10 percent stocked by forest trees (based on crown closures) or 16.7 percent stocked (based on tree stocking).

Functional at risk (FAR): riparian wetland areas that are functional, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Greenline: that specific area where a more or less continuous cover of vegetation is encountered when moving away from the center of an observable channel. The greenline is often, but not necessarily, located at the water's edge.

Hummocking: a form of micro-topographic relief characterized by raised pedicels of vegetated soil as much as 0.6 m (2ft) higher than the surrounding ground which results from long term large animal trampling and tracking in soft soil. Vegetation on the pedicels usually differs from that on the surrounding lower area due to moisture difference between the two levels. Hummocking is also caused by abnormal hydrologic heaving.

Hydric soil: soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrophyte: Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Hydrologic Unit: The USGS has developed a system of geographic units based upon watersheds. These units were originally subdivided to four levels. Subsequently two additional subdivisions have been developed. Currently there are six levels, with the sixth being the smallest unit.

Kerogen: Kerogen is a complex waxy mixture of hydrocarbon compounds that is the primary organic component of oil shale. Kerogen is thought to have originated from compacted organic material, such as algae and various forms of plant life that accumulated at the bottom of ancient lakes and seas and was buried at great depths over long periods of geologic time.

Lacustrine: from the French "lacustre" or lake. Permanently flooded lakes and reservoirs, generally over 20 acres, exhibiting wave-formed or bedrock shoreline features. (Cowardin *et al*., 1979).

Lands with Wilderness Characteristics: those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in Section 2 (c) of the Wilderness Act. These are separate from lands already designated as Wilderness or wilderness study areas.

Lentic: standing or still water such as lakes and ponds.

Lotic: flowing or actively moving water such as rivers and streams.

Nonpoint source pollution: pollution originating from diffuse sources (land surface or atmosphere) having no well-defined source.

Palustrine: from the Latin "palus" or marsh. All non-tidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens. (Cowardin *et al.*, 1979)

Preliminary General Sage-grouse Management Areas (PGMA): Is occupied (seasonal or year-round) habitat outside of priority habitat. These areas have been identified by state fish and wildlife agencies in coordination with respective BLM offices.

Preliminary Priority Sage-grouse Management Areas (PPMA): Areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by state fish and wildlife agencies in coordination with respective BLM offices.

Proper functioning condition (PFC): Lotic riparian-wetland areas are considered to be in proper functioning condition when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and ground-water recharge;
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses;
- Support greater biodiversity

Riparian –wetland areas can function properly before they achieve their potential. The PFC definition does not mean potential or optimal conditions have been achieved.

Pugging: the small depressions and areas of compaction in saturated soils caused by the hoof action of animals.

Resource Reserve Allotment: A unit of public land that will not have term grazing permits issued. Such an allotment would only be grazed on a temporary nonrenewable basis. The use of this allotment would be to provide temporary grazing to rest other areas following wildfire, habitat treatments, or to allow for more rapid attainment of rangeland health.

Riparian zone: the banks and adjacent areas of water bodies, water coursed, seeps, and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally so as to provide a moister habitat than that of contiguous flood plains and uplands.

Rosgen Classification System: A classification system for natural rivers in which a morphological arrangement of stream characteristics is organized into relatively homogeneous stream types. Morphologically similar stream reaches are divided into 7 major stream type categories that differ in entrenchment, gradient, width/depth ratio, and sinuosity in various landforms. Within each major category are six additional types delineated by dominant channel materials from bedrock to silt/clay along a continuum of gradient ranges.

Spring brook: a channel that carries water from a spring. Where there is sufficient flow, the channel forms a perennial stream. Frequently in arid environments, the flow is insufficient to create a perennial stream. Groundwater emerges at the springhead, flows a short distance within the spring brook, and then submerges.

Spring province: a group of springs in close geographical proximity.

Stream power: Stream power is the rate of energy dissipation against the bed and banks of a river or stream per unit downstream length. It is given by the equation: $\Omega = \rho g Q S$ where Ω is the stream power, ρ is the density of water (1000 kg/m^3), g is acceleration due to gravity (9.8 m/s^2), Q is discharge (m^3/s), and S is the channel slope. **Unit stream power** is stream power per

unit channel width, and is given by the equation: $\omega = \frac{\rho g Q S}{b}$ where ω is the unit stream power, and b is the width of the channel. Stream power is used extensively in models of landscape evolution and river incision.

Total Maximum Daily Load (TMDL): The goal of the Clean Water Act (CWA) is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Under section 303(d) of the CWA, states are required to develop lists of impaired waters. The law requires that states establish priority rankings for waters on the lists and develop TMDLs for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards.

TMDL Planning Areas: Montana DEQ is using a watershed approach to address TMDLs based on the premise that water quality restoration and protection are best addressed through integrated efforts within a defined geographic area. DEQ has divided the state into 91 watershed planning areas to facilitate development of TMDL/water quality restoration plans.

Wilderness Characteristics: These attributes include the area's size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values.

Woodland: forest communities occupied primarily by noncommercial species such as juniper, mountain mahogany, or quaking aspen groves. All western juniper forest lands are classified as woodlands, since juniper is classified as a noncommercial species. Woodland tree and shrub canopy cover varies, but generally individual plant crowns do not overlap.

5.4 References – Literature and Materials Reviewed and/or Cited During the Preparation of this Document

Adams, B.W., J. Carlson, D. Milner, T. Hood, B. Cairns and P. Herzog. 2004. Beneficial grazing management practices for Sage-Grouse *(Centrocercus urophasianus)* and ecology of silver sagebrush *(Artemisia cana)* in southeastern Alberta. Technical Report, Public Lands and Forests Division, Alberta Sustainable Resource Development. Pub. No. T /049. 60 pp.

Bailey, D.W., G.R. Welling and E.T. Miller. 2001c. Cattle use of foothills rangeland near dehydrated molasses supplement. J Range Management 54: 338-347.

Balph, D.F. Balph, M.H., and Malacheck, J.C. 1989. Cues cattle use to avoid stepping on crested wheatgrass tussocks. Journal of Range Management 42:376-377.

Bengeyfield, P. 2004. Using Stream Channel Reference Data to Guide Land Management Decisions, in Furniss, M.; Clifton, C.; Ronnenberg, K. eds. 2007. Advancing the Fundamental Sciences: Proceedings of the Forest Service National Earth Sciences Conference, San Diego, CA, 18-22 October 2004. Gen. Tech. Rep. PNW-GTR-689. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station. 577 p. http://stream.fs.fed.us/afsc/pdfs/Bengeyfield_2.pdf http://www.fs.fed.us/pnw/publications/gtr689/

Bartos, D.L. and R.B. Campbell, Jr. 1998. Decline of Quaking Aspen in the Interior West – Examples from Utah. Society for Range Management: Rangelands February 1998 Vol. 20 No.1: 17-24.

Beschta, Robert L. 2003 Cottonwoods, Elk, and Wolves in the Lamar Valley of Yellowstone National Park. Ecological Applications 13 (5): 1295-1309

Bjornn, T.C., M.A. Brusven, M.P. Molnau, and J.H. Milligan 1977. Transport of granitic sediment in streams and its effects on insects and fish. University of Idaho, College of Forestry, Wildlife and Range Sciences, Bulletin Number 17. Moscow, Idaho).

Booth, D. T., Cox, S. E., & Likins, J. C. 2015. Fenceline contrasts: grazing increases wetland surface roughness. *Wetlands Ecology and Management.* 23, 183-194.

Bradley, L., J. Gude, N. Lance, K. Laudon, A. Messer, A. Nelson, G. Pauley, M. Ross, T. Smucker, J. Steuber, and J. Vore. 2015. Montana Gray Wolf Conservation and Management. 2014 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 60pp.

Brinkman, Kenneth A.; Roe, Eugene I. 1975. Quaking aspen: silvics and management in the Lake States. Agric. Handb. 486. Washington, DC: U.S. Department of Agriculture, Forest Service. 52 p.

Bryce, S. A., G. A. Lomnicky, and P. R. Kaufmann. 2010. Protecting sediment-sensitive aquatic species in mountain streams through the application of biologically based streambed sediment criteria. Journal of the North American Benthological Society 29:657–672).

CAT, 2016. Caterpillar Equipment web page. Specifications for a D8T Track-Type Tractor (Large Dozer). Found here: http://www.cat.com/en_US/products/new/equipment/dozers/large-dozers/18582378.html

Clary, W.P., and W.C. Leininger. 2000. Stubble height as a tool for management of riparian areas. Journal of Range Management 53(6): 562-573.

Clary,W.P., Webster, B.F. 1989. Managing grazing of riparian areas in the intermountain region. U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station. General Technical Report Int-263, 11pp.

Cornell Lab of Ornithology. 2016. All About Birds. Ferruginous Hawk. Available: https://www.allaboutbirds.org/guide/Ferruginous_Hawk/lifehistory#top. *Accessed February 2, 2016.*

Corning, RV. 2002. Diminished Sweetwater river flows from the high cold desert region of Wyoming. A whitepaper included in Part III of the 2002 Green Mountain Common Allotment Evaluation, Lander Field Office, Bureau of Land Management. In: Booth, D. T., Cox, S. E., & Likins, J. C. 2015. Fenceline contrasts: grazing increases wetland surface roughness. *Wetlands Ecology and Management.* 23, 183-194.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Home Available: http://www.npwrc.usgs.gov

Dewey, Steve. 2007. Extension Weed Specialist, Utah State University. Personal communication.

De Staso, J., and F. J. Rahel. 1994. Influence of water temperature on interactions between juvenile Colorado River cutthroat trout and brook trout in a laboratory stream. Transactions of the American Fisheries Society 123:289-297. Dunham et al. 1999; Novinger 2000

Dunne, T., and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco, CA, 818p.

Ehrhart, R.C., and P.L. Hanson. 1997. Effective cattle management in riparian zones; a field survey and literature review. Riparian Technical Bulletin No. 3. U.S. Department of the Interior, Bureau of Land Management, Montana State Office, and Riparian and Wetland Research Program, Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, MT. 92 pp.

Ehrhart, R.C., and P.L. Hanson. 1998. Successful strategies for grazing cattle in riparian zones. Riparian Technical Bulletin No. 4. U.S. Department of the Interior, Bureau of Land Management, Montana State Office, and Riparian and Wetland Research Program, Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, MT. 47 pp.

Evans, C.C. 1986. The relationship of cattle grazing to sage grouse use of meadow habitat on the Sheldon National Wildlife Refuge. Thesis, University of Nevada, Reno, USA.
In: Beck, Jeffrey L., and Dean L. Mitchell. "Influences of Livestock Grazing on Sage Grouse Habitat". *Wildlife Society Bulletin (1973-2006)* 28.4 (2000): 993–1002.

Fletcher, Robert H. 1960. *Free Grass to Fences*. University Publishers Inc.

Foresman, K.R. 2012. Mammals of Montana. Mountain Press Publishing Company, Missoula, Montana.

Gratson, M. W., and C. Whitman. 2000. Road closures and density and success of elk hunters in Idaho. Wildlife Society Bulletin 28:302-310. In McCorquodale, S. 2013. A Brief Review of the Scientific Literature on Elk, Roads, and Traffic.

Gullion, Gordon W.; Svovoda, Franklin J. 1972. The basic habitat resource for ruffed grouse. In: Aspen: Symposium proceedings; [Date of conference unknown]; [Location of conference unknown]. Gen. Tech. Rep. NC-1. St. Paul, MI: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 113-119.

Hansen, P.L., R.D. Pfister, K. Boggs, B.J. Cook, J. Joy, and D.K. Hinckley. 1995. Classification and Management of Montana's Riparian and Wetland Sites. Misc. Publication No. 54. Montana Forest and Conservation Experiment Station, Missoula, MT.

Haroldson, M.A., F.T. van Manen, and D.D. Bjornlie. 2014. Estimating Number of Females with Cubs. Pages 11-20 *in* F.T. van Manen, M.A. Haroldson, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana, USA.

Hendrickson. J. and B. Olsen. 2006. Understanding Plant Response to Grazing. In: Targeted Grazing: A natural approach to vegetation management and landscape enhancement. Pp. 33.

Hillis, J.M., M. J. Thompson, J. E. Canfield, L. J. Lyon, C. L. Marcum, P. M. Dolan, and D. W. McCleery. 1991. Defining elk security: the Hillis paradigm. Pages 38−43 *in* A. G. Christensen, L. J. Lyon, and T. N. Lonner, editors. Proceedings of the elk vulnerability symposium. Montana State University, Bozeman, Montana, USA.

Higgins, S.F., Wightman, S.J., and C.T. Agouridis. 2011. Pasture Feeding, Streamside Grazing, and the Kentucky Agriculture Water Quality Plan. University of Kentucky Cooperative Extension: AEN-105.

Horan, D.L., Kershner, J.L., Hawkins, C.P., Crowl, T.A., 2000. Effects of habitat area and complexity on Colorado River cutthroat trout density in Uinta Mountain streams. Transactions of the American Fisheries Society 129 (6), 1250–1263.

Howard, J.L. 1996. Populus tremuloides. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, November 6].

Hyman, W. A. and Vary, D. 1999. Best management practices for environmental issues related to highway and street maintenance. National Cooperative Highway Research Program Synthesis of Highway Practice 272. National Academy Press. Washington, DC: Transportation Research Board, National Research Council. In: USDA. 2006b. United State Forest Service. Low-water Crossings: Geomorphic, Biological, and Engineering Design Considerations. National Technology and Development Program. October 2006

Interagency Grizzly Bear Study Team. 2014. Grizzly Bear Recovery Zone (*alias Primary Conservation Area*). Found at: http://www.nrmsc.usgs.gov/files/norock/IGBST/Web_Map_Files/Grizzly_Bear_Recovery_Zone.pdf. *Accessed November 16, 2015*.

Interagency Grizzly Bear Study Team. 2016. Interagency Grizzly Bear Study Team Boundary Maps. Found at: http://www.arcgis.com/home/webmap/viewer.html?webmap=78152b8e0bde457ca95918fdd48c5352. *Accessed May 17, 2016.*

Interagency Lynx Biology Team. 2013. Canada lynx conservation assessment and strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp.

Irving, J. S. and Bjorn, T. C. 1984. Effects of Substrate Size Composition on Survival of Kokanee Salmon and Cutthroat Trout and Rainbow Trout Embryos. Technical Report 84-6. Moscow, ID, University of Idaho.

Kashian, D.M, Romme, W.H., Regan, C.M. 2007. Reconciling Divergent Interpretations of Quaking Aspen Decline on the Northern Colorado Front Range. Ecological Applications, 17(5), 2007, pp 1296-1311.

Kuhn, T. J., H. D. Safford, B. E. Jones, and K. W. Tate. 2011. Aspen (*Populus tremuloides*) stands and their contribution to plant diversity in a semiarid coniferous landscape. Plant Ecol., 212 (2011), pp. 1451–1463.

LANDFIRE (2013): LANDFIRE Existing Vegetation Type layer. U.S. Department of Interior, Geological Survey. [Online]. Available: http://landfire.cr.usgs.gov/viewer/ [2013, May 8].

Laycock.W.A. 1994. Implications of Grazing vs. No Grazing on Today's Rangelands. In: Vavra, M,. W.A. Laycock, and R.D. Pieper. 1994. Ecological Implications of Livestock Herbivory in the West. 272.

Taylor, S. E.; Rummer, R. B.; Yoo, K. H.; [and others]. 1999. What we know and don't know about water quality at stream crossings. Journal of Forestry 97(8):12-17. In: USDA. 2006b. United State Forest Service. Low-water Crossings: Geomorphic, Biological, and Engineering Design Considerations. National Technology and Development Program. October 2006

Long J.N. and K. Mock. 2012. Changing perspectives on regeneration ecology and genetic diversity in western quaking aspen: implications for silviculture. Canadian Journal of Forest Research 42(12); 2011-2021.

Lonn, J.D., Skipp, B., Ruppel, E.T., Janecke, S.U., Perry Jr., W.J., Sears, J.W., Bartholomew, M.J., Stickney, M.C., Fritz, W.J., Hurlow, H.A., and Thomas, R.C., 2000, Geologic map of the Lima 30' x 60' quadrangle, southwest Montana: Montana Bureau of Mines and Geology Open-File Report 408, 42 p.

Malone, Michael P., Richard B. Roeder, and William L. Lang. 1976. Montana A History of Two Centuries. University of Washington Press, Seattle Washington.

Marlow, C.B., D. Allen, and K. Olson-Rutz. 1991. Making riparian zone protection a workable part of grazing management. In: Proceedings of the international beef symposium. January 15-17, Great Falls, MT. Animal Range Sciences Department, Montana State University, Bozeman, MT. p.256-266.

Montana Department of Environmental Quality, Water Quality Planning Section, Watershed Protection Bureau. 2007. Montana Nonpoint Source Management Plan. Helena, Montana http://www.deq.mt.gov/wqinfo/nonpoint/2007NONPOINTPLAN/Final/NPSPlan.pdf

Montana Department of Environmental Quality, Water Quality Planning Section, Watershed Protection Bureau. 2012. Montana Nonpoint Source Management Plan. Helena, Montana
http://www.deq.mt.gov/wqinfo/nonpoint/NonpointSourceProgram.mcpx

Montana Fish, Wildlife, and Parks. 2005. Management Plan and Conservation Strategies for Sage Grouse in Montana. Helena, MT. 130 pp.

Montana Fish, Wildlife, and Parks. 2013. FWP Fact Sheet: Congress Delists Montana Wolf Population. Available at http://fwp.mt.gov/fishAndWildlife/management/wolf/ . [Accessed 12 December, 2013].

Montana Fish, Wildlife and Parks. 2015a. Brucellosis. Available at http://fwp.mt.gov/fishAndWildlife/management/elk/brucellosis/default.html. [November, 2015].

Montana Fish, Wildlife and Parks. 2015b. Targeted Elk Brucellosis Surveillance Project, 2011 – 2015 Comprehensive Report. 20 pp.

Montana Natural Heritage Program. 2015a. Montana Field Guide. Available at http://fielduide.mt.gov. [2015, November].

Montana Natural Heritage Program. 2015b. Natural Heritage Map Viewer. Available at http://mtnhp.org/mapviewer/. [2015, November].

Mueggler, W. F. 1985. Forage. In: DeByle, Norbert V.; Winokur, Robert P., eds. Aspen: ecology and management in the western United States. Gen. Tech. Rep. RM-119. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 129-134.

Morris, K. and Reich, P. 2013. Understanding the relationship between livestock grazing and wetland condition. Arthur Rylah Institute for Environmental Research Technical Report Series No. 252. Department of Environment and Primary Industry, Heidelberg, Victoria

National Oceanic and Atmospheric Administration, Climate Data Online, Grant 5, Montana (January 1961 – October 2015). Available online at: https://www.ncdc.noaa.gov/cdoweb/. Accessed: 11/19/2015.

Neil H. Ringler & James D. Hall (1975) Effects of Logging on Water Temperature, and Dissolved Oxygen in Spawning Beds, Transactions of the American Fisheries Society, 104:1, 111-121.

Perry, C., and R. Overly. 1977. Impact of roads on big game distribution in portions of the Blue Mountains of Washington, 1972-1973. Washington Game Department Report, Olympia, WA. 38 pp. In McCorquodale, S. 2013. A Brief Review of the Scientific Literature on Elk, Roads, and Traffic.

Proffitt, K. M., J. A. Gude, K. L. Hamlin, M. A. Messer. 2013. Effects of hunter access and habitat security on elk habitat selection in landscapes with a public and private land matrix. The Journal of Wildlife Management Vol. 77, Issue 3, pages 514-524.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Inigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

Ripple, W. J. and Beschta R.L. 2004, Wolves and the Ecology of Fear: Can Predation Risk Structure Ecosystems. Bioscience Aug 2004/ Vol. 54 No 8 : 755-766

Ripple, W. J., and R.L. Beschta. 2005. Linking Wolves and Plants: Aldo Leopold on Trophic Cascades. Bioscience July 2005/ Vol. 55 No 7: 613-621.

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena, Vol 22: 169-199 Elsevier Science, B.V. Amsterdam.

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO. pp.352

Rosgen D. and L. Silvey. 1998. Field Guide for Stream Classification. Wildland Hydrology. Pagosa Springs, CO. Second edition ISBN 0-9653289-1-0.

Rumble, Mark A.; Pella, Timothy; Sharps, Jon C.; Carter, Arthur V.; and Parrish, J. Barry. 1996. Effects of Logging Slash on Aspen Regeneration in Grazed Clearcuts. USDA Forest Service / UNL Faculty Publications. Paper 89.

Schultz, B. 2009. A review of nest trampling by livestock and the implications for nesting birds on shrub-grass rangelands in the western states. In Proceedings of Fourth National Conference on Grazing Lands. Grazing Lands Conservation Initiative and Society for Range Management (pp. 13-16).

Shepperd, Wayne D.; Rogers, Paul C.; Burton, David; Bartos, Dale L. 2006. Ecology, biodiversity, management, and restoration of aspen in the Sierra Nevada. Gen. Tech. Rep. RMRS-GTR-178.Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station 122 p.

Shepperd, W.D. 2001. Manipulations to Regenerate Aspen Ecosystems. USDA Forest Service Proceedings, RMRS-P18. 355-365.

Skovlin, J.M. 1984. Impacts of grazing on wetlands and riparian habitat: a review of our knowledge. p. 1001-1103. In: Developing strategies for range management. Westview Press, Boulder, CO.

Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

Taylor, S. E.; Rummer, R. B.; Yoo, K. H.; [and others]. 1999. What we know and don‘t know about water quality at stream crossings. Journal of Forestry 97(8):12-17.
In: USDA. 2006b. United State Forest Service. Low-water Crossings: Geomorphic, Biological, and Engineering Design Considerations. National Technology and Development Program. October 2006

Tilton, M. E., and E. E. Willard. 1982. Winter habitat selection by mountain sheep. J. Wildl. Manage. 46:359-366.

Tomback, D.; Arno, S. F.; Keane, R. E. 2001. Whitebark Pine Communities: Ecology and Restoration. Washington, DC: Island Press. 440 p.

Tysdal, R.G., Lee, G.K., Haddemer, J.H., and Hanna, W.F., Mineral Resources of the Blacktail Mountains Wilderness Study Area, Beaverhead County, Montana, 1987, U.G.S. Bulletin 1724-B.

USDA. 2006. Natural Resources Conservation Service. Field Indicators of Hydric Soils in the United States, A Guide for Identifying and Delineating Hydric Soils, V 6.0 G.W. Hurt and L.M. Vasilas (eds.), in cooperation with the National Technical Committee for Hydric Soils. Available: http://landcare.sc.egov.usda.gov/images/pdf/HydricFieldIndicators_v6_0.pdf

USDA. 2006b. United State Forest Service. Low-water Crossings: Geomorphic, Biological, and Engineering Design Considerations. National Technology and Development Program. October 2006

USDA. 2011. The National Agriculture Imagery Program (NAIP), administered by the USDA's Farm Service Agency (FSA), acquires aerial imagery during the agricultural growing seasons in the continental U.S. The imagery, digital ortho photography, is available to governmental agencies and the public. Available:
http://www.fsa.usda.gov/FSA/apfoapp?area=home&subject=prog&topic=nai

USDA. 2012. Natural Resources Conservation Service. Applying the Sage-Grouse Fence Collision Risk Tool to Reduce Bird Strikes. Conservation Effects Assessment Project.

USDA. 2013. Natural Resources Conservation Service. Montana Rangeland Ecological Site Key. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/technical/landuse/pasture/?cid=nrcs144p2_057025 [Accessed December 10, 2015].

USDA. 2014. Natural Resources Conservation Service. Red Rocks Lake Area Part of Beaverhead County, Montana, Natural Resources Conservation Service, United States Department of Agriculture, Soil Survey Geographic (SSURGO) Database. Available online at: http://sdmdataaccess.nrcs.usda.gov/. Survey Area Publication Date: 9/03/2014.

USDA. 2015. Natural Resources Conservation Service. Horse Prairie- South Valley Area- Part of Beaverhead County, Montana, Natural Resources Conservation Service, United States Department of Agriculture, Soil Survey Geographic (SSURGO) Database. Available online at: http://sdmdataaccess.nrcs.usda.gov/. Survey Area Publication Date: 09/29/2015.

USDI. 1998, 2015. Bureau of Land Management. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lotic Areas - TR 1737-15.

USDI. 1999. Bureau of Land Management. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lentic Areas - TR 1737-16.

USDI. 2000, 2005. Bureau of Land Management. Interpreting Indicators of Rangeland Health – TR 1734-6.

USDI. 2001. Bureau of Land Management. A Guide to Managing, Restoring, and Conserving Springs in the Western United States-TR 1737-17.

USDI. 2001. Bureau of Land Management. BLM manual 6840 - Special Status Species Management.

USDI. 2003. U.S. Fish and Wildlife Service. Endangered and threatened wildlife and plants; final rule to list the Columbia Basin District population segment of the pygmy rabbit (*Brachylagus idahoensis*) as endangered. Federal Register 68:10388-10409.

USDI. 2004. Bureau of Land Management. Dillon Resource Management Plan and Environmental Impact Statement (DRAFT), Volume 1. Dillon Field Office. Dillon, Montana. 389 pp.

USDI. 2006. Bureau of Land Management. Record of Decision and Approved Dillon Resource Management Plan. Dillon Field Office. Dillon, Montana. 227 pp.

USDI. 2008.U.S. Fish and Wildlife Service. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available: http://www.fws.gov/migratorybirds/. [2011, November 22].

USDI. 2010. Bureau of Land Management. Memorandum of Understanding Regarding Water Quality Management on Bureau of Land Management Lands in Montana Between the Montana Department of Environmental Quality and the United States Department of the Interior Bureau of Land Management BLM-MOU-MT923-1030.

USDI. 2013. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U. S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary. Federal Register 50 CFR Part 17.

USDI. 2014a. Bureau of Land Management. 2014 Montana/Dakotas Special Status Species List. Instruction Memorandum No. MT-2014-067.

USDI. 2014b. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States; Establishment of a Nonessential Experimental Population of the North American Wolverine in Colorado, Wyoming, and New Mexico; Proposed Rule. Federal Register 50 CFR Part 17.

USDI. 2015a. Bureau of Land Management. Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions or Idaho and Southwestern Montana, Nevada and Northeastern California, Oregon, Utah.

USDI. 2015b. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Greater Sage-grouse (*Centrocercus urophasianus*) as an Endangered or Threatened Species. Federal Register 50 CFR Part 17.

USDI. 2016. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears From the Federal List of Endangered and Threatened Wildlife. Federal Register 50 CFR Part 17. Docket No. FWS–R6–ES–2016–0042.

USEPA. 1998. Interim Air Quality Policy on Wildland and Prescribed Fires. Available: http://www.epa.gov/ttncaaa1/t1/memoranda/firefnl.pdf

USEPA. 2003. Office of Water. National Management Measures for the Control of Nonpoint Pollution from Agriculture. EPA-841-B-03-004. Washington, D.C. Available: http://www.epa.gov/nps/agmm/

USEPA. 2011. Office of Air and Radiation, Air Quality Planning and Standards, Ambient Air Monitoring Program. Available: http://epa.gov/airquality/qa/monprog.html

USEPA. 2012. The Clean Water Act: Protecting and Restoring our Nation's Waters. Available at: http://water.epa.gov/action/cleanwater40/cwa101.cfm (accessed March 4, 2014).

Vuke, S.M., K.W. Porter, J.D. Lonn, and D.A. Lopez. 2007. Geologic Map of Montana, Montana Bureau of Mines and Geology Geologic Map 62-D, 73 p.

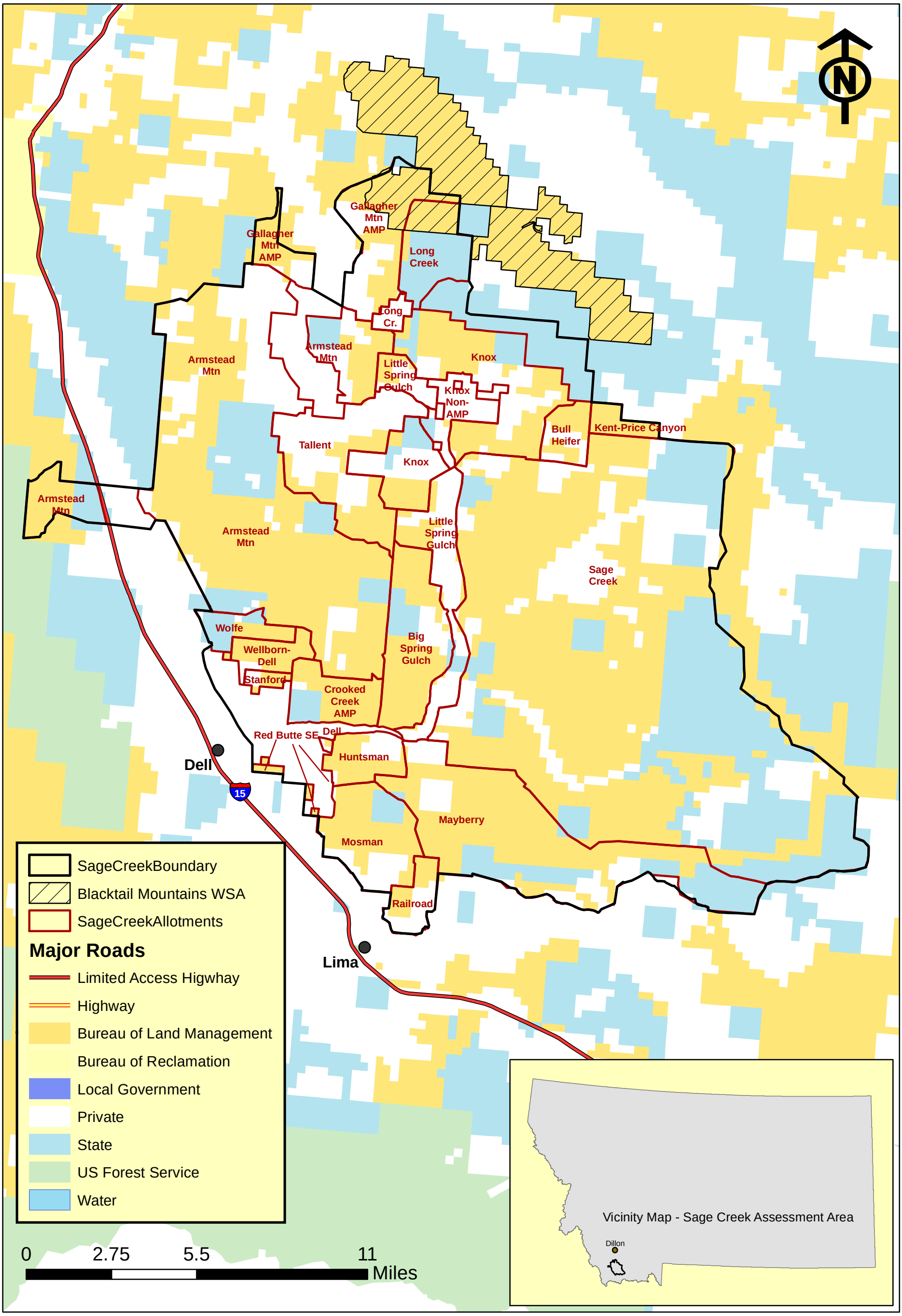
Waltee, D. 2016. Personal Communication. Wildlife Biologist, Montana Fish Wildlife and Parks.

Wargo, Rebecca S. and Richard N. Weisman, 2006. A Comparison of Single-Cell and Multicell Culverts for Stream Crossings. Journal of the American Water Resources Association (JAWRA) 42(4):989-995.

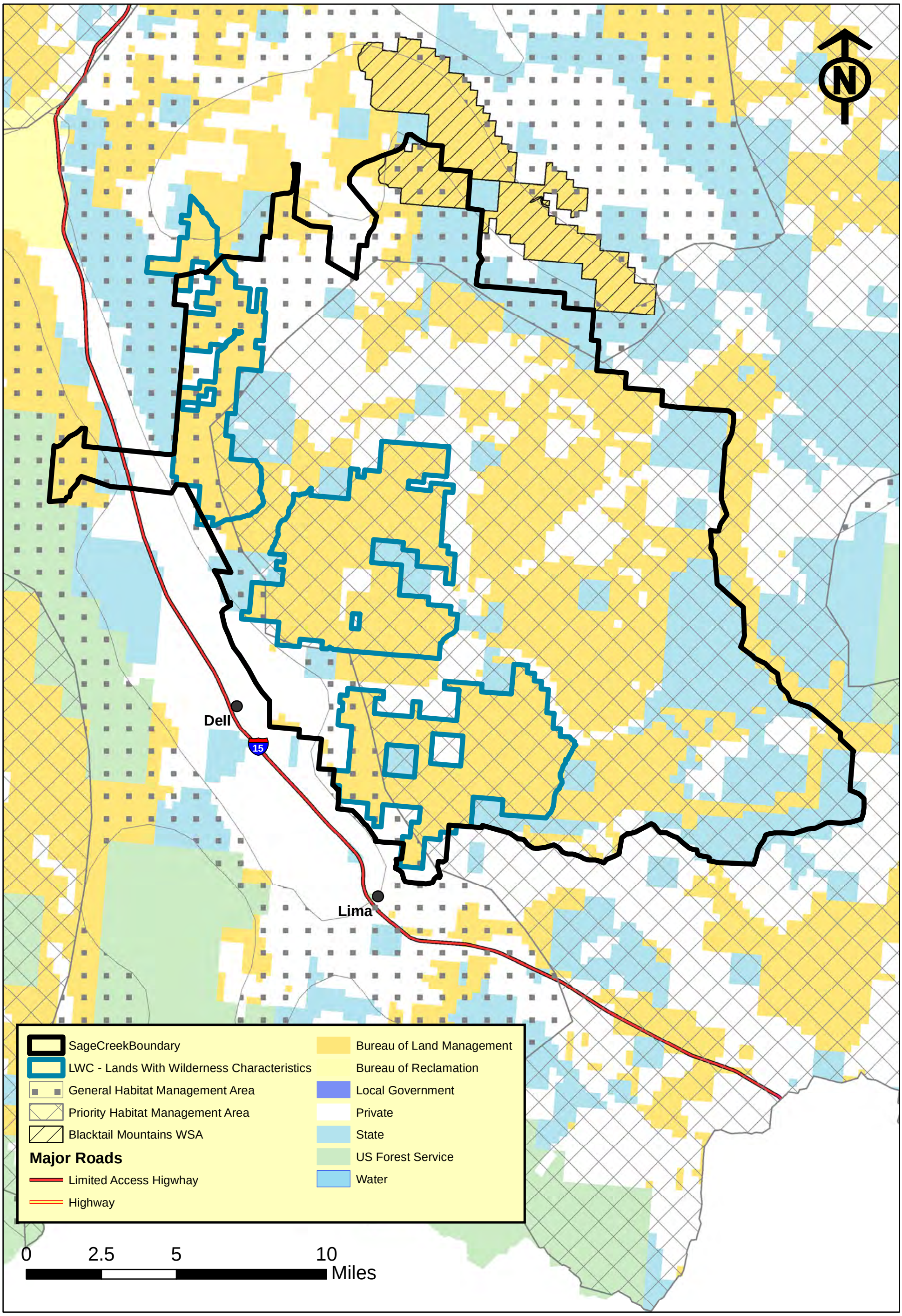
Weaver, T. and J. Fraley. 1991. Fisheries Habitat and Fish Populations. Flathead Basin Forest Practices Water Quality and Fisheries Cooperative Program. Flathead Basin Commission. Kalispell, Montana.

Werner, J. K., B. A. Maxell, P. Hendricks, and D. L. Flath. 2004. Amphibians and reptiles of Montana. Mountain Press Publishing Company. Missoula, Montana. 262 pp.

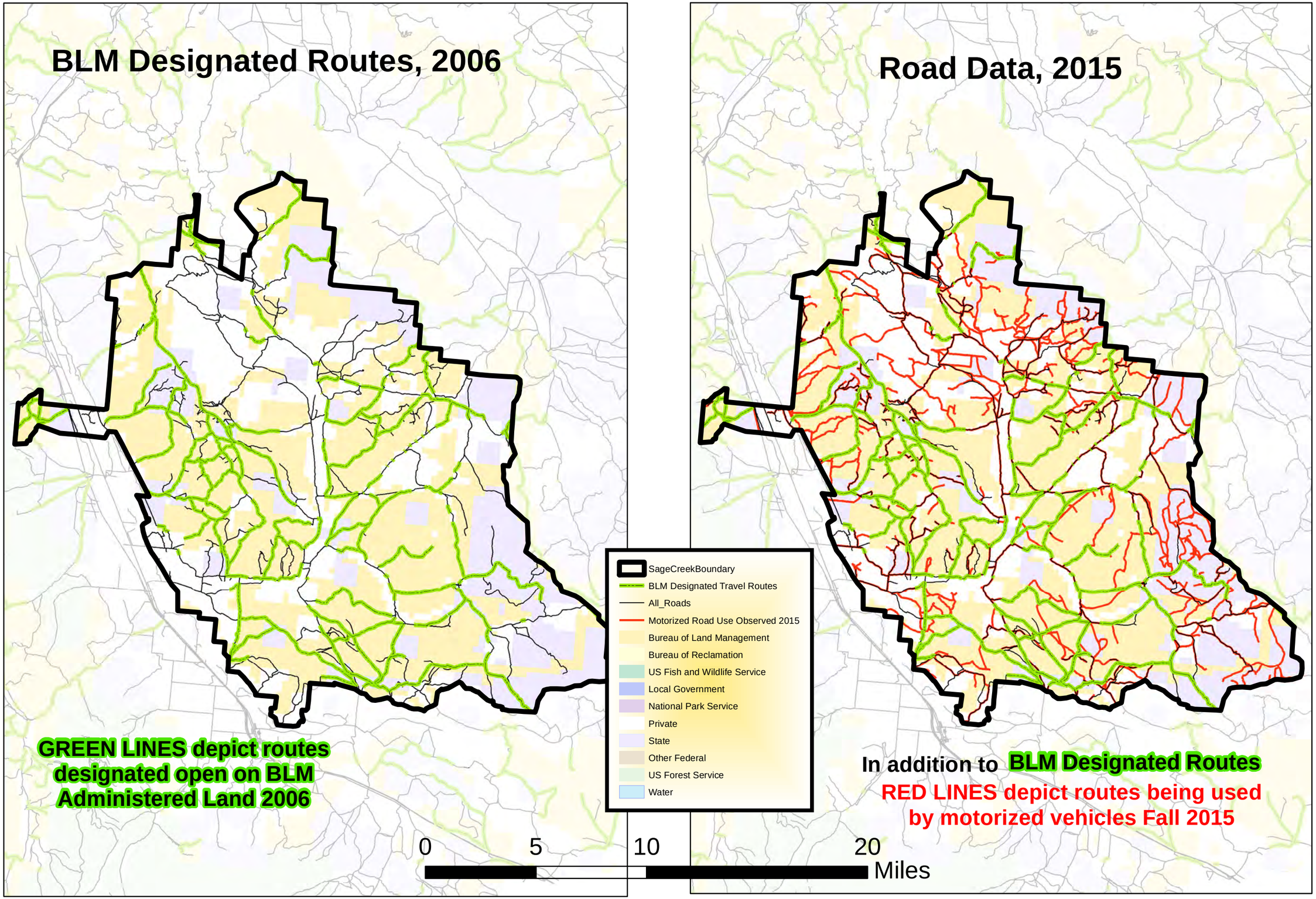
Appendix A- Sage Creek Watershed Maps #1-14



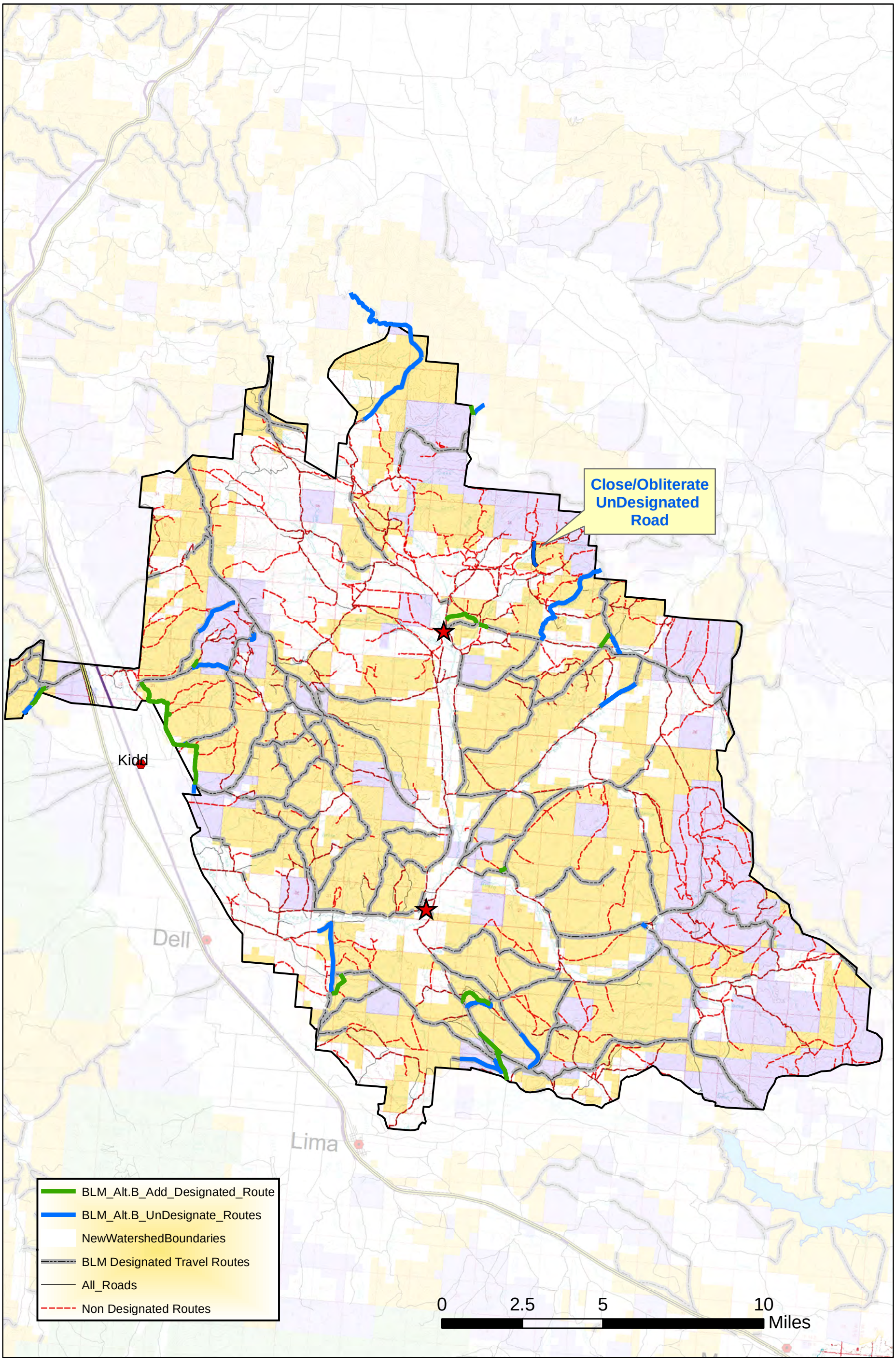
Map 1 - Sage Creek Assessment Area Boundary and Allotments



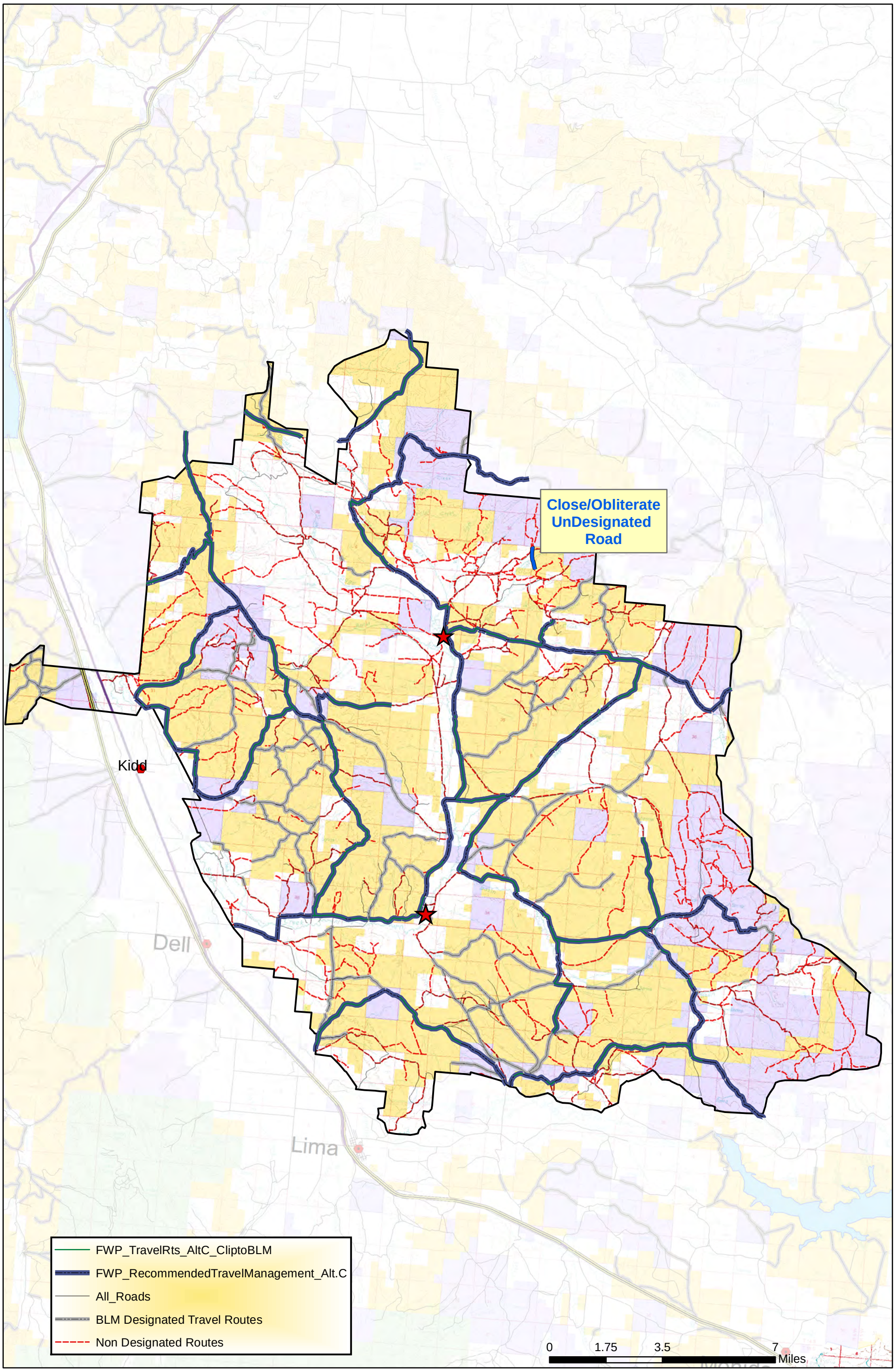
Map 2 - Sage Creek Lands With WildernessCharacteristics and Sage Grouse Management Areas



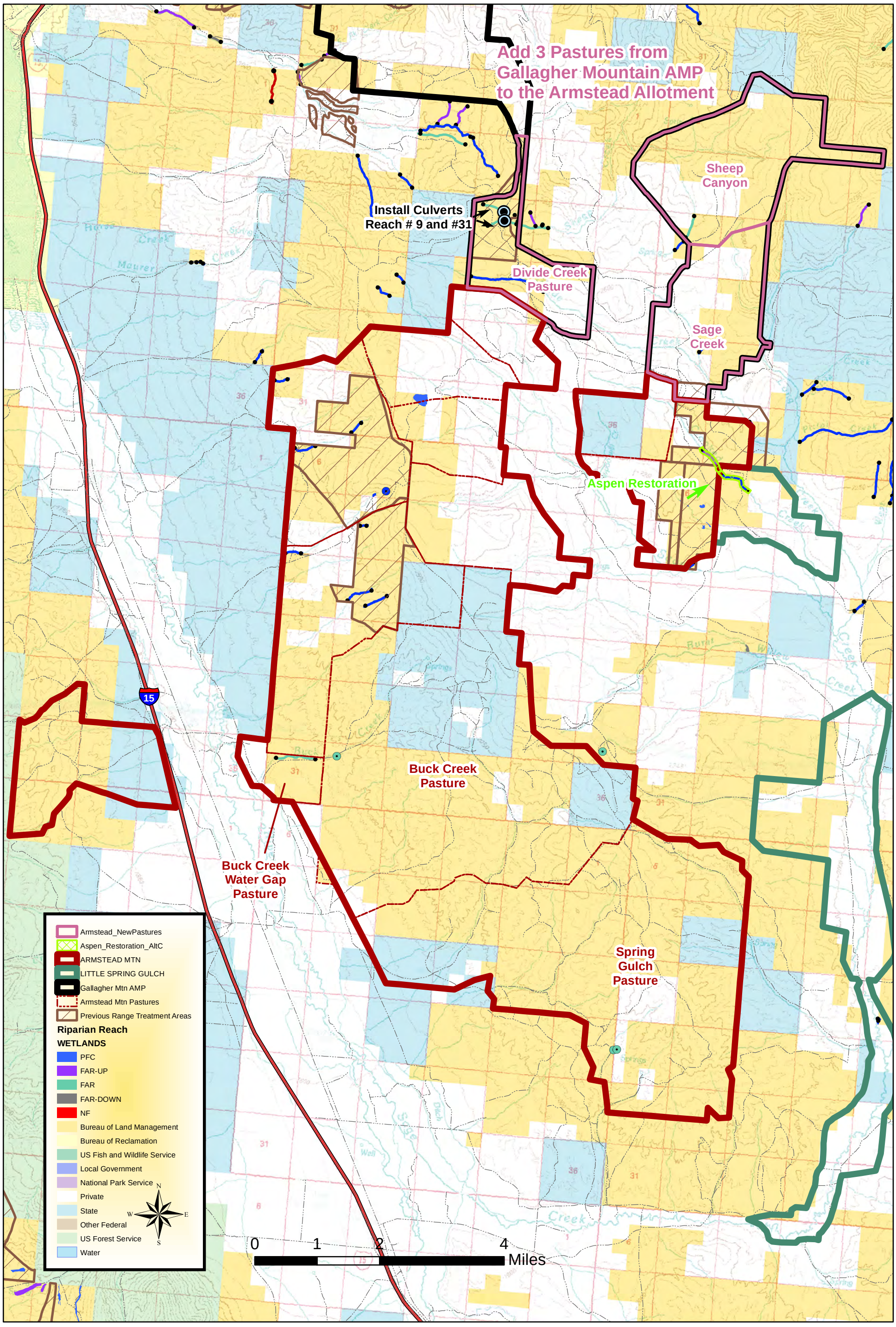
Map 3 - BLM Road Data From 2006 and 2015



Map 4 - Sage Creek Travel Management Proposals Alternative B

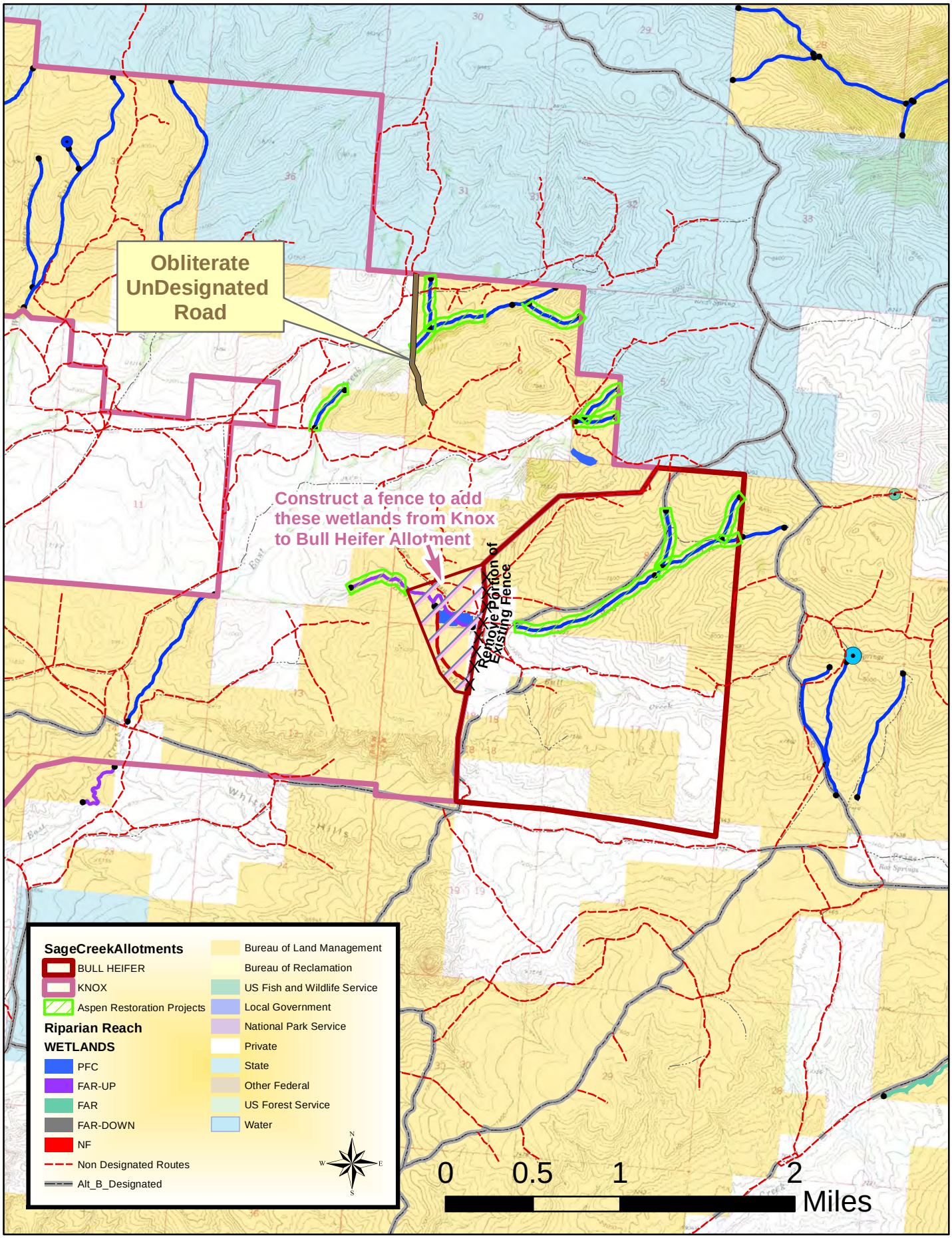


Map 5 - FWP Travel Management Proposals Alternative C

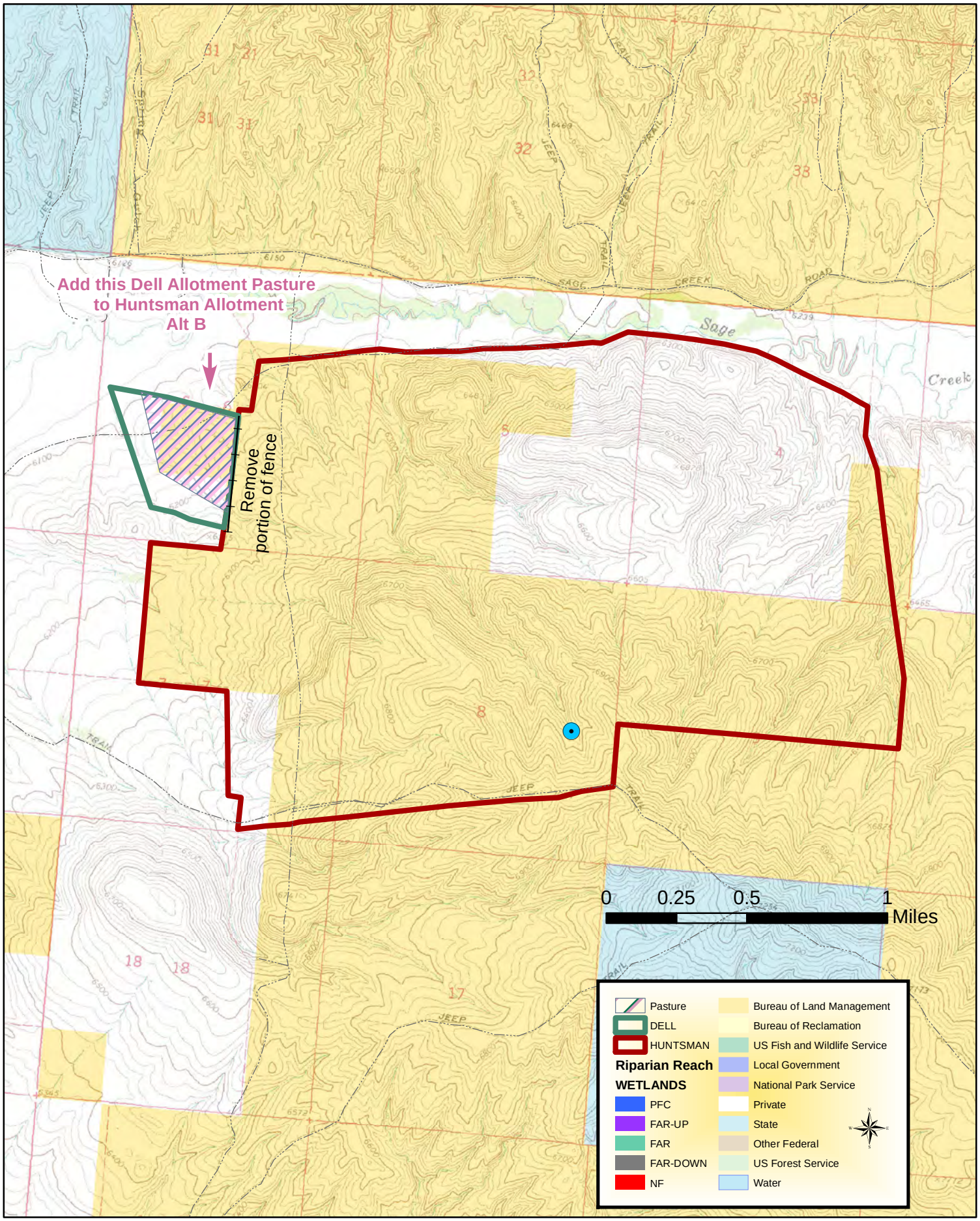


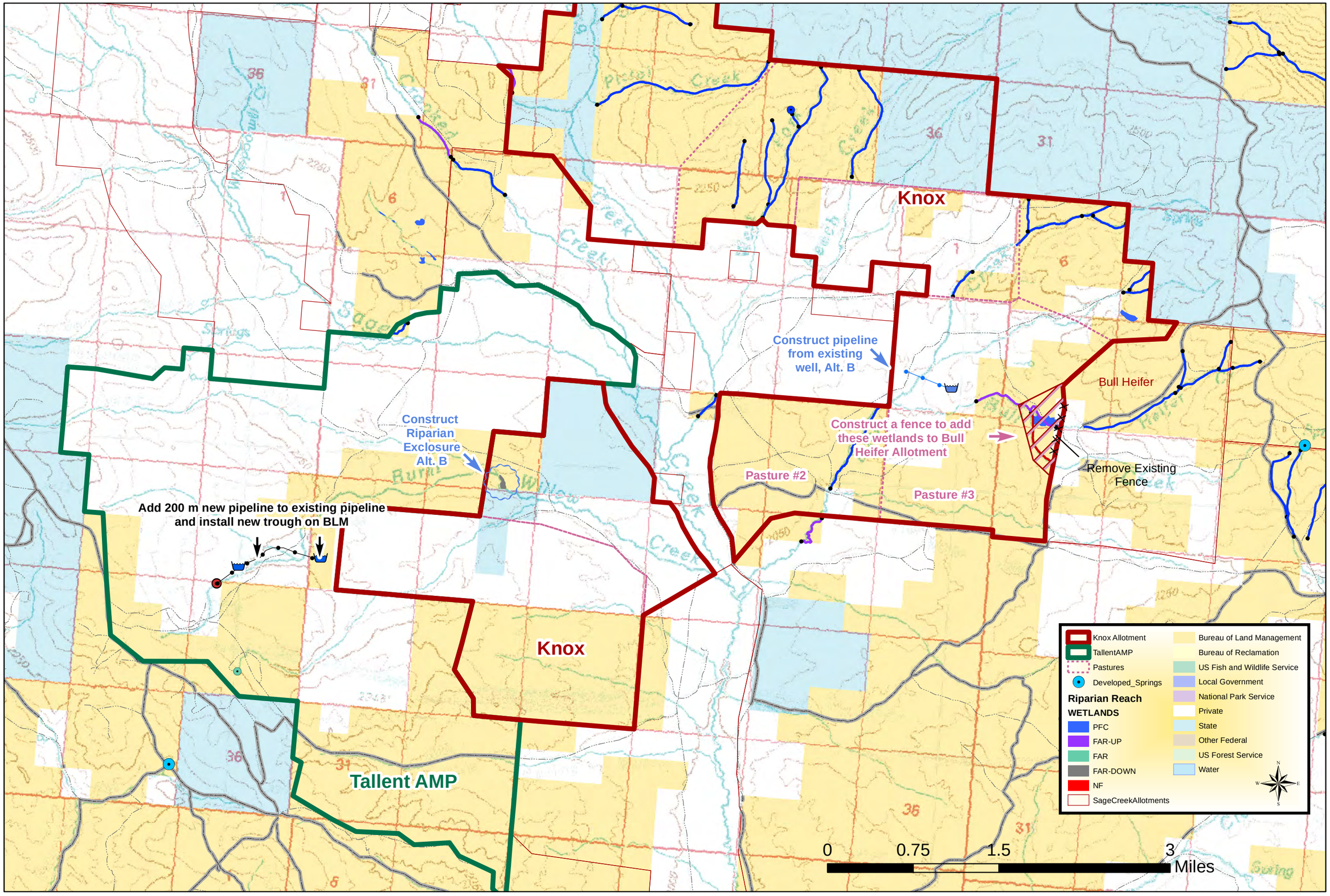
Map 6 - Gallagher Mountain AMP 30013, Armstead Mountain 30008 and Little Spring Gulch 20604

Map 7 - Bull Heifer 10137 and Knox Allotment 10136



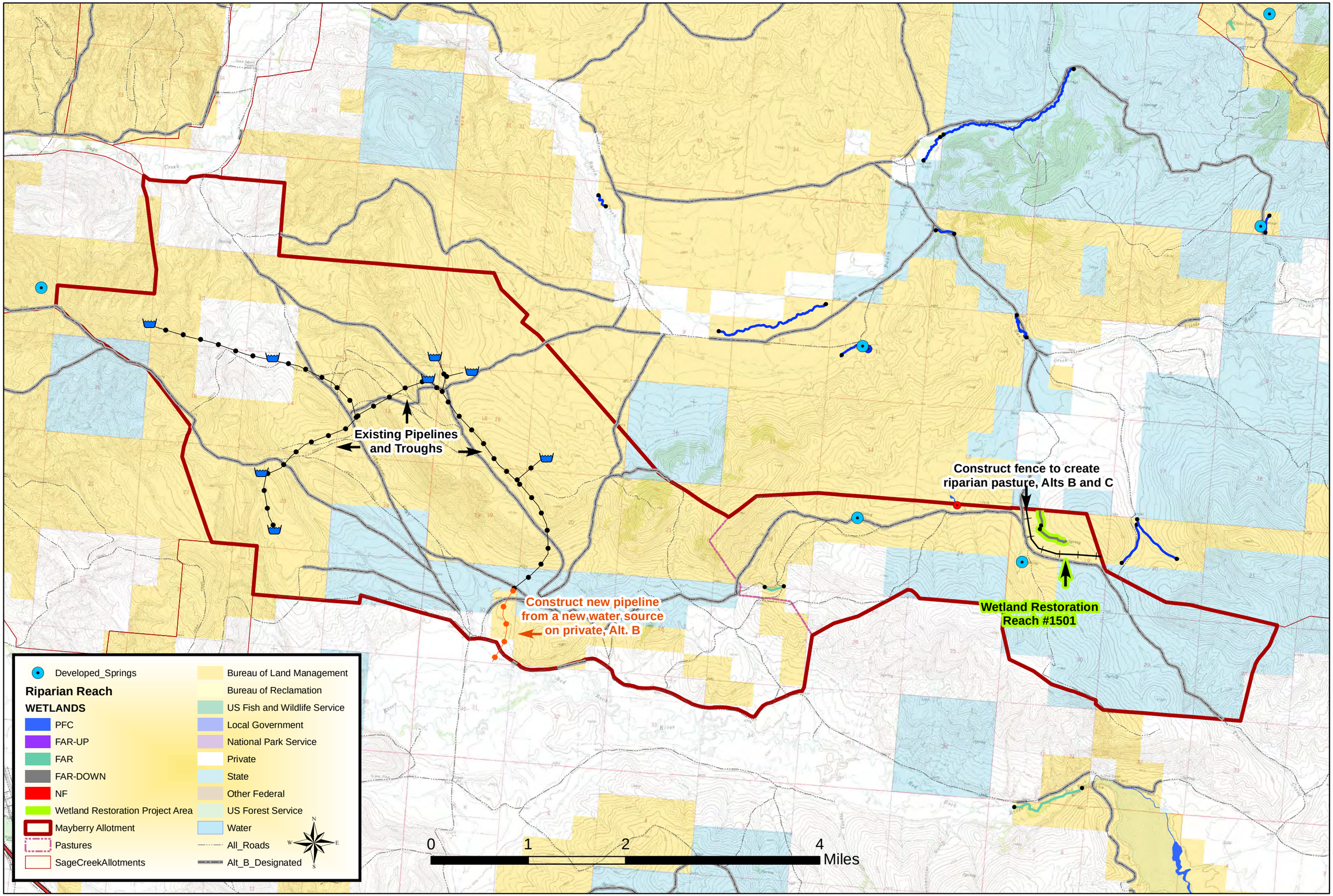
Map 8 - Dell 20620 and Huntsman 10123 Allotments



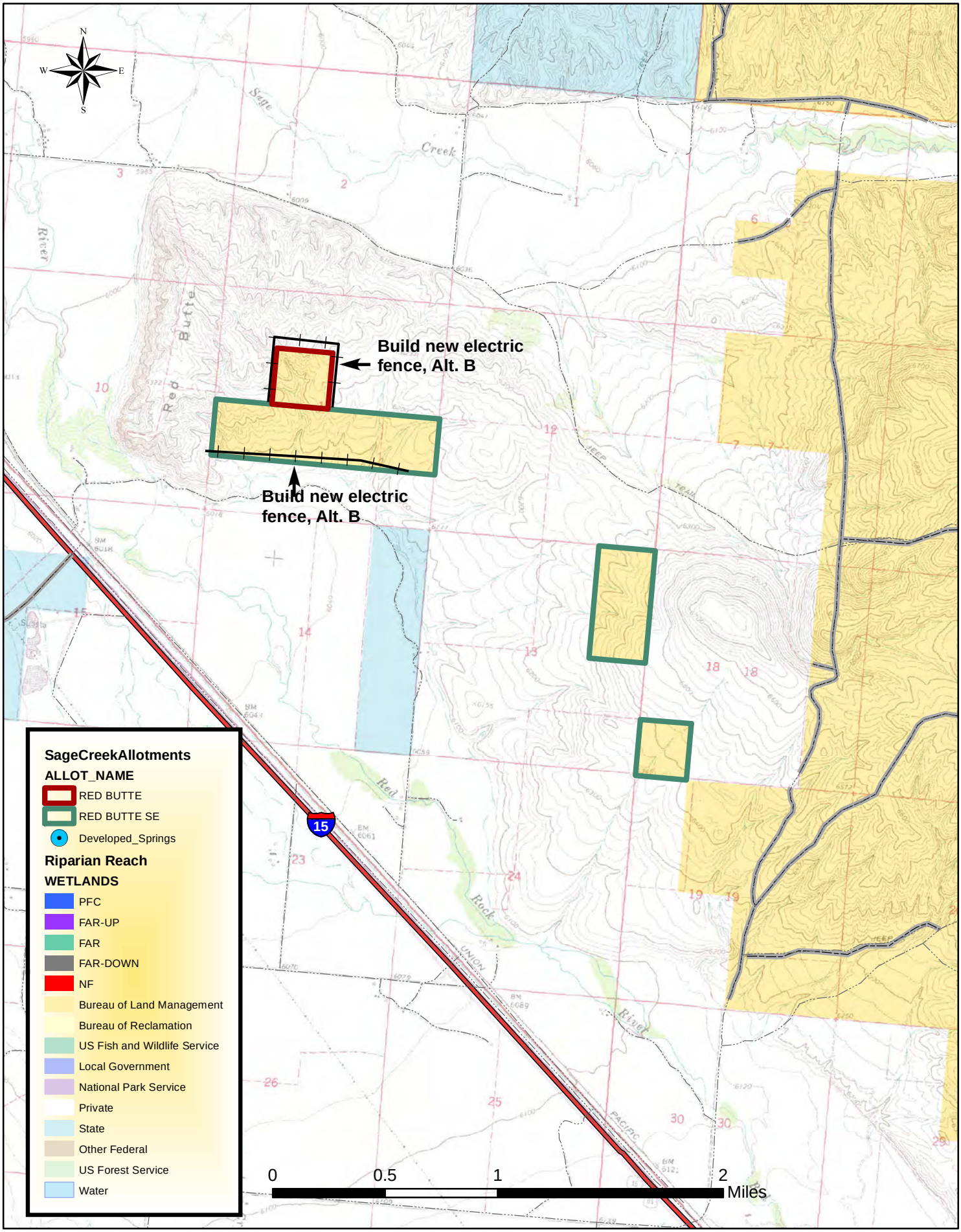


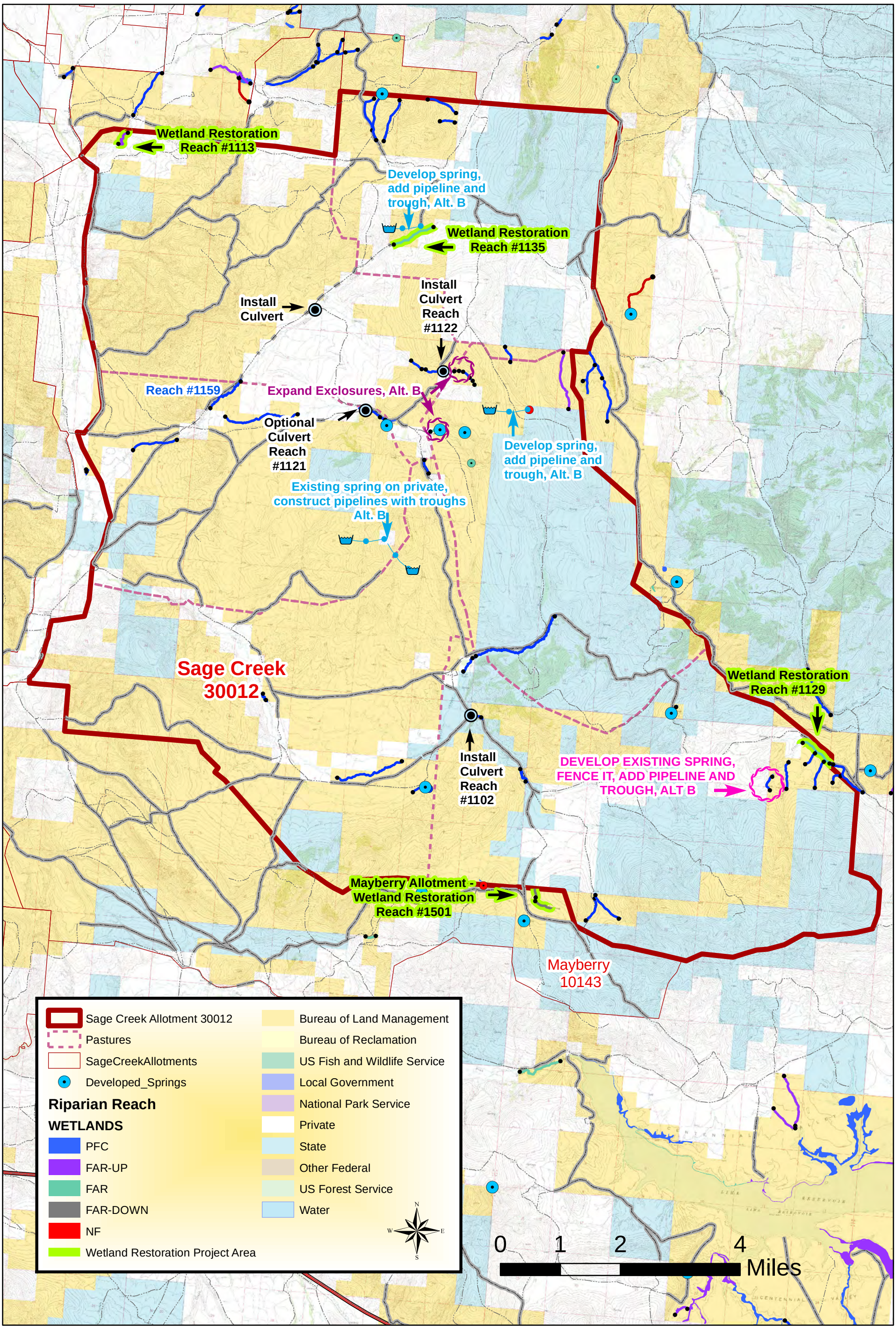
Map 9 - Knox 10136 and Tallent AMP 20037

Map 10 - Maybeberry 10143

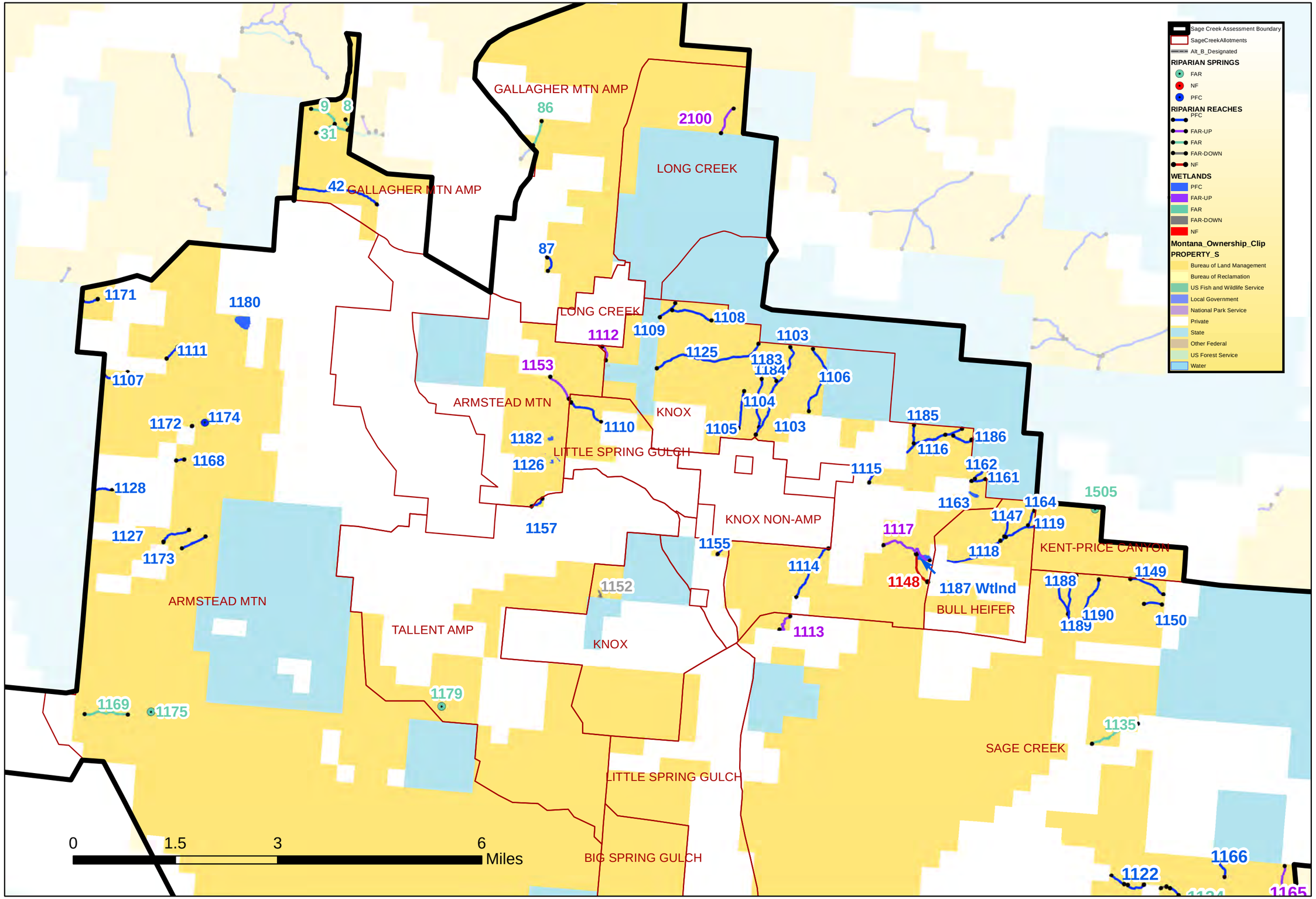


Map 11 - Red Butte SE 30615 and Red Butte 20630

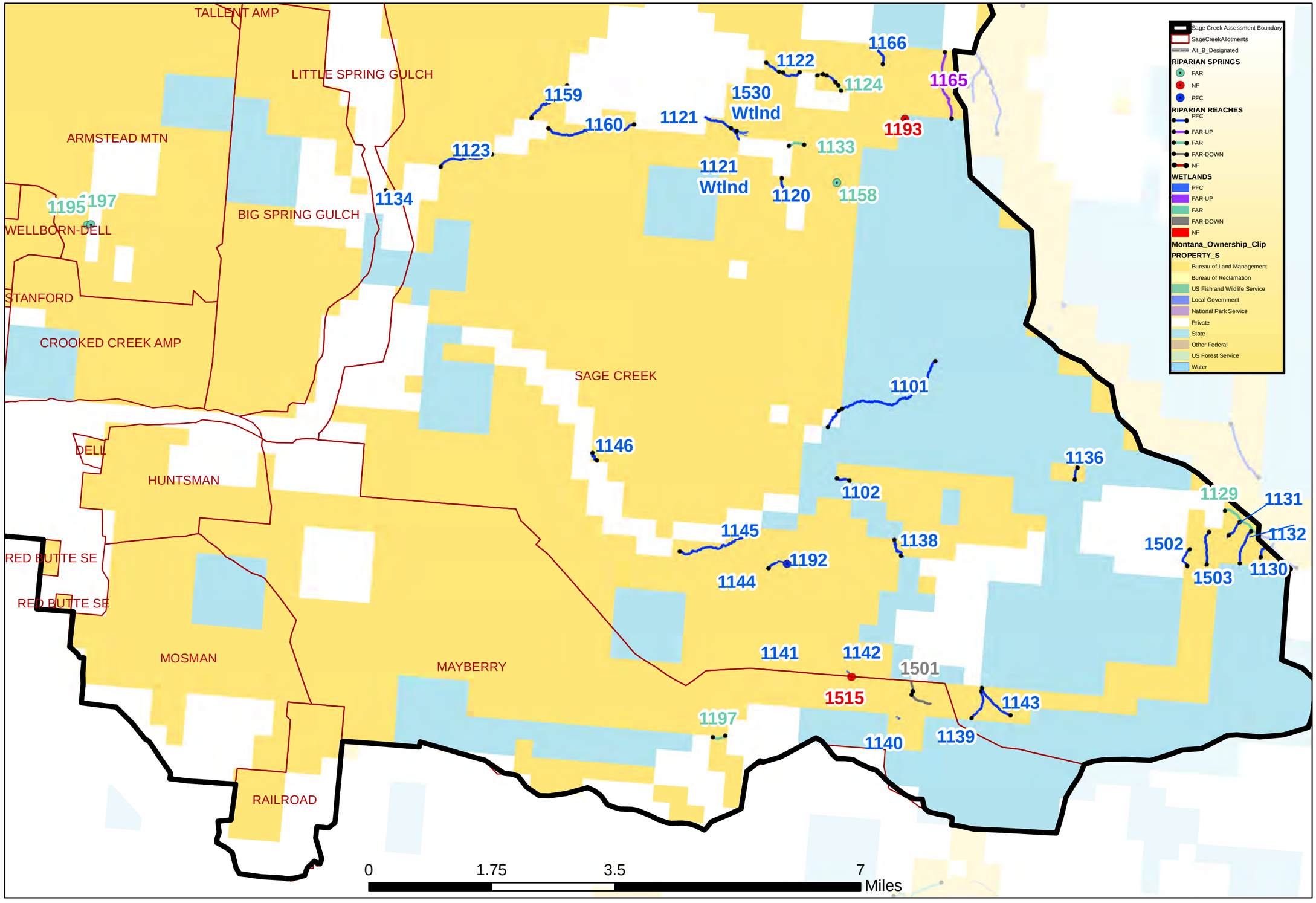




Map 12 - Sage Creek Allotment 30012



Map 13 - Sage Creek North Half Riparian Reaches



Map 14 - Sage Creek South Half Riparian Reaches

Appendix B- Sage Creek Watershed Monitoring Plan

Appendix B

Sage Creek Watershed

Monitoring Plan

Monitoring Plan for Sage Creek Watershed

Introduction

The purpose of this resource monitoring plan is to measure the effectiveness of existing management, and where applicable, management changes, structural projects and vegetative treatments, in meeting the goals and objectives developed for the Sage Creek Watershed (SCW). This plan has been designed to measure progress towards site specific objectives developed by an ID team where resource concerns were identified during the Sage Creek Watershed Assessment. This plan will identify when, where and how studies will be conducted, as well as the types of data that will be collected, how the data will be evaluated, and who will participate in the process. All monitoring methodologies are approved BLM monitoring methodologies and are described in various BLM or Interagency Handbooks. This information, including technical references, BLM policy and procedure handbooks, and monitoring guidelines and methodology descriptions are available for review at the Dillon Field Office. Technical references and BLM procedural handbooks are also available on the BLM library website; http://web.nc.blm.gov/blmlibrary. All BLM employees that collect monitoring data are trained specialists and a monitoring refresher is completed annually.

All ***existing*** monitoring studies that are needed to measure progress towards objectives or Standards will continue to be read on the same time schedule as any identified new studies. In addition to the watershed and site specific monitoring, Assessment, Inventory and Monitoring (AIM) transects will be established within the next adaptive management cycle throughout the Dillon Field Office to measure land health at the watershed scale and Land Use Plan Effectiveness at the field office (land use plan) scale.

Site Specific Objectives

Three Key Issues and seven additional Resource Concerns were identified during the Sage Creek Watershed Assessment and through public scoping and were analyzed in the Sage Creek Watershed Environmental Assessment (EA). Site specific objectives have been developed based on each key issue and resource concern. The amount of change desired for each of the objectives will be determined once additional baseline data is gathered during the 2016 field season. The goal is to make measurable progress towards site specific objectives to be able to meet all Rangeland Health Standards and site specific objectives by 2025.

Key Issue # 1: Riparian, Wetland, and Aquatic Habitat

Objectives:

- Increase composition and cover of deep-rooted riparian species along stream channels and spring/wetland areas (reduce bare ground).
- Increase vigor and regeneration of aspen.
- Improve physical condition of stream channel/streambanks.
- Stop head cuts and restore vertical channel stability.
- Reduce sediment inputs into streams generated by human activities.
- Restore, maintain and/or enhance native vegetation and hydrology of springs, seeps and wet meadows with emphasis on ecological function and biodiversity.

Monitoring activities to measure progress towards meeting Riparian, Wetland and Aquatic Habitat objectives:

- **Continue monitoring existing riparian studies to measure progress towards objectives.**
- Springs that are developed/redeveloped will be photographed before and after development and inspected and photographed periodically after development (every 2-3 years), including prior to the next scheduled assessment.
- Spring developments will be checked at least annually during compliance inspections to verify that maintenance is being completed as agreed to in Cooperative Agreements.
- Dysfunctional spring developments that are removed/cleaned up will be photographed before and after project clean-up.
- New culverts, hard water crossings or water gaps will be photographed before and after implementation of the projects.
- Wetland restoration projects on wetlands 1129 (Clover Creek), 1113 (East Creek), 1135 Little Sage Creek, 1501 (Little Basin Creek trib.) would be monitored by delineating the current wetlands; setting up vegetation transects perpendicular to the existing edge that extend from outside the current wetland into treated wetlands; and/or setting up vegetation transects completely within the current wetland perimeter; and/or setting up photo points to measure vegetative changes within and adjacent to the wetlands and overall effectiveness of wetland restoration projects.
- Wetlands will also be monitored through aerial photos to determine if they are increasing or decreasing in size.

Table 1: Additional Site Specific Riparian and Wetland and Aquatic Habitat Monitoring

Allotment Name and #	Stream or Wetland and Number	Objective	Monitoring Methodology
Armstead Mtn. #30008 (including Gallagher Mtn Pastures)	#1169 Red Rock trib. #8 Sheep Creek trib. #9 Sheep Creek trib. #31 Sheep Creek WF #86 Sheep Creek trib.	Reduce streambank impacts, increase deep-rooted riparian vegetation along the greenline.	Cumulative width-depth ratio transect; greenline transect and/or photo points
Knox #10136	#1148 Bull Creek #1152 Burnt Willow	Reduce streambank impacts and increase deep-rooted riparian vegetation Reduce streambank impacts Reduce impacts to wetland	Cumulative width-depth transects. Greenline transect and/or photo points. Photo points
Mayberry #10143	#1197 Red Rock trib. #1501 Little Basin Creek trib.	Reduce streambank impacts; reduce noxious weeds. Reduce impacts to spring and spring brook. Increase wetland vegetation	Photo points Delineate wetland; daubenmire transect, and/or photo points
Sage Creek AMP #30012	#1129 Clover Creek #1135 Little Sage Creek	Reduce streambank impacts, increase wetland vegetation.	Cumulative width/depth ratio, greenline, delineate wetland and/or photo points

Allotment Name and #	Stream or Wetland and Number	Objective	Monitoring Methodology
	#1124 Little Sage Creek trib. #1133 Little Sage Creek trib.	Reduce streambank impacts	Photo points
	#1113 East Creek	Increase wetland vegetation, increase size of the wetland.	Delineate wetland, Daubenmire transect, and/or photo points.

Key Issue #2: Upland and Sagebrush Steppe Habitat

Objectives:

- Restore the soil/site stability, hydrological function, and biotic integrity of upland sites in allotments where one or more of these attributes of rangeland health was determined to be reduced.
- Increase cover and frequency of native perennial cool season herbaceous species where concerns were documented, which will improve the hydrological function and site productivity.

Monitoring activities to measure progress towards meeting upland habitat and associated species objectives:

- Continue monitoring existing upland studies to measure progress towards objectives.

Table 2: Site Specific Upland and Sagebrush Steppe Habitat Monitoring

Allotment Name	Objective	Monitoring Methodologies
All allotments Sage Creek AMP #30012	Maintain or increase composition and cover of cool season perennial bunchgrasses	Daubenmire or Quadrat Frequency transects and/or Photo points (most of this monitoring is already in place, but will be continued) Trend studies will be added in the Sage Creek Allotment
Dell #20620	Increase composition of native species	Daubenmire transect or photo points
Red Butte #20030 Red Butte SE #30615	Increase composition and cover of cool season perennial bunchgrasses. Decrease bareground.	Photo points

Key Issues #3: Recreation and Travel Management

Objectives:

- Effectively implement the Dillon RMP Travel Management Plan, as amended.
- Revise motorized route designations as necessary to correct mapping errors and improve route designations.
- Reduce unauthorized (non-designated route travel) motor vehicle use which

occurs most frequently during the big game hunting season.

- Maintain reasonable motorized wheeled vehicle access to those areas where it already exists, and improve access to public land where appropriate and where opportunities are currently limited.
- Provide a spectrum of recreational opportunities that includes both motorized and non-motorized opportunities.
- Reduce resource impacts caused by recreationists, including spread of noxious weeds, habitat fragmentation, wildlife security issues, loss of vegetation and soil compaction/erosion from unauthorized motor vehicle use.

The goals for both Travel Management and OHV Use and Transportation in the Approved Dillon Resource Management Plan for Recreation, as amended collectively say; "to manage roads and trails and manage motorized travel to provide for public access or administrative needs, while maintaining or protecting resource values in conjunction with other federal agencies, state and local governments, and private landowners."

Monitoring will consist of compliance checks throughout the year to determine if closed roads show signs of use, as well as the enforcement of the travel management plan, specifically during the big game hunting season.

Resource Concern #1: Special Status Species Habitat

Objectives:

- Maintain existing sagebrush habitat so that 80% or more of big sagebrush communities provide vegetative composition and structure for sage grouse nesting/early brood rearing, >40% sagebrush habitat meets summer/late brood habitat characteristics, and >80% meets winter habitat characteristics where appropriate (relative to ecological site, etc.).
- Maintain an average 7 inches herbaceous understory within site potential within sage grouse nesting/early brood rearing habitat.
- Maintain or increase composition of highly nutritious forbs (e.g. composites and legumes) in sage grouse nesting/early brood rearing habitat.
- Maintain/enhance habitat for cold water fisheries in occupied streams within the watershed.
- Cooperate with MT Fish, Wildlife and Parks to expand the current distribution of westslope cutthroat trout (WCT) in the Sage Creek Drainage.
- Maintain or enhance habitat for sensitive plant species and provide ample opportunity for reproduction and seedling establishment.

Monitoring Activities to measure progress towards meeting Fish, Wildlife and Special Status Species Habitat objectives:

Table 3: Site Specific Monitoring for Sagebrush Obligate Species Habitat

Allotment Name	Objective	Monitoring Methodologies
All Priority and General Sage Grouse Habitat	-Maintain existing sagebrush habitat so that 80% or more of big sagebrush communities provide vegetative composition and structure for sage grouse nesting/early brood rearing, >40% sagebrush habitat meets summer/late brood habitat characteristics, and >80% meets winter habitat characteristics where appropriate (relative to ecological site potential, etc.). - Maintain or increase composition of highly nutritious forbs (e.g. composites and legumes) in sage grouse nesting/early brood rearing habitat. -Maintain an average 7 inches herbaceous understory within site potential within sage grouse nesting/early brood rearing habitat.	-Habitat Assessment Framework (HAF) - Line Point Intercept plots to measure canopy cover of sagebrush, and herbaceous and forb understory. -Forage utilization and herbaceous understory cover will be measured within staff constraints.

Related objectives and monitoring activities to measure progress towards fish, wildlife and special status species habitat are included above under Key Issues for Riparian, Wetland, and Aquatic Health, Upland Health and Sagebrush Steppe Habitat, and Forest, Woodland and Priority Species Habitat.

Additional monitoring activities specific to fish, wildlife and special status species habitat include:

- Document and establish baseline inventory for any new "unmapped" populations of sensitive plants that are found. The inventory should include the number of individual plants, a description of the habitat (e.g., associated species, soils, aspect and elevation) and an assessment of any existing and potential threats to the population.
- Continue existing trend monitoring for Idaho sedge.
- Coordinate with MTFWP to continue delineating seasonal habitat for sage grouse.
- Coordinate with MTFWP to continue annual sage grouse lek monitoring (male lek attendance counts).
- Coordinate with MTFWP to continue monitoring population trends of WCT in within the Sage Creek Watershed.
- Maintain a 6" herbaceous stubble height threshold along greenline and/or three inches on the floodplain by reach, whichever occurs first to provide a sediment buffer on all WCT streams.
- Continue habitat monitoring on WCT habitat every 5-10 years to include temperature data and habitat surveys using the DEQ protocol for monitoring.

Resource Concern #2: Forest and Woodland and Priority Species Habitat

Objectives:

- Maintain/enhance existing aspen and promote the successful regeneration of aspen.
- Retain and promote five needle pine trees that appear to have some resistance to white pine blister rust.
- Explore options to enhance mountain mahogany habitat.

Monitoring activities to measure progress towards meeting forest and woodland habitat objectives:

- Establish photo points on all aspen restoration stream reaches. Reaches may include 1115, 1116, 1117, 1118, 1147, 1161, 1162, 1164, 1185, 1186 (Alt. B) and possibly 1110 and 1153 (Alt. C). Photos will be taken pre-treatment preferably in the early fall or late spring so the aspen regeneration is most noticeable.
- Following treatment, re-take photos annually until aspen saplings are above browse height or it has been determine that the treatment has been unsuccessful.
- Establish a representative sample of Fixed Radius Plots within and/or adjacent to mechanical aspen root disturbance treatment areas. The plots will be used to document aspen regeneration and potentially clone expansion. Plots will be read pre-treatment, one year after treatment and then once every two years until aspen saplings have grown taller than browse height, or the aspen root suckering response to the mechanical disturbance has ceased.

Resource Concern #3: Noxious and Invasive Species

Objectives:

- Reduce the composition of noxious and invasive vegetative species within the watershed.
- Mitigate the spread of noxious and invasive plants into, within, or from the watershed.

Monitoring activities to measure progress towards meeting noxious and invasive species objectives are included in above under Riparian, Wetland, and Aquatic Habitat and Upland and Sagebrush Steppe Habitat.

Projects causing any soil disturbance will be seeded with a native seed mix and inventoried for noxious and invasive species until the disturbed area is re-vegetated and infestation by noxious or invasive species is no longer a concern due to the disturbance.

Resource Concern #4: Wilderness Characteristics and Wilderness Study Area

Objectives:

- Maintain wilderness characteristics of the Blacktail Mountains Wilderness Study Area.
- Maintain Lands with Wilderness Characteristics values of: sufficient size, retain their natural character, and provide outstanding opportunities for solitude or

primitive and unconfined recreation.

Planned monitoring will consist of compliance checks and continuation of existing monitoring. WSA monitoring forms will be completed, and photographic documentation will be used where applicable.

Resource Concern #5: Socioeconomics

Objectives:

- Continue to contribute to the local economy by providing an opportunity for sustainable uses on public land including livestock grazing and recreational activities.

Trends in socioeconomics will not be monitored by the local BLM office.

Resource Concern #6: Cultural and Paleontological Resources

Objectives:

- Preserve and protect significant cultural and paleontological resources and ensure that they are available for appropriate uses by present and future generations.
- Reduce imminent threats from natural or human-caused deterioration, or potential conflict with other resource uses.
- Ensure that all authorizations for land and resource use avoid inadvertent damage to federal and nonfederal cultural resources in compliance with Section 106 of the National Historic Preservation Act and the Paleontological Resources Preservation Act.

Monitoring activities to measure progress towards meeting cultural and paleontological resource objectives include:

Cultural Resources: Visit a minimum of 10 previously recorded cultural resource properties that are listed on the National Register of Historic Places or determined eligible for listing, on an annual basis, to update the site form to current professional standards and to assess the current condition and trend of significant resource values.

Paleontological Resources: Of the five major geographic paleontological areas in the field office, visit one of the geographic areas on an annual basis to identify if any adverse impacts are occurring.

Resource Concern #7: Visual Resources Management

Objectives:

- Partially retain the existing character of the area outside WSA.
- Keep any changes to characteristic landscape very low so as not to attract attention within Blacktail Mountains WSA.

Monitoring activities to measure progress towards meeting visual resource objectives include: Reviewing proposed activities for consistency, and encouraging field staff to look around when they are in the area and report unauthorized activities that may be impacting visual resources.

Types of Data Collected
The established permanent vegetative and physical trend transects in the Sage Creek Watershed were read and data was updated during 2014. The date when these studies were initially established and read is considered baseline data. However, in order to adequately measure progress towards site specific objectives in areas where resource concerns were documented, additional studies will be established in key areas during 2016 or 2017 and baseline data will be gathered on the newly established studies. Baseline data is considered the starting point from which to measure progress towards meeting objectives or effectiveness of management changes implemented beginning in 2017 (on the new studies only). Data from existing studies will be compared and evaluated from the time they were established and data was initially collected.

Key areas are defined as relatively small areas that reflect or have the capability to reflect the effectiveness of management of the resources of a larger area. Depending on management objectives, a key area may be a representative sample of a large stratum, pasture, allotment, or a particular management area. Key areas or monitoring sites should represent the high variability of riparian, upland and forest habitat types, patterns of use, and conditions of forest, rangeland or riparian health. Over the next several years the following data will be collected (See Table 4).

- Actual livestock and wildlife use. Actual use is the grazing use of an area by all classes of forage consumers. This information is necessary to provide a correlation between utilization and trend data. Considered alone, actual use data are essentially meaningless. However, when considered in conjunction with climate and utilization data, this data is necessary to interpret trend data accurately.
- Annual compliance, including utilization of upland forage, browse levels on willows and aspen, measurement of sedge stubble heights and/or measurement of stream bank alteration. This monitoring will occur primarily at established key areas, but may occur in other areas as well. Annual compliance monitoring will be done on a prioritized basis with I category allotments being the highest priority, followed by M, and then C category allotments. In areas where competition for resources may occur between livestock and big game, pre-livestock data may also be collected. This annual data will be used to help determine pasture moves, accurately interpret trend data, and serve as an early indicator on whether implemented changes are effective. If annual monitoring reveals resource degradation or ineffective management changes (as determined by BLM specialists), trend studies may be read at any time prior to the next scheduled assessment (2025), and adjustments in management analyzed in the interim.
- Local precipitation and temperature. This data is necessary to interpret trend data accurately.
- Long term trend. Trend data will be used to measure progress towards meeting objectives as described above.
- Land Use Plan effectiveness monitoring. The AIM methodology will be phased in within the Dillon Field Office during the next planning cycle (10 years). This data can be used at multiple scales and will be used to measure land use plan effectiveness and may also be used to measure effectiveness of landscape level assessments (e.g. Sage Creek Watershed) and project level projects (e.g. aspen restoration) as they are implemented. This data will be stored via TerraDat, which will be available to the public.

Trend refers to the direction of change and indicates whether the forest, rangeland, riparian area or other resource is being maintained or is moving toward or away from the desired plant community or other specific management objectives. Trend studies are important in the long term for determining the effectiveness of management actions in meeting or moving towards management objectives.

Trend data will be collected again in 2024, unless specified otherwise for specific objectives. The Sage Creek Watershed will be re-assessed or evaluated during 2025. In this process, all monitoring data will be summarized, analyzed, interpreted, and evaluated to measure progress toward meeting objectives. Trend data gathered in 2024 will be compared to baseline (established in 2016 or 2017) and existing trend data gathered or updated in 2014. The measured change in the data will be used to measure progress toward meeting objectives, thereby evaluating management and making informed decisions regarding subsequent management (continuation or change). This is called adaptive management. For example, if monitoring data shows that progress is being made toward established objectives, current management will be continued or modified slightly as warranted, according to the data. However, if data shows a downward trend (change away from objectives) or does not show any progress toward meeting objectives by 2024, and it is determined that current livestock management is a significant factor in precluding progress toward meeting objectives, then management will be adjusted by implementing an alternate system, changing the season of use and/or reducing authorized AUMs. The level of adjustment will be determined by the degree of divergence from the objectives.

Monitoring methodology descriptions are available for review at the Dillon Field Office. Technical references and BLM procedural handbooks are also available on the BLM library website; http://web.nc.blm.gov/blmlibrary.

Table 4: Planned Resource Monitoring Activities

Type	Method	Responsibility	Frequency
Actual Use	Actual Use Reports submitted by grazing lessees Wildlife observations Wildlife population monitoring in cooperation with the MFWP Recreation user days	Range, Wildlife and Recreation Staff	Annually
Compliance/ Utilization	Utilization – Grazed/Ungrazed Method or Key Forage Plant Method	Range, Wildlife or Fisheries Biologists, Hydrologist Outdoor Rec Planner.	Annually on a prioritized basis
	Stubble height – Stubble Height Method		
	Bank alteration – Stream bank Alteration Methodology as defined by Idaho State Office BLM, 2000		
	Browse use – Extensive Browse Method		
Climate	Precipitation data available from National Oceanic and Atmospheric Administration and other sources	Available from external sources	Annually
Habitat Characterization-Assessment	Inventory for leks and seasonal habitats Habitat Assessment Framework (HAF) in priority and general habitat, elk calving and winter and mule deer winter habitats	Wildlife Staff, MFWP, NWF	Annually on a prioritized basis

Type	Method	Responsibility	Frequency
Population(s)	Sage Grouse – male lek attendance WCT – periodic population sampling through electro-fishing Pygmy rabbit surveys Wildlife population monitoring (MFWP has lead)	MFWP and BLM Biologists will coordinate and assist, where applicable	Annually for sage grouse; 5 year intervals for WCT
Trend (also see Table 3)	**Biotic** Assessment, Inventory and Monitoring (AIM) Quadrat Frequency Daubenmire Line Point Intercept Cover Board Woody Species Regeneration Greenline Multiple Indicator Monitoring (MIM) Macroplots/Belt Transects Fixed Radius Plot Photopoints Fire Regime Condition Class (FRCC) LANDFIRE (as applicable)	Range, Wildlife or Fisheries Biologists, Hydrologists, Foresters, Fuels Specialists	Any new trend monitoring studies will be established during 2016. Trend data (new and existing studies) will be gathered again in **2024 or 2025.**
	Physical Cumulative width/depth ratio, MIM, site specific soils interpretation.		
Watershed Assessment	Analysis, Interpretation, Evaluation, Recommendations followed by NEPA	ID team	FY2025

Budget Requirements

This monitoring plan was prepared with the assumption that funding will remain at or near existing levels for the foreseeable future. In this light, it is anticipated that the bulk of the monitoring workload will have to be borne by the existing range, wildlife, fisheries, forestry, fuels, hydrology, recreation, wilderness and cultural resource specialists along with a minimum of six seasonal technicians each field season for the duration of this plan.

Litigation workload associated with Watershed Assessments also directly effects how much monitoring the existing staff is able to complete.

Appendix C- Sage Creek Watershed Biological Evaluation for Special Status Fish and Wildlife Species

BLM DILLON FIELD OFFICE

Biological Evaluation for Special Status Fish and Wildlife Species.

Form Revised August 2014 - Updated September 2014

Project: Sage Creek Watershed Environmental Assessment [DOI-BLM-MT-B050-2016-0008-EA]

Step 1a.	Step 1b.	Step 1c.	Step 2	Step 3.	Step 4.	Step 5.	Step 5.	Step 5.
List of all Special Status Species that are known or suspected to occur on the DFO.	**Current Management Status of the Species.**	**Does the species occur on this portion of the Field Office?**	**Is the species or its habitat found in the surrounding area?**	**Could this proposal have any effect?**	**Are Irreversible or Irretrievable Resources involved?**	**Alt A level of effect**	**Alt B level of effect**	**Alt C level of effect**
Canada Lynx (*Lynx canadensis*)	Threatened	N	Y	N	--	--	--	--
Grizzly Bear (*Ursus arctos horribilus*)	Threatened	Y	Y	N	--	--	--	--
Mammals								
Fringed myotis (*Myotis thysanodes)*	Sensitive	N	Y	N	--	--	--	--
Gray Wolf (*Canis lupus*)	Sensitive	Y	Y	N	--	--	--	--
Great Basin pocket mouse (*Perognathus parvus*)	Sensitive	N	Y	Y	N	MIIH	MIIH	MIIH
North American Wolverine (*Gulo gulo luscus*)	Sensitive	N	Y	N	--	--	--	--
Pygmy Rabbit (*Brachylagus idahoensis*)	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH
Spotted Bat (*Euderma maculatum*	Sensitive	N	Y	N	--	--	--	--
Townsend's Big-eared Bat *(Plecotus townsedii)*	Sensitive	N	Y	N	--	--	--	--
Birds								
American Bittern (*Botaurus lentiginosus*)	Sensitive	N	Y	N	--	--	--	--
Bald Eagle (*Haliaeetus leucocephalus*)	Sensitive	Y	Y	N	--	--	--	--
Black Tern (*Chlidonias niger*)	Sensitive	N	Y	N	--	--	--	--
Black-backed Woodpecker *(Picoides arcticus)*	Sensitive	N	Y	N	--	--	--	--
Brewer's sparrow *(Spizella breweri)*	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH

(cont.) List of all Special Status Species that are known or suspected to occur on the DFO.	Current Management Status of the Species.	Does the species occur on this portion of the Field Office?	Is the species or its habitat found in the surrounding area?	Could this proposal have any effect?	Are Irreversible or Irretrievable Resources involved?	Alt A level of effect	Alt B level of effect	Alt C level of effect
Burrowing Owl (*Athene cunicularia*)	Sensitive	N	Y	N	--	--	--	--
Caspian Tern (*Hydroprogne caspia*)	Sensitive	N	Y	N	--	--	--	--
Chestnut-collared Longspur (*Calcarius ornatus*)	Sensitive	N	N	N	--	--	--	--
Common Tern (*Sterna hirundo*)	Sensitive	N	Y	N	--	--	--	--
Ferruginous Hawk (*Buteo regalis*)	Sensitive	Y	Y	N	--	--	--	--
Flammulated Owl (*Otus flammeolus*)	Sensitive	N	Y	N	--	--	--	--
Forster's Tern (*Sterna forsteri*)	Sensitive	N	Y	N	--	--	--	--
Franklin's Gull *(Larus pipixcan)*	Sensitive	N	Y	N	--	--	--	--
Golden Eagle *(Aquila chrysaetos)*	Sensitive	Y	Y	N	--	--	--	--
Great Gray Owl (*Strix nebulosa*)	Senstive	Y	Y	N	--	--	--	--
Greater Sage Grouse (*Centrocercus urophasianus*)	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH
Lewis's Woodpecker (*Melanerpes lewis*)	Sensitive	Y	Y	Y	N	--	MIIH	MIIH
Loggerhead Shrike (*Lanius ludovicianus*)	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH
Long-billed Curlew (*Numenius americanus)*	Sensitive	Y	Y	N	--	--	--	--
McCown's longspur *(Calcarius mccownii)*	Sensitive	Y	Y	N	--	--	--	--
Mountain Plover (*Charadrius montanus*)	Sensitive	N	N	N	--	--	--	--

(cont.) List of all Special Status Species that are known or suspected to occur on the DFO.	Current Management Status of the Species.	Does the species occur on this portion of the Field Office?	Is the species or its habitat found in the surrounding area?	Could this proposal have any effect?	Are Irreversible or Irretrievable Resources involved?	Alt A level of effect	Alt B level of effect	Alt C level of effect	Alt D level of effect
Peregrine Falcon (*Falco peregrinus anatum*)	Sensitive	Y	Y	N	--	--	--	--	--
Sagebrush Sparrow (*Artemisiospiza nevadensis*)	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH	MIIH
Sage thrasher *(Oreoscoptes montanus)*	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH	MIIH
Sprague's Pipit (*Anthus spraugueii*)	Sensitive	N	N	N	--	--	--	--	--
Trumpeter Swan (*Cygnus buccinator*)	Sensitive	N	Y	N	--	--	--	--	--
Veery (*Catharus fuscescens*)	Sensitive	Y	Y	Y	N	MIIH	BI	BI	BI
White-faced Ibis (*Plegadis chihi*)	Sensitive	N	N	N	--	--	--	--	--
Yellow billed cuckoo *(Coccyzus americanus)*	Sensitive	N	N	N	--	--	--	--	--
Amphibian/reptiles									
Boreal/Western toad *(Bufo boreas)*	Sensitive	Y	Y	Y	N	MIIH	MIIH	MIIH	MIIH
Northern leopard frog *(Rana pipiens)*	Sensitive	N	N	N	--	--	--	--	--
Fish									
Westslope cutthroat trout *(Onchorhynchus clarkii lewisi)*	Sensitive	Y	Y	Y	N	MIIH	BI	BI	--
Fluvial Arctic Grayling (*Thymallus arcticus montanus*)	Sensitive	N	N	N	N	--	--	--	--
Invertabrates									
Western Pearlshell *(Margaritifera falcatea)*	Sensitive	N	N	N	N	--	--	--	--

Step 6. Are there any specific recommendations to avoid significant effects (if any)? These are mitigation measures needed to avoid determinations of: LAA, LJ, WIFV. If so, the narrative describing these recommendations would be discussed in the NEPA document.

Step 7. Documentation: This short form is intended to follow a seven-step process to provide basic biological evaluations. Judgments must not be arbitrary but should be reasoned. This form provides a "road map" of that reasoning and assumes the judgments are drawn from numerous sources. Any species-specific impacts should be discussed in the NEPA document or below under the Narrative of Potential Impacts.

The signature below certifies that:

1. The wildlife biologist has reviewed the proposed action and its alternatives, but may or may not have provided input to alternative design, depending on the issues.

2. The wildlife biologist has an understanding of the specific conditions found in the affected area. Column 1a lists all possible Special Status Species in the Dillon Field Office. Column 1b identifies the species' current management status. Column 1c indicates whether there are no records (N/A), or whether the species is considered a Transient (T) or Resident (R) {for our purposes, resident includes migratory species that fulfill a portion of their life history here}. Step 2 is satisfied by field visits or knowledge of local conditions from previous visits resulting in enough information to determine if the area is potential habitat for species listed in Step 1. Extensive surveys are not necessary if the conservative approach is taken that: "suitable habitat" means the potential for occupancy.

3. The wildlife biologist has an understanding of the species habitat needs and other attributes important to the determination. This can be a combination of literature review, professional experience, and consultation with others.

4. The wildlife biologist has assimilated the above information in making the "determinations" (i.e. final judgments about the scientific significance of the effects).

Signed: /s/*Katie Benzel* **Date:** 5-20-2016 **Signed:** /s/*Paul Hutchinson* **Date:** 5-20-2016

Printed Name and Title: Katie Benzel, Wildlife Biologist and Paul Hutchinson, Fisheries Biologist

N/A – "Not Applicable." Indicates this species does not occur in the project area or that the project would have no bearing on its potential habitat. These species were removed from detailed analysis after field review of existing and potential habitats and consideration of distribution records.

FEDERALLY LISTED SPECIES

NE - No Effect
***LAA** - May Effect - Likely to Adversely Affect (formal consultation required)
NLAA - May Effect, Not Likely to Adversely Affect (informal consultation - concurrence with determination - required)
BE - Beneficial Effect (informal consultation - concurrence with determination - required)

SPECIES PROPOSED FOR LISTING

NE - No Effect
NLJ - Not likely to Jeopardize the continued existence of the species or result in the destruction or adverse modification of proposed critical habitat
***LJ** - Likely to Jeopardize the continued existence of the species or result in the destruction or adverse modification of proposed critical habitat

SENSITIVE SPECIES

NI - No Impact
MIIH - May Impact Individuals or Habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.
***WIFV** - Will Impact Individuals or habitat with a consequence that the action may contribute to the need for federal listing or cause a loss of viability to the population or species.
BI - Beneficial Impact

* triggers formal consultation process

NARRATIVE of POTENTIAL IMPACTS

FEDERALLY LISTED SPECIES:

Canada Lynx:
The Dillon Field Office does not contain any lynx critical habitat and no lynx have been documented within the SCW. Forested areas may provide temporary habitat for transient lynx dispersing from established lynx populations, but these areas likely do not contain all physical and biological features in adequate quantities and spatial arrangements to support lynx populations over time (USDI, 2014a). The forest habitat within the DFO is generally drier than the preferred moist boreal forests that include dense understories that provide foraging habitat and cover for the lynx's main prey, the snowshoe hare (USDI, 2014a). The USFWS provided evidence that the Beaverhead-Deerlodge National Forest (USFS managed lands in southwestern Montana where the DFO manages BLM administered lands) was likely not occupied by lynx at the time of listing and is not currently occupied by lynx, indicating that lynx do not occupy this area or this area is lacking in either quantity or spatial arrangement (or both) of one or more of the essential features. USFWS has determined that forests in southwestern Montana and the DFO are not essential to the conservation of lynx, and does not meet the definition of critical habitat (USDI, 2014a). Snow-tracking surveys designed to detect presence of multiple forest carnivores, including lynx, conducted by the Idaho Department of Fish and Game from 2004 to 2006 detected no lynx in the Beaverhead Mountains Section, just west of the DFO (USDI, 2014a). Forest habitat in SCW isn't considered adequate lynx habitat. The watershed may be used as a lynx linkage zone between suitable habitats. Forest habitat in the SCW isn't extensive (approximately 2% of the acreage in the watershed), while sagebrush grassland habitat is (89% of the watershed acreage). Lynx prefer to move through continuous forests, and have been observed to avoid large openings until shrubs and trees provide enough cover to hide them (Ruggiero et al. 2000; USDI, 2003). Although sagebrush grassland habitat may provide connectivity, it is not typical lynx habitat. No alternatives proposed in this EA are anticipated to affect Canada lynx.

Grizzly Bear:
On March 3, 2016 the USFWS announced plans to remove the Greater Yellowstone Ecosystem (GYE) grizzly bear population from the Federal List of Endangered and Threatened Wildlife (USDI, 2016). According to the Interagency Grizzly Bear Study Team (IGBST), the current GYE grizzly bear population is roughly 757 individuals (Haroldson et al, 2014). SCW is within the Distinct Population Segment (DPS) boundary which distinguishes the population of grizzly bears in the GYE as distinct from the remaining populations in the lower 48 states. The DPS boundary includes all landscapes where genetically distinct Yellowstone grizzly bear occur and may occur given future range expansion, delineated along easily identifiable boundary features (i.e. Interstate 15 to the west). The Dillon Field Office is outside the Grizzly Bear Recovery Zone, which depicts an area surrounding Yellowstone National Park where inter-agency grizzly bear recovery efforts are concentrated for the long-term conservation of the distinct Yellowstone grizzly bear population (IGBST, 2014). The SCW is outside of the Demographic Monitoring Area (DMA). The DMA is a boundary within which the total GYE population size is estimated and biologically sustainable mortality limits are established. Only those grizzly bear observations and mortalities inside the DMA count towards the population estimates and mortality thresholds (IGBST, 2016). Therefore, human caused deaths of bears in SCW would not be counted towards, "the sustainable mortality limits" set for the Greater Yellowstone DPS. Grizzly bear observations have occurred over the past two years within and surrounding the SCW. There have been no conflicts with humans or livestock reported in regards to grizzly bears in SCW.

There is potential for conflicts between livestock and large carnivores, especially when livestock are calving or have young offspring. There are no sheep grazing permits allotted in SCW. Amending grazing leases to state that livestock losses may occur from wolves and grizzly bear would create awareness, and minimize conflicts between lessees and agencies responsible for managing the predator population. Including a stipulation in grazing permits that the permittee, agency personnel, and Montana FWP will jointly determine how to properly treat or dispose of livestock carcasses on BLM administered land would reduce the potential for attracting predators. Notification by the permittee to the BLM, MT FWP, or Wildlife Services as soon as is practical of any grizzly bear depredation on livestock or conflicts between grizzly bears and livestock, even if the conflict does not result in the loss of livestock, would likely reduce the chance of livestock depredation and the possible removal of the grizzly bear. Posting and encouraging food storage recommendations would also reduce conflicts between grizzly bear and public land users.

Although there is potential for conflicts between livestock and grizzly bear, there are no changes to livestock management proposed in this EA that would affect the grizzly bear population. None of the allotments are proposed to have a change in season of use, except the 40 acre Dell allotment, Alternative C, which would change from 5/1-11/30 to 2/1-4/15. This change in season of use in this allotment would not impact grizzly bear, and would move the season of use further outside of the spring and summer seasons that bears are active. There are also no increases in active BLM AUMs proposed in this EA. Proposed changes in this EA would only educate public land users and reduce potential conflicts with grizzly bear (i.e. the stipulations listed above) and no effects are anticipated due to the proposed alternatives.

BLM SENSITIVE SPECIES:

Gray Wolf:
The Northern Rocky Mountain population of gray wolves, including Montana wolves, was delisted from the list of Endangered and Threatened Wildlife in 2011 as part of the Appropriations Act. To avoid relisting, Montana will comply with federal regulations to manage wolves in a manner that will guarantee that the state maintains at least a minimum of 150 wolves and 15 breeding pairs (MFWP, 2013). Since delisting, a hunting season for wolves has been implemented in Montana. The combined maximum hunting and trapping bag limit is five wolves per person during the 2015 season. In 2014, a minimum estimate of 122 wolves in 23 verified packs were documented in southwestern Montana in the Montana Portion of the Greater Yellowstone Experimental Area (GYA), 11 of which qualified as a breeding pair. This number of breeding pairs increased from five last year. This represents a 33% increase in the minimum count compared with 2013, which had 92 wolves. Five new packs were documented in 2014 (Bradley et al., 2015).

Gray wolves move seasonally following migrating ungulates within their territory. They disperse widely and exhibit no particular habitat preference except for the presence of native ungulates within its territory on a year-round basis. They are opportunistic carnivores that predominantly prey on large ungulates. Primary prey species in the SCW include deer, elk and moose. Alternative prey sources include rodents, vegetation and carrion as well as domestic livestock such as cattle and sheep. They commonly hunt in packs, but lone animals and pairs are able to kill prey as large as adult moose. They are territorial throughout the year and packs generally consist of a socially dominant pair, their offspring of the previous year, and new pups, although other breeding-age adults that may or may not be related to the alpha pair may also be present. Conflicts between wolves and livestock are an issue in the GYA. BLM administered land in SCW does not include any authorized sheep grazing. Livestock grazing permits will

be amended to make permittees aware that losses to livestock could occur from gray wolves. Including a stipulation in grazing permits that the permittee, agency personnel, and Montana FWP will jointly determine how to properly treat or dispose of livestock carcasses on BLM administered land would reduce the potential for attracting predators. Even with the introduction of hunting and trapping seasons in MT since de-listing, wolf populations have continued to increase. None of the alternatives proposed in this EA, including grazing management alternatives, are anticipated to impact the gray wolf population beyond the current situation.

Great Basin Pocket Mouse:
Great Basin pocket mouse habitat does occur in areas of the watershed, however this species has not been documented in the SCW since 1949 (MNHP, 2016b). Habitats in Montana are arid and sometimes sparsely vegetated, including grassland-shrubland with less than 40% cover, and landscapes with sandy soils. Other areas of its range include arid and semiarid habitats, including pine woodland, juniper-sagebrush scablands, sandy short-grass steppes, and shrubland covered with sagebrush, bitterbrush, greasewood, and rabbitbrush; heavily forested habitats are avoided. They usually are found in habitats with a higher percent of sand and are not found in areas with more clayey soils (MNHP, 2016a). Alternatives that work towards maintaining a mosaic of sagebrush cover and promote herbaceous and forb species within sagebrush habitat (a priority objective in this EA) will improve possible Great Basin pocket mouse habitat. Although the Great Basin pocket mouse has not been documented in the SCW in over 67 years, if by chance they are present, livestock grazing may impact individuals or habitat but none of the alternatives proposed in this EA are expected to reduce viability to the population or species, or lead to federal listing.

North American Wolverine:
In 2014 the United States Fish and Wildlife Service withdrew a proposal to list the North American wolverine in the contiguous United States as a Threatened species under the ESA (USDI, 2014b). Wolverines occur in coniferous montane forest types, preferring rugged, roadless, isolated habitats. Home range size in western Montana averages 150 mi^2 for females and 163 mi^2 for males (Foresman, 2012). Transient wolverines are more likely to occur at higher elevation forested habitat on the north side of Blacktail Ridge but limited suitable habitat is present within the analysis area and is not a sufficient size for supporting a female wolverine's natal territory. None of the alternatives proposed in this EA are expected to impact wolverines.

Pygmy Rabbit:
Sage Creek Watershed provides year-round pygmy rabbit habitat. Pygmy rabbits are found throughout the SCW in suitable sagebrush habitat. Pygmy rabbits are endemic to sagebrush habitat and require sagebrush for forage and cover, as well as deep alluvial soil to dig their burrows. Sagebrush comprises nearly 100% of their winter diet and over half of their summer diet. Pygmy rabbit populations in Montana are genetically linked to populations in Idaho, proving they are much more mobile than previously thought (Estes-Zumpf 2008). A recent study in the DFO (Camp et.al. 2014) concluded that the presence of cattle did not markedly influence properties of vegetation related to predation risk or integrity of burrow systems when grazing is permitted at sustainable levels. While individuals or habitat may be impacted, none of the alternatives are anticipated to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Fringed Myotis, Spotted Bat, and Townsend's Big-Eared Bat:
All three BLM sensitive species of bats are found in a variety of habitat types including desert shrublands, sagebrush-grassland, and woodland habitats. These species roost in caves, mines, rock crevices, buildings, and other protected sites (Foresman, 2012; MNHP, 2016a). None of these species have been documented in SCW. While their presence has not been documented, habitat does exist within SCW. None of the alternatives are expected to impact these three species.

Bald Eagle:
Bald eagles were down-listed from Endangered to Threatened in 1995, and delisted in 2007. The Montana Bald Eagle Management Plan and addendum (MBEWG 1994, MBEWG 2010) directs management of this species in the state. Currently, bald eagles continue to receive protection from the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act. In 1980, Montana had 31 known or suspected bald eagle territories. There were over 700 nesting pairs reported in 2014 (MBEWG, 2016). The specific population recovery objective for nesting bald eagles in Montana was 99 nesting pairs, which was reached in 1990. Nesting sites are generally located within larger forested areas near large lakes and rivers where nests are usually built in the tallest, oldest, large diameter trees. Nests are also commonly found in cottonwoods along rivers in the DFO. The majority of their diet is comprised of fish. Important prey for bald eagles includes waterfowl, especially in the winter, salmonids, suckers, whitefish, carrion and small mammals and birds. General objectives for bald eagle habitat management in Montana include: maintaining prey bases; maintaining forest stands currently used or suitable for nesting, roosting, and foraging; planning for future potential nesting, roosting, and foraging habitat; and minimizing disturbances from human activities in nest territories (MNHP, 2016a). None of the alternatives in this EA are expected to impact habitat or prey for bald eagles to the extent that would lead to federal listing.

Black-backed Woodpecker:
Black-backed woodpeckers inhabit early successional, burned forests of mixed conifer, lodgepole pine, Douglas-fir, and spruce-fir. Black-backed woodpeckers are highly responsive to forest fire and other processes, such as spruce budworm outbreaks, resulting in high concentrations of wood-boring insects invading dead trees. The burned forest habitat is lacking in the SCW, however wood-boring insect breakouts have occurred in the watershed, contributing potential black-backed woodpecker habitat. No alternatives are expected to impact black-backed woodpecker populations.

Brewer's Sparrow, Loggerhead Shrike, Sagebrush Sparrow, and Sage Thrasher:
The Brewer's sparrow, sagebrush sparrow, and sage thrasher utilize sagebrush habitats. The Brewer's sparrow mainly feeds on insects during the breeding season, and young are fed almost exclusively arthropods (Rotenberry et al. 1999). Foraging occurs primarily in shrubs. In central Montana, food volume was 71 to 81% animal (Coeopterans and Hemipterans) and 8 to 17% plant (grass seeds) (MNHP, 2016a). The sagebrush sparrow is found in Montana in localized populations in southwestern and south-central part of the state. They forage on insects and spiders as well as seeds, small fruits, and succulent vegetation. This inconspicuous sparrow is often overlooked because it spends much of its time running along the ground between shrubs, often with its tail raised in the air, oftentimes gleaning arthropods from the lower stems and leaves of shrubs (MNHP, 2016a). Sagebrush sparrow females build nests low in shrubs or occasionally on the ground. The sage thrasher also depends on sagebrush grassland habitat, like the previous two species discussed here. During the breeding season, sage thrashers mainly eat insects, with other arthropods and some plant material, as well as berries and small fruits if available (MNHP, 2016a). Like the sagebrush sparrow, the sage thrasher also primarily forages on the ground. Their nests are usually placed deep within or under big sagebrush or three-tip sagebrush. Loggerhead shrikes are associated with open

woodlands, and have also been documented nesting in sagebrush, bitterbrush, and greasewood. This highly territorial bird primarily forages on arthropods, amphibians, small to medium-sized reptiles, small mammals and birds (MNHP, 2016a). Loggerhead shrikes will impale their prey on sharp objects, including the barbs on barbed wire fences. Guidelines for sagebrush habitat found in the HAF would also provide for Brewer's sparrow, sagebrush sparrow, sage thrasher, and loggerhead shrike habitat. While individuals and habitat may be impacted, alternatives proposed in this EA are not likely to impact the viability of these species or lead to federal listing.

Burrowing Owl:
Burrowing owls are found in open grasslands characterized by sparse vegetation and bare ground where abandoned burrows dug by mammals such as ground squirrels, prairie dogs and badgers are available. They are not known to excavate their own burrows, but existing burrows may be enlarged or modified making them more suitable. There are no prairie dog colonies in the SCW, but badger, ground squirrel and pygmy rabbit burrows are prevalent. Although they provide burrows, badgers are a major predator of burrowing owls. Burrowing owls in this area are thought to be migrants. Habitat is limited in SCW, with open grassland making up only 2% of the overall watershed. Burrowing owls in the northern part of its range migrate to Mexico and Central America. They are opportunistic feeders with a varied diet dependent upon the time of year with invertebrates comprising the majority of their diet in most areas, but small mammals, amphibians, reptiles, and birds may also be consumed. The alternatives in this EA are not expected to have any effect on burrowing mammals that provide nesting habitat for burrowing owls and grassland habitat is not expected to change. None of the alternatives in this EA would impact burrowing owls or lead to Federal listing.

Ferruginous Hawk:
Ferruginous hawks that breed in Montana are migratory. Fall migration begins in August through early September. Young birds will migrate south earlier than, and independent of, adults. Restani (1991) reported most ferruginous hawks return to the Centennial Valley, which is south of SCW, in April and May. Ferruginous hawks construct nests on the ground on hill slopes or crests, on rocky outcrops and cliffs, and in trees and shrubs (usually mountain mahogany and juniper in the DFO). Nests are largely made with sagebrush stems and lined with cow dung, sod, and bark that the female strips from trees. According to the North American Breeding Bird Survey, ferruginous hawk numbers are stable or slightly increasing (Cornell Lab of Ornithology, 2016). Possible threats to ferruginous hawks include reduction in prey, competition from other hawks (mainly Swainson's and red-tailed hawks), loss of prairie habitat, nest site disturbance, or impacts in wintering areas. In southwestern Montana, primary prey includes ground squirrels, passerines, grasshoppers, and voles (Restani 1991). Vulnerability of prey is an important factor in ferruginous hawk habitat suitability. Ferruginous hawks avoid dense vegetation that reduces their ability to see prey (MNHP, 2016a). None of the alternatives are expected to reduce prey availability or habitat, including nesting habitat, for ferruginous hawks in SCW that would lead to federal listing or loss of population or species viability.

Flammulated Owl:
In the northern part of their range flammulated owls are a Neotropical migrant arriving in late April-early May and departing by October. Flammulated owls are obligate cavity nesters and prefer mature open canopy ponderosa pine and Douglas-fir forests but have also been documented using cavities in pure aspen stands. No food habit data exists for flammulated owls in Montana, however information gathered from other areas of the species' range indicate flammulated owls mainly hunt at night foraging on nocturnal arthropod prey along the interface between forest or woodland and grassland. Most studies have shown that flammulated owls have a preference of ponderosa pine and although they have not been

documented in the SCW, they have been documented using Douglas-fir in other watersheds in the DFO. The alternatives in this EA are not expected to impact this species.

Golden Eagle:
Golden eagles are protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act. Some golden eagles remain in Montana year-round, but vertical migration from mountains to valleys occurs in the winter. They generally nest on cliffs when available, or in large trees associated with sagebrush/grassland. This open shrub/grassland is used for hunting jackrabbits, ground squirrels, and carrion. They occasionally prey on deer and pronghorn (mostly fawns), waterfowl, grouse, weasels, skunks, and other animals. Management of healthy golden eagle populations requires maintaining prey habitat where eagles forage. This involves sustaining native grasslands and shrub-steppe landscapes which are the prime habitats for jack rabbits. Shooting and poisoning from the ingestion of lead fragments in carrion that have been shot with lead bullets are the primary threats to golden eagles in SCW. Golden eagles are regularly observed in the SCW, with a couple of known nesting sites. None of the alternatives in this EA are expected to impact golden eagle nesting habitat or prey abundance.

Great Gray Owl:
Great gray owls are a resident species in Montana, both during the breeding season and in winter. During periods of low prey abundance and/or large snowfalls birds may move from higher to lower altitudes within the state. Also, birds from Canada may move into the state during winter for similar reasons (MNHP, 2016a). They inhabit a wide range of habitats and elevations, preferring mature coniferous and deciduous forests near meadows. Great gray owls do not build their own nests. Nest sites include large, broken-top trees, debris platforms from dwarf mistletoe, and stick nests from other raptors. Great gray owls prefer natural forest openings such as meadows, bogs, and fens for foraging as well as subclimax, old-growth, selectively logged, and small clear-cut forests. They usually forage in open areas where scattered trees or forest margins provide suitable sites for visual searching and perching. Their main prey is small mammals, especially rodents, such as voles. The mature forest habitat that great gray owls prefer is limited in the SCW, composing about 2% of the watershed's acreage. None of the alternatives proposed in this EA are expected to impact the great gray owl population.

Greater Sage Grouse:
BLM administered lands in the SCW provide year-round sage grouse habitat. There are over 171,230 acres of sage grouse priority habitat management area (PHMA) in the SCW, making up 84% of the total watershed acreage and 82% of BLM administered acres. There are over 38,881 acres of sage grouse general habitat management area (GHMA) in the watershed, which is 19% of the total and 17% of the BLM administered acreage in SCW. Important sage grouse seasonal habitat is centered on breeding and winter complexes. Sagebrush is an important habitat component for sage grouse. It comprises nearly 100% of sage grouse winter diets and provides thermal, hiding, and nesting cover. Broods require a high protein diet of forbs and insects, usually found in riparian habitats. Sage grouse typically nest within 2-3 miles of leks. There are at least seven active leks within the watershed. Numbers of male sage grouse attending leks are relatively stable on these leks, with higher than average counts on a couple of the leks in 2016. Birds may also move to other leks in close proximity. Other leks are considered unconfirmed, with insufficient data to classify them as an active lek. Two of these unconfirmed leks have never had documentation of displaying males. Activity has been documented in 2016 at two other unconfirmed leks. Additional seasons of monitoring are required to determine the status. An effort to locate new leks and confirm activity at unconfirmed leks, in coordination with Montana Fish, Wildlife and Parks (MFWP) is ongoing in the watershed and throughout the DFO.

The DFO radio-collared sage grouse throughout the Field Office from 1999-2012. Based on the telemetry data gathered, sage grouse captured from leks within the SCW, Centennial Valley, and Sweetwater winter in the SCW, mainly in the Sage Creek allotment as well as the Armstead Mountain and Mayberry allotments.

Maintaining the integrity of all seral stages of sagebrush habitats on public lands is important for sage grouse viability. "Suitable" seasonal sagebrush cover and height objectives for sage grouse are 15-25% cover and 12-31 inches (arid sites) or 16-31 inches (mesic sites) for nesting/early brood-rearing, 10-25% cover and 16-32 inches for late brood-rearing/summer, and ≥10% cover and ≥ 10 inches for winter habitat (USDI, 2015). Habitat plots were completed during the 2015 brood-rearing season, within three miles of leks in SCW. Average shrub cover was slightly higher (32%) than the 15-25% range for nesting/early brood-rearing, and average sagebrush height was 23.2 inches. The perennial grass cover objective for breeding habitat is ≥10% on arid sites and ≥15% on mesic sites, with a height objective of ≥ 7 inches. Perennial forb cover objectives for breeding habitat are ≥5% on arid sites and ≥10% on mesic sites (USDI, 2015). The average perennial grass and forb cover combined for these plots was 71% and an average height of 10.9 inches, meeting perennial grass and forb nesting/early brood-rearing habitat objectives. The canopy cover and heights of shrubs and herbaceous vegetation is highly variable based on species composition and soil types.

Under Alternative A, current conditions would largely be maintained, and the quality and quantity of sage grouse brood rearing habitat may be reduced on the two allotments (Gallagher Mountain AMP and Mayberry) that didn't meet riparian standards. The Dell allotment didn't meet upland standards and is within a GHMA. This 40 acre allotment doesn't contain much, if any, sagebrush, greatly limiting the amount of use this allotment receives from sage grouse. Under Alternative A, the lack of vegetative diversity would be maintained. Livestock grazing impacts under Alternative B and C may reduce herbaceous and forb cover and add disturbance to sage grouse. While individuals and habitat may be affected, none of the alternatives proposed in this EA would result in a loss of viability to the population or species, and wouldn't lead to federal listing.

<u>Lewis's Woodpecker:</u>
Lewis's Woodpecker breeding habitat includes open forest and woodland, often logged or burned, including coniferous forest; primarily ponderosa pine (*Pinus ponderosa*), riparian woodland and orchards, and less commonly in pinyon-juniper. Important habitat features include an open tree canopy, a brushy understory with ground cover, dead trees for nest cavities, dead or downed woody debris, perch sites, and abundant insects. Unlike other woodpeckers, Lewis's Woodpeckers are not morphologically well adapted to excavate cavities in hard wood. They tend to nest in a natural cavity, abandoned Northern Flicker (*Colaptes auratus*) hole, or previously used cavity. Lewis's Woodpeckers feed on adult emergent insects (e.g., ants, beetles, flies, grasshoppers, tent caterpillars, mayflies) in summer, and ripe fruit and nuts in fall and winter. They are opportunistic and may respond to insect outbreaks and grasshopper swarms by increasing breeding densities. Unlike other woodpeckers, the Lewis's Woodpecker does not bore for insects but will flycatch and glean insects from tree branches or trunks; they also drop from a perch to capture insects on the ground (MNHP, 2016a). Specific needs of the Lewis's Woodpecker at the microsite and site level could be met in the form of interspersed zones of shrubby understory within the overall habitat mosaic (Casey, 2000). Using dead aspen and conifers within aspen stands to build browse barriers for the aspen protection/restoration treatments would move trees that Lewis' woodpecker may potentially feed on. These impacts are very minimal, if even existent, and wouldn't cause a loss of viability to the population or species.

Long-billed Curlew:
Long-billed curlew populations have declined throughout much of their range (Casey, 2013). The DFO is participating in spring curlew survey efforts organized by MFWP. The long-billed curlew is migratory and arrives in Montana in mid-April. Breeding habitat includes mixed grass prairie habitats and moist meadows, preferring to nest in open, short-statured grasslands and avoiding trees, dense shrubs, or tall, dense grasses (MNHP, 2016a). Curlews are opportunistic foragers, feeding primarily on invertebrates and small vertebrates such as bird eggs and nestlings, foraging in open prairie grasslands and meadows, at the edges of prairie ponds and sloughs (Dugger and Dugger 2002). Virtually all studies have indicated that relatively short graminoid vegetation is among the key habitat variables selected by nesting curlews (Casey, 2013.) Livestock grazing, particularly early season grazing, typically has a positive benefit on nesting long-billed curlews, although year-round grazing can be detrimental (Dugger and Dugger, 2002.) Improving riparian habitat would improve foraging conditions and hiding cover for brood rearing. The alternatives in this EA would not reduce population or species viability.

McCown's Longspur:
The McCown's longspur is migratory in Montana, arriving in late April to mid-May and leaving in September. Nesting habitat is characteristically open with sparse vegetation on semi-arid shortgrass steppe, structurally similar to habitats like overgrazed pastures (With 2010). Grazing may actually benefit McCown's longspur. Threats to this species include habitat disruptions like plowing, pesticide use, and suppression of grassland fires that maintain shortgrass prairie (With 2010). McCown's longspur primarily eat grass and forb seeds, insects, and other arthropods. None of the alternatives in this EA would impact McCown's longspur that would lead to loss of population viability.

Peregrine Falcon:
Peregrine falcons are migratory in Montana and arrive to breeding areas in late April to early May; departure begins late August-early September. The peregrine falcon was delisted from the list of Endangered and Threatened Species in 1999. Peregrine falcons feed primarily on birds, mostly medium-size passerines up to small waterfowl as well as sage grouse. They have occasionally been reported to prey on small mammals (e.g., bats, lemmings), lizards, fish, or insects. Nests typically are situated on ledges of vertical cliffs, often with a sheltering overhang. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. There are no known eyries in SCW. None of the alternatives in this EA would impact peregrine falcons that would lead to federal listing.

Veery:
Veery are summer migrants that breed in moist, low elevation deciduous forests with a dense understory. They are also found in very thick and wide willow or alder shrub riparian habitat near water. Veerys feed on insects, fruit, and spiders. They mostly feed on the ground, swoop from a perch to the ground to capture prey, foliage glean, and occasionally grab insects from the air. Veery are a fairly common host for cowbird parasitism, making them vulnerable to landscape changes and disturbances (Casey, 2000). Over grazing can lead to an increase in cowbirds which in turn leads to increased parasitism. All of the grazing AMP's are managed for moderate grazing and would not have a significant impact. Managing or improving the riparian habitat to meet PFC and increase riparian woody regeneration would be beneficial. Under the No Action alternative, wildlife habitat in allotments that didn't meet riparian/wetland standards would continue to be affected by reduced vegetative and woody cover, vegetative species composition, and structural diversity, which may impact individuals or habitat, but would not lead to federal listing or a loss of population or species viability.

Western Toad:
Western toad habitat includes low elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes, to high elevation ponds, fens, and tarns at or near treeline (MNHP, 2016a). Western toads may wander miles from breeding sites through coniferous forests and subalpine meadows, lakes, ponds, and marshes (Werner et al. 2004). They are active between April and October, with adult's diets consisting of flies, ants, and sometimes smaller individuals of their own species. They breed in any clean standing water, with mating season between May and July. While no breeding sites have been identified on BLM administered land within SCW, breeding habitat probably occurs within the allotments with various springs, and wetlands. Reduced access by livestock to breeding sites within grazing allotments can prevent undue trampling mortality. Maintaining existing and constructing new livestock exclosures to improve riparian habitat can benefit breeding populations. While individuals and habitat may be impacted, impacts would not contribute to federal listing or cause a loss of viability to the population or species.

Westslope Cutthroat Trout:
Westslope Cutthroat trout (WCT) are found in several streams within the Sage Creek Basin. The populations in Little Basin and East Creek would be effected by proposals within this document. The management changes proposed, would have a beneficial effect to these populations through sediment reduction and improvements to riparian habitat adjacent to these streams. None of the alternatives are likely to cause a loss of viability to the these populations.

LITERATURE CITED

Bradley, L., J. Gude, N. Lance, K. Laudon, A. Messer, A. Nelson, G. Pauley, M. Ross, T. Smucker, J. Steuber, and J. Vore. 2015. Montana Gray Wolf Conservation and Management. 2014 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 60pp.

Camp, M.J. J. Rachlow, L. Shipley, T. Johnson, and K. Bockting. 2014. Grazing in Sagebrush Rangelands in Western North America: Implications for Habitat Quality for a Sagebrush Specialist, the Pygmy Rabbit. The Rangeland Journal 36:151-159.

Casey, D. 2000. Partners in Flight Draft Bird Conservation Plan Montana. Version 1.0. 287 pp.

Casey, D. 2013. Conservation Strategies for the Long-billed Curlew. American Bird Conservancy, Kalispell, MT. 35pp.

Cornell Lab of Ornithology. 2016. All About Birds. Ferruginous Hawk. Available: https://www.allaboutbirds.org/guide/Ferruginous_Hawk/lifehistory#top. *Accessed February 2, 2016*.

Dugger, B. D. and K. M. Dugger. 2002. Long-billed Curlew (Numenius americanus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/628

Estes-Zumpf, W.A. 2008. Dispersal and Gene Flow Among Pygmy Rabbit (*Brachylagus idahoensis*) Populations In Idaho and Southwestern Montana. Dissertation in the College of Graduate Studies at University of Idaho, Moscow, ID.

Foresman, K.R. 2012. Mammals of Montana. Mountain Press Publishing Company, Missoula, Montana.

Haroldson, M.A., F.T. van Manen, and D.D. Bjornlie. 2014. Estimating Number of Females with Cubs. Pages 11-20 *in* F.T. van Manen, M.A. Haroldson, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana, USA.

Interagency Grizzly Bear Study Team. 2014. Grizzly Bear Recovery Zone (*alias Primary Conservation Area*). Found at: http://www.nrmsc.usgs.gov/files/norock/IGBST/Web_Map_Files/Grizzly_Bear_Recovery_Zone.pdf. *Accessed November 16, 2015*.

Interagency Grizzly Bear Study Team. 2016. Interagency Grizzly Bear Study Team- Boundary Map. Found at: http://www.nrmsc.usgs.gov/science/igbst/maps/boundary. *Accessed March 31, 2016*.

MBEWG. 1994. Montana Bald Eagle Working Group. Montana bald eagle management plan. 2nd edition. Bureau of Reclamation. 104 pp. http://www.fws.gov/montanafieldoffice/Endangered_Species/Recovery_and_Mgmt_Plans/Montana_Bald_Eagle_mgmt_plan.pdf

MBEWG. 2010. Montana Bald Eagle Working Group. Montana bald eagle management guidelines: An addendum to Montana Bald Eagle Management Plan, 1994. Montana Fish, Wildlife & Parks, Helena, MT. 13 pp. http://fwp.mt.gov/fishAndWildlife/species/delisted/baldEagle.html

MBEWG. 2016. Montana Bald Eagle Working Group. Bald eagle nesting populations and nest monitoring, 1980-2014. Final Report. Montana Fish, Wildlife & Parks. 27 pp.

MFWP. 2013. Montana Fish, Wildlife, and Parks. FWP Fact Sheet: Congress Delists Montana Wolf Population. Available at http://fwp.mt.gov/fishAndWildlife/management/wolf/ . [Accessed 12 December, 2013].

MNHP (Montana Natural Heritage Program). 2016a. Montana Field Guide. Available at http://fielduide.mt.gov. [2015, November].

MNHP (Montana Natural Heritage Program). 2016b. Natural Heritage Map Viewer. Available at http://mtnhp.org/mapviewer/. [2015, November].

Restani, M. 1991. Resource partitioning among three *Buteo* species in the Centennial Valley, Montana. Condor 93:1007-1010.

Rotenberry, J. T., M. A. Patten and K. L. Preston. 1999. Brewer's sparrow (*Spizella breweri*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires, tech. eds. 2000. Ecology and conservation of lynx in the United States. University Press of Colorado. Boulder, CO. 480 p.

Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds. 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

USDI. 2003. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; notice of remanded determination of status for the contiguous United States distinct population segment of the Canada lynx; clarifications of findings; final rule. 50 CFR Part 17. *Federal Register* Vol. 68, No. 128. pp 40076-40101.

USDI. 2014a. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous U. S. Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary. Federal Register 50 CFR Part 17.

USDI. 2014b. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States; Establishment of a Nonessential Experimental Population of the North American Wolverine in Colorado, Wyoming, and New Mexico; Proposed Rule. Federal Register 50 CFR Part 17.

USDI. 2015. Bureau of Land Management. Idaho and Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment.

USDI. 2016. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears From the Federal List of Endangered and Threatened Wildlife. Federal Register 50 CFR Part 17. Docket No. FWS–R6–ES–2016–0042.

Werner, J.K., B. Maxell, P. Hendricks and D. Flath; 2004. Amphibians and Reptiles of Montana. Mountain Press Publishing Company, Missoula, Montana.

With, K.A. 2010. McCown's Longspur (*Rhynchophanes mccownii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/096

Appendix D- Sage Creek Watershed Biological Evaluation for Special Status Plants

Biological Evaluation for
Special Status Plants on BLM Lands in the Sage Creek Watershed
(Sage Creek Watershed Environmental Assessment)
DOI-BLM-MT-B050-2016-0008-EA

Prepared by
Kelly Savage, Rangeland Management Specialist/TES Plants
May 2016

None of the plants currently listed as endangered or threatened under the Endangered Species Act inhabit BLM lands in the Dillon Field Office. However, Ute ladies' tresses, which is listed as threatened in Montana, is known to occur on private and state lands in Beaverhead, Madison, Gallatin, and Jefferson counties. Thirteen sensitive plant species inhabit BLM-administered lands within the Dillon Field Office. Three of those species are known to occur within the Cumulative Impact Area of the Sage Creek Watershed (SCW) Environmental Assessment. One of the three sensitive plant species is whitebark pine which is discussed in section 3.2.5. The potential effects that the various alternatives may have on these species are summarized in the following table. A detailed discussion of predicted effects and potential impacts to special status plant species and their habitat is provided in the attached "Supplemental Information on Special Status Plants on BLM Lands in the Sage Creek Watershed."

Definitions of Abbreviations used in the Table.

NI - No Impact

BI - Beneficial impact to populations or habitat

MIIH - May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

* **WIFV** - Will impact individuals or habitat with a consequence that the action may contribute to a trend toward federal listing or cause a loss of viability to the population or species.

* Consultation with the U.S. Fish and Wildlife Service will be initiated if an alternative is selected that may contribute to a loss of viability to a population of species reviewed in this evaluation.

Biological Evaluation Summary for Special Status Plants for the Sage Creek Watershed Environmental Assessment (DOI-BLM-MT-B050-2016-0008-EA)

Common Name *Genus species*	Does the species occur on Public Lands within the Centennial Watershed?	Is the species or its habitat found in the Cumulative Impact Area?	Are irreversible or irretrievable resources involved?	What effect could this proposal have? *		
				Alt. A	Alt. B	Alt. C
Ute ladies' tresses *Spiranthes diluvialis*	NO	NO	--	--		
Cusick's horse-mint *Agastache cusickii*	NO	NO	--	--		
Sapphire rockcress *Arabis fecunda*	NO	NO	--	--		
Painted milkvetch *Astragalus ceramicus var. apus*	NO	NO	--	--		
Bitterroot milkvetch *Astragalus scaphoides*	NO	NO	--	--		
Railhead milkvetch *Astragalus terminalis*	NO	NO	--	--		
Idaho sedge *Carex idahoa*	YES	YES	NO	NI		
Fendler cat's-eye *Cryptantha fendleri*	NO	NO	--	--		
Beautiful bladderpod *Lesquerella pulchella*	NO	NO	--	--		
Sand wildrye *Leymus flavescens*	NO	NO	--	--		
Alkali primrose *Primula alcalina*	NO	NO	--	--		
Silver chicken sage *Sphaeromeria argentea*	YES	YES	NO	NI		

* The livestock management and project proposals are not consistent across alternatives. For example, the season of use for one allotment under Alternative B may not be the same as the season of use for another allotment under the same alternative. For the purposes of this biological evaluation if a proposed grazing treatment (numbers, duration, time of year, frequency of rest), project or vegetative treatment within a given alternative is likely to adversely affect a sensitive plant or its habitat, then that effect is reflected in the table.

Supplemental Information on Special Status Plants on BLM Lands in the Sage Creek Watershed

The Dillon Resource Management Plan, as amended provides guidance that requires project sites in high probability habitats to be surveyed for sensitive plants prior to any ground disturbing activities. This reduces the possibility that sensitive plant species would be accidentally or inadvertently impacted by BLM activities.

No impacts from any of the three alternatives considered in the EA are anticipated for silver chicken sage or Idaho sedge.

Silver chicken sage inhabits sagebrush steppe habitats. The known populations of this plant species, in the SCW, face no anthropogenic threats. They appear to tolerate and may benefit from disturbances that reduce competition such as livestock grazing.

Idaho sedge (*Carex idahoa*) is found in a couple different riparian habitat locations throughout the SCW. It is found in wet to moist alkaline meadows, is palatable, and sensitive to intensive grazing, especially during spring and early summer. Repeated herbivory, particularly between mid-May and mid-July may lead to population declines. Rest-rotation grazing regimes may allow enough recruitment to maintain stable populations of these palatable sensitive plants. The current grazing management is a rest-rotation grazing system and there will be no changes to with plan. The riparian areas that this species inhabits are in proper functioning condition. No impacts to know populations of this species or their habitat are anticipated with any of the proposed alternatives.

During the summer of 2010, the U.S. Fish and Wildlife Service announced a 90-day finding on a petition to list whitebark pine (*Pinus albicaulis*) as endangered or threatened and to designate critical habitat. In July of 2011, the finding was released; whitebark was given a warranted but precluded listing with a priority of 2 and is currently on the candidate species list (For a complete description of whitebark pine in the SCW see Forest and Woodland Habitat section 3.2.5).

Cumulative Considerations:
High probability habitats will be surveyed for sensitive plants prior to any ground disturbing activities on federal land but botanical surveys aren't required on private and state lands even on cooperative projects (e.g. a pipeline that crosses multiple ownerships). It's possible that sensitive plant species could be accidentally or inadvertently impacted by construction or placement of range improvement projects on non-federal lands.

The invasion of introduced species and noxious weeds near and into special plant species habitat across all ownerships poses a direct threat to these plants through competition, habitat degradation and the potential impact of herbicides. The use of insecticides on private lands within the BSCW to control grasshoppers or other insects may affect pollinators that visit sensitive plant species on BLM lands.

Kelly Savage	5/20/2016
Signature	Date

Printed Name and Title: Kelly Savage, Rangeland Management Specialist/TES Plants

References:

Heidel, B.L. 1998. Conservation status of *Spiranthes diluvialis* Sheviak in Montana. Unpublished report to U.S. Fish and Wildlife Service. Montana Natural Heritage Program, Helena. 55 pp. + app.

Heidel, B.L., and J. Vanderhorst. 1996. Sensitive plant surveys in Beaverhead and Madison counties, MT. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena, MT.

Lesica, P. 2003. Conserving Globally Rare Plants on Lands Administered by the Dillon Office of the Bureau of Land Management. Report to the Bureau of Land Management, Dillon Office. Montana Natural Heritage Program, Helena, MT.

Montana Natural Heritage Program (MNHP). 2015. Montana Rare Plant Field Guide. (Available online at http://mtnhp.org/SpeciesOfConcern/Default.aspx)

United States Department of the Interior, Bureau of Land Management, Dillon Field Office. 2014. Montana BLM Sensitive Plant Species Found on or Near BLM Lands Administered by the Dillon Field Office. List prepared for the Dillon Field Office based on Instruction Memorandum No. MT-2014-0

Appendix E- Dominant Native Grasses in Sage Creek Watershed

Appendix E. Dominant Native Grasses in Sage Creek Watershed

Bluebunch wheatgrass. (*Elymus spicatus*)

Cool-season, Native, Perennial, bunchgrass.

Physical Characteristics: Bluebunch wheatgrass's growth habit is cespitose and usually bunches up to at the base. It ranges in height from 12 to 48 inches in height pending soil productivity and seasonal precipitation (USDA 2012). Most plants growing on BLM administered lands in the Sage Creek Watershed are in the 12 to 30 inch range.

Uses: Bluebunch wheatgrass is palatable to all classes of livestock and wildlife. It is preferred forage for cattle and horses year-round (USDA 2012).

Management: Bluebunch wheatgrass growth begins in April and plants stay green well into the summer. It is very drought resistant, persistent and adapted to stabilization of disturbed sites. It does not compete well with aggressive introduced grasses. It is well suited for areas receiving 12 to 20 inches of annual precipitation (USDA 2012).

Idaho Fescue. (*Festuca idahoensis*)

Cool-season, Native, Perennial, bunch grass.

Physical Characteristics: Idaho Fescue's growth habit is cespitose with leaves mostly basil (Stubbendieck 2011). It ranges in height from about one to three feet pending soil productivity and seasonal precipitation (Ogle 2000). Most plants growing on BLM administered lands Sage Creek Watershed are in the 12 to 24 inch range.

Uses: Idaho fescue provides fair to good forage for all types of domesticated livestock (Ogle 2000). It is good year-around forage for elk and is grazed in the spring by deer. It seneses later in the growing season and as a result can provide good forage for late season grazing.

Management: Idaho fescue is susceptible to overgrazing. Idaho fescue should be rested during the growing season once every three or four years to promote health plants (Ogle 2000). Bluebunch wheatgrass is very drought resistant, persistent and adapted to stabilization of disturbed sites. It does not compete well with aggressive introduced grasses. It is well suited for areas receiving 14 to 20 inches of annual precipitation (Ogle 2000).

Needle-and-threadgrass. (*Hesperostipa comata*)

Cool-season, Native, Perennial bunchgrass

Physical Characteristics: Needle-and-Thread growth habit is densely cespitose with most leaves basil. It ranges in height from 12 to 48 inch range pending soil productivity and seasonal

precipitation (Ogle 2006). Most plants growing on BLM administered lands in Sage Creek Watershed are in the 12 to 36 inch range.

Uses: Needle-and-Thread is considered good forage in the spring prior to awn development and again in the fall after seed is shattered. The long awns may injure livestock. It can provide good fall and winter forage. It is most common in 7-16" precipitation zones (Ogle 2006).

Management: Needle-and-thread is an important plant in a wide variety of plant communities throughout the United States. It is very drought tolerant.

Basin wildrye (*Leymus cinereus*)

Cool-season, Native, Perennial, bunchgrass

Physical Characteristics: Basin wildrye growth is cespitose. It ranges from three to six feet in height but can reach up to 10 feet in ideal growing condition (Ogle 2000, Stubbendieck 2011). Most plants growing on BLM administered lands in Sage Creek Watershed are in the 3 to 6 foot range.

Uses: Basin wildrye is considered good spring forage for cattle and fair spring forage for sheep. It becomes unpalatable in early summer and its forage has little value to domestic livestock and elk starting in early summer and going the rest of the year.

Management: Basin wildrye is a high forage producer but the forage value has a narrow spring window when the plant is palatable. It is generally not tolerant of heavy spring grazing because its growing points are relatively high (10-15 cm above the ground) and the plant can be damaged

(Ogle 2000, Stubbendieck 2011) . Because of its high stature, it provides excellent cover and nesting for birds and small animals. It is very hardy to drought.

Literature Review

Ogle, D.G. USDA, NRCS Plant Guide. 2000. Basin Wildrye. Idaho State Office, Boise, Idaho. Pp 1-4.

Ogle, D.G. USDA, NRCS Plant Guide. 2000. Idaho Fescue. Idaho State Office, Boise, Idaho. Pp 1-5.

Ogle, D.G. USDA, NRCS Plant Guide. 2006. Needle-and-Thread. Idaho State Office, Boise, Idaho. Pp1-4.

Release Brochure for 'Goldar' Bluebunch Wheatgrass (Pseudoroegneria spicata). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210. Published December 2012.

Stebbendieck, James, S.L. Hatch, and N.M. Bryan. North American Wildland Plants. 2011. Board of Regents of the University of Nebraska. Pp 165, 174, 194, 203