



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

Draft Resource Management Plan and Environmental Impact Statement

Missoula Field Office



Estimated agency total costs
associated with developing and
producing this EIS: \$2.7 million

The Bureau of Land Management is responsible for the stewardship of our public lands. The BLM's mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/MT/PL-19/002+1610

Draft Resource Management Plan and Draft Environmental Impact Statement – Volume I For the Missoula Field Office

May 2019

Lead Agency: Bureau of Land Management

Responsible Official: Montana/Dakotas State Director

For Information Contact: Maggie Ward, RMP Team Leader

Missoula Field Office
3255 Fort Missoula Road
Missoula, MT 59804-7204

(406) 329-3914

<https://go.usa.gov/xmyyG>

This page intentionally left blank

Table of Contents

Table of Contents.....	ii
List of Tables.....	vii
List of Figures.....	x
Executive Summary	1
1.1 Purpose and Need	1
1.2 Decision from this plan	2
1.3 Planning Issues and Concerns.....	2
1.4 Overview of the Alternatives	3
Alternative A – No-action Alternative.....	3
Alternative B – Preferred Alternative	4
Alternative C	4
1.5 Overview of Environmental Consequences.....	5
Vegetative communities.	5
Aquatics and Terrestrial Wildlife.....	6
Resources Uses	7
Special Designations.....	9
Economics	10
1.6 Public Involvement, Consultation, and Coordination	10
Chapter 1. Introduction	13
1.1 Planning Area	13
1.2 Purpose and Need for the Plan.....	17
1.3 Decision to be made	17
1.4 Issues and Concerns.....	18
1.5 Issues Considered but Not Further Analyzed	19
1.6 Planning Criteria.....	20

<i>1.7 Major Laws, Policies, and Plans.....</i>	<i>21</i>
<i>1.8 Relationship to other BLM Policies, Plans, and Programs</i>	<i>21</i>
Chapter 2. Alternatives	23
<i>2.1 Features Common to Action Alternatives.....</i>	<i>23</i>
<i>2.2 No-action Alternative (Alternative A).....</i>	<i>24</i>
<i>2.3 Features common to Alternatives B and C</i>	<i>27</i>
Air Quality	28
Aquatic Habitat and Special Status Species	28
Cave and Karst Resources	30
Cultural and Heritage Resources	31
Forest Vegetation and Special Status Plant Species	32
Noxious and Invasive Plant Species	33
Paleontological Resources	34
Grassland and Shrubland Vegetation	35
Soil, Water, and Riparian-Wetlands.....	35
Wildlife Habitat and Special Status Species	37
Visual Resources	41
Wildland Fire Management	42
Minerals	44
Forest Products	44
Livestock Grazing	46
Recreation and Visitor Services	46
Travel and Transportation Management	47
Withdrawals and Other Segregations.....	49
Land Tenure	49
Access.....	51
Land Use Authorizations	51

Roads and Facilities	52
Areas of Critical Environmental Concern	53
National Trails	54
Wild and Scenic Rivers	55
Wilderness Study Areas	55
Public Safety: Abandoned Mines	55
Tribal Interests	56
<i>2.4 Alternative B (Preferred Alternative).....</i>	<i>56</i>
Vegetation and Habitat Management	57
Key Resource Uses	59
Special Designations and Lands with Wilderness Characteristics.....	61
<i>2.5 Alternative C.....</i>	<i>62</i>
Vegetation and Habitat Management	63
Key Resource Uses	66
Special Designations and Lands with Wilderness Characteristics.....	68
<i>2.6 Alternatives Considered but Not Analyzed in Detail.....</i>	<i>69</i>
Theodore Roosevelt Conservation Partnership proposal	69
Close Entire Decision Area to Livestock Grazing	69
<i>2.7 Comparison of Alternatives and Environmental Consequences</i>	<i>70</i>
Chapter 3. Affected Environment and Environmental Consequences	77
<i>3.1 Introduction.....</i>	<i>77</i>
Scope of the Analysis	77
Geographic and Temporal scales.....	77
Incomplete or unavailable information	77
<i>3.2 Vegetation Communities.....</i>	<i>78</i>
3.2.1 Affected Environment.....	78
3.2.2 Environmental Consequences: Forest Vegetation	101

3.2.3 Environmental Consequences: Wildland Fire Management.....	110
3.2.4 Environmental Consequences: Grassland and Shrublands.....	118
<i>3.3 Resources.....</i>	<i>125</i>
3.3.1 Air Quality	125
3.3.2 Aquatic Habitat and Special Status Species	133
3.3.3 Soil, Water, Riparian Resources	157
3.3.4 Cave and Karst Resources	171
3.3.5 Cultural and Heritage Resources.....	172
3.3.6 Lands with Wilderness Characteristics.....	178
3.3.7 Visual Resources	180
3.3.8 Wildlife Habitat and Special Status Species	184
3.3.9 Paleontological Resources	216
<i>3.4 Resource Uses.....</i>	<i>218</i>
3.4.1 Recreation and Visitor Services.....	218
3.4.2 Travel and Transportation Management.....	224
3.4.3 Livestock Grazing	226
3.4.4 Energy and Minerals	234
3.4.5 Forest Products	238
3.4.6 Withdrawals.....	243
<i>3.5 Lands and Realty</i>	<i>245</i>
3.5.1 Land Tenure	245
3.5.2 Access.....	245
3.5.3 Land Use Authorizations	246
<i>3.6 Special Designations.....</i>	<i>249</i>
3.6.1 Areas of Critical Environmental Concern	249
3.6.2 Backcountry Byways	253
3.6.3 National Trails	254

3.6.4 Wild and Scenic Rivers	257
3.6.5 Wilderness Study Areas	259
3.7 <i>Social and Economic Conditions Including Environmental Justice</i>	263
Key Points	263
Indicators	263
Geographic and Temporal scales	264
Analytical Methods and Assumptions.....	264
Affected Environment.....	265
Environmental Consequences	268
3.8 <i>Public Safety: Abandoned Mines</i>	276
3.9 <i>Tribal Interests</i>	277
Affected Environment.....	277
Environmental Consequences	277
Chapter 4. Collaboration, Consultation, and Public Involvement	279
4.1 <i>Tribal Consultation</i>	279
4.2 <i>Cooperating Agencies</i>	279
4.3 <i>USFWS Consultation</i>	279
4.4 <i>Public Involvement</i>	279
4.5 <i>Congressional Outreach</i>	280
Glossary	281
List of References.....	311
Abbreviations and Acronyms	326
Appendices	328

See Volume II for the following appendices:

Appendix A. Air Quality and Climate	A-1
Appendix B. Aquatic and Riparian Habitat Conservation Strategy	B-1
Appendix C. Forest Vegetation	C-1
Appendix D. Impaired Waters	D-1
Appendix E. Locatable Minerals Reasonable Foreseeable Development Scenario	E-1
Appendix F. Major Laws	F-1
Appendix G. Wild and Scenic River Suitability Report.....	G-1
Appendix H. Maps	H-1
Appendix I. Noxious and Invasive Species List	I-1
Appendix J. Post-Wildfire Emergency Stabilization and Rehabilitation Procedures.....	J-1
Appendix K. Probable Sale Quantity Determinations and Calculations.....	K-1
Appendix L. Recreation Management Areas.....	L-1
Appendix M. Socioeconomic Report.....	M-1
Appendix N. Summary of No-action Alternative Management	N-1
Appendix O. Supplemental Rules	O-1
Appendix P. Design Features and Best Management Practices.....	P-1
Appendix Q. Lands and Realty.....	Q-1
Appendix R. Rangeland Health	R-1

List of Tables

Table 1. Surface land ownership within the planning area by county	16
Table 2. Mineral ownership within the planning area by county	16
Table 3. Management areas in the 1986 Garnet RMP (alternative A: no-action alternative)	24
Table 4. Cultural resource use allocations.....	32
Table 5. Alternative B ACEC management direction.....	62

Table 6. Summary of ACEC management direction for alternative C.....	68
Table 7. Total acres managed by the Missoula Field Office	71
Table 8. Wildlife Habitat	71
Table 9. Fish Habitat	71
Table 10. Lands with wilderness characteristics.....	71
Table 11. Visual resources.....	72
Table 12. Forestry and Woodland Products	72
Table 13. Wildland Fire Management Zones	72
Table 14. Livestock Grazing	73
Table 15. Lands and Realty (Land Tenure).....	73
Table 16. Lands and Realty (Rights-of-Way)	73
Table 17. Locatable Minerals	73
Table 18. Mineral Materials	74
Table 19. Nonenergy solid leasable.....	74
Table 20. Recreation Management Areas	75
Table 21. Off-highway vehicle and snowmobile allocations	75
Table 22. Special Designations (ACECs, WSAs, WSRs, National Trails)	75
Table 23. Wilderness Study Area Management, if released from designation for other uses.....	76
Table 24. Forest species compositions, habitat type groups, and fire groups.....	82
Table 25. National Vegetation Classification System standard macro groups for rangeland	90
Table 26. Acres of infested BLM-managed lands in the analysis area.....	98
Table 27. Noxious weed species in the analysis area	99
Table 28. Total modeled acres of wildfire on BLM per alternative	110
Table 29. Total modeled acres of wildfire on forest vegetation analysis area per alternative	111
Table 30. Range improvements on BLM-managed lands in the planning area	120
Table 31. Monitoring data comparison to Montana and national ambient air quality standards.....	128
Table 32. IMPROVE Monitors in the Planning Area.....	129

Table 33. Normal Missoula Temperature, Precipitation, and Wind Data	130
Table 34. Comparison of Prescribed Fire by Alternative.....	131
Table 35. Smoke emissions (tons) per decade by alternative for prescribed fires	131
Table 36. Comparison of Projected Average Decadal Wildfire Acres and Emissions for the Next Five Decades..	132
Table 37. Miles of perennial streams and acres of lakes reservoirs in 8-digit hydrologic units by analysis and decision area	136
Table 38. Miles of stream in 8-digit hydrologic units by analysis and decision area	137
Table 39. Native-fish species and their occurrence in the planning area	138
Table 40. Miles of perennial stream bull trout critical habitat, occupied bull trout, and occupied westslope cutthroat trout by 8-digit HUC sub-basin.....	138
Table 41. Non-native fish species and their occurrence in the planning area	142
Table 42. Acres of wetlands in the analysis and decision areas.....	143
Table 43. Occurrence of amphibians and aquatic reptiles in the analysis area.....	144
Table 44. Summary of stream miles/acres with moderate or high mineral development potential common to all alternatives	150
Table 45. Stream miles open to grazing across alternatives	151
Table 46. Stream miles with special status fish species in grazing allotments not meeting rangeland health standards	151
Table 47. Acres ROW exclusion or avoidance across alternatives	151
Table 48. Acres open, limited and closed to motorized and non-motorized travel.....	152
Table 49. Summary of stream miles/acres within priority fuels management areas	152
Table 50. Land ownership in the analysis area	153
Table 51. Indicators and potential impacts for soil, water, and riparian resources	158
Table 52. Riparian-wetland areas inventoried and assessed in the decision area	160
Table 53. Summary of soil, water, and riparian-wetland impacts	166
Table 54. Summary of visual resource management classes by alternative	182
Table 55. Classification of livestock grazing allotments under the 1986 Garnet RMP.....	228
Table 56. Alternative A: withdrawal of development potential	236
Table 57. Alternative B: withdrawal of development potential	236

Table 58. Alternative C: withdrawal of development potential.....	237
Table 59. Summary of existing withdrawals.....	243
Table 60. Summary of existing ACECs and relevant and important values	251
Table 61. Summary of proposed ACEC designation findings.....	252
Table 62. Summary of proposed ACEC designations	252
Table 63. Eligible wild and scenic river segments in the decision area	258
Table 64. 2016 PILT payments and acres.....	266
Table 65. Current employment contributions to the regional economy by program area, 2016	267
Table 66. Employment (number of jobs contributed) by Missoula BLM Program Area, by Alternative, Average Annual.....	270
Table 67. Labor Income contributed (\$1,000) by Missoula BLM Program Area, by Alternative, Average Annual	270

List of Figures

Figure 1. Missoula RMP planning area	14
Figure 2. Missoula RMP 3-county analysis and decision areas	15
Figure 3. Habitat type groups in the forest vegetation analysis area.....	84
Figure 4. Patch size analysis of warm/dry to moderately warm/dry habitat type groups	91
Figure 5. Current condition and NRV of successional classes on BLM lands across all habitat type groups	93
Figure 6. Missoula, Powell, and Granite Counties' Douglas-fir beetle-caused mortality.....	96
Figure 7. Missoula, Powell, Granite Counties' mountain pine beetle-caused mortality.....	97
Figure 8. Differences in the alteration of structural stages among alternatives displayed by successional classes for a time period of five decades. TS 0 is the current condition and TS 1-5 correspond with the first through fifth decades.....	102
Figure 9. The level of Douglas-fir beetle outbreaks predicted on BLM lands by SIMPPLLE for Alternatives A, B, and C expressed as an average of 30 SIMPPLLE simulations	104
Figure 10. The level of stand-replacing fire predicted on BLM lands by SIMPPLLE for Alternatives A, B and C expressed as an average of 30 SIMPPLLE simulations	108
Figure 11. Historic and future (modeled) acres of wildfire	110
Figure 12. Modelled acres of stand-replacing wildfire on BLM per alternative	112

Figure 13. Modelled acres of mixed-severity wildfire on BLM by alternative	112
Figure 14. Modelled acres of light-severity wildfire on BLM by alternative.....	113
Figure 15. Modeled acres of light-severity wildfire across forest vegetation analysis area by alternative.....	117
Figure 16. Modeled acres of mixed-severity wildfire across forest vegetation analysis area by alternative	117
Figure 17. Modeled acres of stand-replacing wildfire across forest vegetation analysis area by alternative	118
Figure 18. BLM-managed lands and the three 8 th -digit HUCs used for the analysis area	135
Figure 19. Bull trout distribution and presence	139
Figure 20. Bull trout critical habitat	140
Figure 21. Distribution of westslope cutthroat trout in the decision area	141
Figure 22. Comparison of Current Levels of Wildlife Habitats against NRV for BLM Lands	196
Figure 23. Comparison of Current Levels of Goshawk Habitat against NRV for BLM Lands	197
Figure 24. Canada Lynx Mature Multistory Habitat for Five Decades across all Alternatives on BLM Lands.....	202
Figure 25. Canada Lynx Stand Initiation Habitat for Five Decades across all Alternatives on BLM Lands.....	203
Figure 26. Elk Habitat for Five Decades across all Alternatives for BLM Lands.....	204
Figure 27. American Marten Habitat for Five Decades across all Alternatives on BLM Land	205
Figure 28. Black Backed Woodpecker Habitat for Five Decades across all Alternatives on BLM Lands	206
Figure 29. Flammulated Owl Habitat for Five Decades across all Alternatives on BLM Lands.....	207
Figure 30. Northern Goshawk Nesting Habitat for Five Decades across all Alternatives on BLM Lands.....	208
Figure 31a. Missoula Field Office Timber Harvest Volume Output and PSQ*	240
Figure 31b. The number of acres available for commercial timber harvest by alternative	240
Figure 32. Sale quantity volume, by alternative, in millions of board feet per decade. Alternative A is measured by ASQ, B and C are measured by PSQ	241

Executive Summary

The United States Department of the Interior, Bureau of Land Management (BLM) has prepared this revision of the Resource Management Plan (RMP) to provide direction for managing public lands under the jurisdiction of the Missoula Field Office (MiFO) in western Montana and an environmental impact statement (EIS) to analyze the environmental effects that could result. The affected lands are currently being managed under the Garnet Resource Area Resource Management Plan (USDI-BLM 1986). The Garnet Resource Area RMP has been formally amended on six occasions. In addition, several new laws, regulations, and policies have affected management of public land since approval of both plans. The RMP is being revised under the Federal Land Policy and Management Act (FLPMA) of 1976 and applicable laws, regulations, and policies.

1.1 Purpose and Need

The need for the revision is the result of a changing land base through exchanges and acquisitions, changing resource conditions, shifting demands for resource uses, new circumstances and information relevant to public lands in the planning area since completion of the Garnet Resource Area RMP in 1986. These changes include but are not limited to:

- Updated or new regional strategies that address threatened species under the Endangered Species Act (Canada lynx, Northern Continental Divide Ecosystem grizzly bear, and bull trout);
- Forest vegetation conditions and resiliency to natural disturbances such as insect and disease infestations, and catastrophic wildland fires;
- An increasing demand for fire-resilient forests for public safety, wildland firefighter safety, and wildland fire severity;
- An increasing community emphasis on recreation opportunities, and access to public lands;
- A fluctuating timber supply, market conditions, and number of local mills; and
- Updated information for multiple resources and evaluations of proposed and existing Areas of Critical Environmental Concern (ACECs); identified corridors for the Lewis and Clark National Historic Trail; evaluated eligible stream segments for suitability and consideration for Wild and Scenic River Designation.

The following three purposes describe the Missoula BLM's distinctive role in the western Montana landscape in contributing to the multiple use and sustained yield mission:

Maintain or restore ecological sustainability for forests and grasslands to provide quality habitat for terrestrial and aquatic wildlife species, and opportunities for sustainable timber harvest and livestock grazing. The purpose of the action is to improve and restore ecological sustainability and resiliency for forested and grassland ecosystems; to provide for clean water, air, and wildlife habitats especially for threatened and endangered species; and to promote resilient landscape patterns and forest conditions, which have the capacity to maintain or regain normal functioning and development following disturbances.

The purpose of the action is to also improve and restore ecological sustainability and resiliency for forest and grassland ecosystems to provide for domestic sources of timber and livestock, which are dependent upon the vegetative communities.

Provide for recreation opportunities and improve access. The purpose of the action includes providing recreation opportunities especially as demand for river-related recreation, hunting, fishing, mountain biking, snowmobiling, and exploring ghost towns increases.

Manage for other social and scientific values. The purpose is also to manage for scientific, scenic, historical and archeological values, including but not limited to cultural resources, special designations, and public safety, that contribute an important part to the broader social and scientific values of western Montana.

1.2 Decision from this plan

The BLM's Missoula RMP will provide an approach to managing public lands it administers in the Missoula planning area. It is a tool by which present and future use is projected. This RMP is the preliminary step in the overall process of managing public lands, and will guide and control future management actions and development of subsequent, more detailed and limited scope projects for resources and uses.

The major provisions of the plan include:

- Objectives for management of BLM-managed lands and resources
- Land use allocations relative to future uses for the purposes of achieving the various objectives; and
- Management direction that identifies where future actions may or may not be allowed, and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-managed lands and resources.

1.3 Planning Issues and Concerns

The BLM identified issue statements and management concerns. Based on public scoping and internal scoping, this Plan revised the following issues and management concerns:

- *Air Quality and Climate.* How would the alternatives consider air quality and the changing climate in its plan?
- *Economics and Community.* How would the BLM consider social and economic conditions in the planning area when managing BLM lands, specifically how should the BLM contribute to local economies and infrastructure needs through recreation opportunities, rights-of-way, mineral exploration and development, livestock grazing, and forest products while managing for wildlife and aquatic habitat?
- *Environmental Justice.* What communities or populations, if any, will receive disproportionate impacts as an effect of RMP implementation? How would the BLM mitigate these effects if any exist?
- *Noxious and Invasive Species.* How would the alternatives address management to limit the spread of invasive species, including aquatic invasive species?
- *Lands available for and recommended for withdrawal from mineral entry.* How will the alternatives either release or recommend for withdrawal acres of interminable temporary segregation?
- *Lands, Realty, and Access.* How should the BLM-managed lands improve public access and resource management, including hunting opportunities, through land tenure actions?

- *Lands with Wilderness Characteristics.* How would the alternatives address lands with wilderness characteristics?
- *Paleontological Resources.* How would the alternatives address surface disturbing activity and paleontological resources?
- *Partnerships.* How would the alternatives address local, state, tribal, and national partnerships to achieve shared goals for priority watersheds and forest vegetation projects?
- *Recreation.* How would the alternatives provide for public demands for access and recreation, specifically hunting, fishing, mountain biking, snowmobiling, off-highway vehicles, hiking, and river-related recreation?
- *Special Designations.* How should special designations be managed to protect values that warrant special designation status?
- *Visual Resources.* How would varying types and intensities of resource uses in the RMP alternatives impact visual resource quality on BLM-managed lands in the planning area?
- *Vegetation Management.* What is the appropriate level of active forest management to move vegetation conditions toward a natural range of variability in order to provide fish and wildlife habitat, and also to provide a sustainable supply of forest products and forage for wildlife and domestic livestock?
- *Watershed Management.* How would the alternatives contribute to restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters, safe drinking water supplies, soil and vegetation health, and the proper functioning condition of riparian-wetlands.
- *Wildlife and Aquatics Species and Habitats.* How would the alternatives manage for ecologically resilient fish and wildlife habitat, including contribution to the recovery of Canada lynx, grizzly bear, and bull trout, big game species, and other Bureau sensitive species?

1.4 Overview of the Alternatives

A detailed comparison of alternatives is described in Chapter 2 of the DEIS, with a table of comparison. The BLM analyzed three alternatives in detail. The “no-action” alternative, Alternative A, would be continuation of management of the Garnet RMP of 1986. The two action alternatives, Alternative B and Alternative C, would reflect various levels of change from the existing Garnet RMP direction. This section provides a brief overview of each of those alternatives.

Alternative A – No-action Alternative

Alternative A is the continuation of present management, referred to as the “No-action” Alternative. This alternative would continue present management practices based on existing land use plans and other management decision documents. Direction contained in the Garnet Resource Area RMP would continue to be implemented. Direction contained in existing laws, regulations, and policies would also continue. The current levels, methods, and mix of multiple use management would continue with an emphasis on forest products, recreation, livestock grazing, and conservation of big game habitats. The Lewis and Clark National Historic Trail would not have a designated corridor.

The 1986 Garnet RMP emphasized management areas. The action alternatives move away from the management area concept, and include allocations aligned with current regulation and policies. Additionally, the action alternatives provide a more criteria-based approach for habitats, particularly providing criteria for activities within habitats.

Alternative B – Preferred Alternative

Alternative B is the BLM Preferred Alternative. Alternative B emphasizes the greatest degree of active management to restore resilient vegetative communities, and to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure. This alternative would produce the greatest quantities of forest products from vegetation restoration activities of all alternatives.

All existing allotments of livestock grazing would remain available subject to the Rangeland Health Standards with flexibility at the site-specific level to adjust the terms and conditions such as season of use, rest rotations, AUMs, and rangeland improvements. More acres are available for using grazing as a management tool under this alternative.

Recreation would be a priority in five areas covering approximately 45 percent of the BLM lands—Lower Blackfoot Corridor, the Garnets (Garnet Ghost Town and winter trails), Chamberlain, Limestone Cliffs, and Ram Mountain—which is a slight increase from the existing plan. Dispersed recreation would continue throughout the planning area. This alternative sets the stage for step-down travel management for motorized and non-motorized opportunities in the Lower Blackfoot and Garnet areas with the “limited to designated routes” allocation. No motorized access would occur in the Wilderness Study Areas (WSAs).

The Lewis and Clark National Historic Trail corridor would be 1/2 mile on public lands on either side of the centerline of the trail. One Area of Critical Environmental Concern (ACEC) would continue its designation (Phil Wright Rock, 640 acres). No river segments eligible for Wild and Scenic status would be recommended as suitable for Wild and Scenic designation.

Threatened or endangered species as designated by the Endangered Species Act (ESA) would continue to be managed in accordance with U.S. Fish and Wildlife Service (USFWS) recovery plans and conservation strategies. Other priority species and habitats for management include Bureau sensitive species, big game, and migratory birds. Restoration of key species habitats would be important in this alternative.

Alternative C

Alternative C emphasizes less active vegetative restoration. Production of forest-based commodity resources from vegetation restoration activities would be the lowest of all alternatives. This alternative emphasizes a greater degree of focus on project level wildlife habitat and riparian conservation and restoration, and on preservation of historic resources.

All existing allotments of livestock grazing would remain available subject to the Rangeland Health Standards with flexibility at the site-specific level to adjust the terms and conditions such as season of use, rest rotations, AUMs, and rangeland improvements. Stricter requirements would be triggered if rangeland health standards were not met with the causal factor livestock grazing. Fewer acres are available for using livestock grazing as a management tool under this alternative.

Wildlife-dependent recreation (hunting, fishing, and wildlife viewing) would be a priority in four Backcountry Conservation Areas covering about 28 percent of the BLM lands—Chamberlain, Ram Mountain, Hoodoos, and Marcum Mountain—with moderate levels of resource use balanced with various human demands and land uses would occur. Recreation would be a priority also in the Lower Blackfoot and Garnets (Garnet Ghost Town and winter trails) covering about 29 percent of the BLM lands. This alternative also sets the stage for step-down travel management focused on motorized and non-motorized opportunities in the Lower Blackfoot, and Garnet areas with the “limited to designated routes” allocation. No motorized access would occur in the WSAs and lands protected for their wilderness characteristics.

The Lewis and Clark National Historic Trail corridor would be 1 mile on public lands on either side of the centerline of the trail. The Phil Wright Rock ACEC (640 acres) and the Limestone Cliffs ACEC (20 acres) would maintain the ACEC designation. No river segments eligible for Wild and Scenic status would be recommended as suitable for Wild and Scenic designation.

ESA designated threatened or endangered species would continue to be managed in accordance with USFWS recovery plans and conservation strategies. Other priority species and habitats for management include Bureau sensitive species, big game, and migratory birds. Restoration of key species habitats would be a high priority in this alternative. Wildlife habitat objectives would be similar to alternative B, but with a greater emphasis on conservation and restoration of terrestrial wildlife habitat. Riparian habitat conservation areas would be managed similar to alternative B, but with a greater emphasis on restoration.

1.5 Overview of Environmental Consequences

Effects on all resources from all actions are described in detail in Chapter 3. This section contains a brief summary of effects by alternatives as related to the key planning issues.

Vegetative communities.

How do the alternatives address maintaining or restoring ecological sustainability to provide quality habitat for terrestrial and aquatic wildlife species, and opportunities for forest products and livestock grazing?

In all vegetation types, the BLM would conduct vegetation treatments (prescribed burns, tree thinning, timber harvest, etc.) to restore conditions, achieve habitat objectives, and increase productivity of the land. Alternative A would treat the second most acres with 12,000 acres per decade to help move conditions to the mid-range of the natural range of variability. Alternative B would treat the most acres per decade with 15,000 acres per decade to move conditions to the mid-range of the natural range of variability quicker. Alternative C would treat the fewest acres with 10,000 acres per decade.

Forests and Woodlands. The majority of the planning area is forested. Wildland fire suppression, insect and disease outbreaks, shifting climate, and historic management have impacted forest vegetation. The goal is to move forest vegetative communities toward the mid-range of the natural range of variability.

Forested vegetation treatments would maintain or move conditions toward the natural range of variability. Specifically, treatments would influence the forest species composition and patch dynamics of the landscape. Alternative B would create the most amount of forest species composition and patch dynamics within the natural range of variability, 10 percent of the forested landscape per decade, followed by Alternatives A and C at 7 and 8 percent of the forested landscape per decade respectively.

Grasslands and Shrublands. Approximately 3 percent of BLM-managed land in the decision area are non-forested, defined as having less than 10 percent tree canopy cover. The remaining 97 percent of forested acres have limited mountain meadows, shrubland and grasslands.

Grassland and shrubland vegetation treatments would help reduce conifer encroachment, reduce fuel loading, and convert non-native grassland vegetation to native grassland vegetation.

Under all alternatives, the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana, North Dakota, and South Dakota (USDI-BLM 1997) would apply. The standards for rangeland health provide a measurement of health for resource conditions including soils, riparian systems, upland vegetation, wildlife habitat, special status species, and air and water quality, and trigger action by the BLM when standards are not being met.

Riparian. Riparian area management is integrated with basin hydrology, surface and ground water, the physical integrity and function of streams, springs, wetlands, water quality, fish and wildlife habitat, and interaction with upland vegetation.

Alternative A would manage according to the Streamside Management Zone law, which would restore riparian communities to properly functioning condition. Approximately 1,700 acres would be managed as Riparian Protection Zone 1 to maintain and enhance riparian areas for wildlife, recreation, fishery, and aquatic habitat. Approximately 4,400 acres would be managed as Riparian Multiple Use Zone to maintain and enhance riparian areas while allowing other uses.

Alternatives B and C both incorporate management of riparian habitat conservation areas (RHCAs) where riparian ecological health and conservation of native fish and habitats would be the priority focus. Under all alternatives, aquatic species and their habitat will receive primary management emphasis within RHCAs. Development of riparian management objectives, delineation of RHCAs, and identification of any design features would occur prior to any project with site-specific information and NEPA analysis. Activities within RHCAs would be designed to enhance, restore, or maintain the physical and biological characteristics, and could not result in long-term degradation of aquatic conditions. Additional acres of riparian communities would be restored through implementation of livestock grazing guidelines.

Noxious Weeds. Proposed noxious weed treatments would occur under all alternatives but to varying degrees. Alternative A does not give treatment targets. Alternative B would treat 21,000 to 50,000 infested acres of noxious and invasive species over the life of the plan. Alternative C would treat 16,000 to 38,000 infested acres of noxious and invasive species over the life of the plan. Alternative C would use bio-control to the extent possible rather than herbicide treatments. Both alternatives would prioritize prevention and control on roads, trails, waterways, recreation sites, and disturbed sites due to other resource management projects. Prevention and control in special designation and cooperative weed management areas would be the next priority.

Wildland Fire Management. All alternatives share the goal to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and live with wildland fire.

Approximately 40 percent of the BLM-managed lands fall within the wildland-urban interface (WUI).

The vegetation treatments listed above will result in treatments to thousands of acres both in and outside of the WUI to reduce hazardous fuels, and outside of the WUI to restore fire-adapted ecosystems and create resilient landscapes. These treatments have included timber sales, thinning, chipping, masticating, and prescribed burning.

Under all alternatives, the BLM would continue to implement the Community Assistance program. Missoula, Powell, and Granite Counties and the Blackfoot Challenge all completed Community Wildfire Protection Plans or equivalent. The investment into these partnerships would result in effective treatments on the ground. Wildfire education, training, and community action/involvement programs have been critical for a successful program.

All alternatives allow full suppression for wildland fire management, especially where values at risk are high. Alternatives B and C allow more flexibility in managing wildland fire for a resource benefit as appropriate.

Aquatics and Terrestrial Wildlife

How do the alternatives provide management for special status species and other priority species?

Vegetation management aimed at restoring or maintaining ecological sustainability through achieving the natural range of variability (NRV), and managing for additional needs of priority species, would provide for the habitat needs of terrestrial wildlife. Under all alternatives, the proposed vegetation treatments described above would result in forested conditions within or moving toward the mid-range of NRV providing resilient habitat for a multitude of wildlife species inhabiting the area. Design features aimed at conserving specific needs of wildlife species—such as travel corridors, dead trees (snags), downed wood, and stand structure—would be implemented at the project level.

Special Status Species. Conservation and recovery of listed species inhabiting BLM-managed lands, Bull Trout and Bull Trout Critical Habitat, Canada Lynx and Canada Lynx Critical Habitat, and the Northern Continental Divide Grizzly Bear, would occur through compliance with the U.S. Fish and Wildlife Service recovery plans, conservation strategies, and other applicable USFWS guidance. These measures would apply to approximately 27 miles of stream habitat designated bull trout; approximately 108,426 acres of Canada lynx Critical Habitat, and 112,461 acres of NCDE Grizzly Bear zone 1 lands. Also under all alternatives, the BLM manages special status species, such as such as Westslope cutthroat trout, western pearlshell mussel, and flammulated owl, according to Bureau Manual 6840.

Open road densities for the grizzly bear would remain at 2011 baseline levels (1.70 mi/mi²) established in the Final Interagency NCDE Grizzly bear strategy (USFWS 2018a) under Alternatives B and C. Alternative A did not establish open road density levels. Implementation of a food storage order would occur under all alternatives.

Big Game. All alternatives would restore or maintain habitat for big game species by maintaining or moving toward the mid-range of NRV for all habitat type groups (HTGs).

Open road densities have the potential to impact big game species. Alternative A contains little direction related to road density within important big game areas. Alternative B would maintain open road densities at 2011 baseline standards (1.70 mi/mi²) in grizzly bear zone 1 habitat, which overlaps with approximately 76,882 acres of big game winter range. Alternative C would protect the most winter range by managing to 2011 baseline standards (1.70 mi/mi²) in all winter range habitat, which is approximately 105,911 acres.

Aquatic Resources. Under Alternative A, the streamside zone management (SMZ) practices would apply. Under Alternatives B and C, in addition to SMZ practices, aquatic species and their habitat will receive primary management emphasis within riparian habitat conservation areas (RHCAs). Activities within RHCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics, and shall not result in long-term degradation of aquatic conditions.

Resources Uses

How do the alternatives provide opportunities for recreation, forest products, livestock grazing, and minerals exploration and development?

Recreation. Many visitors use public lands to hunt, fish, camp, float, mountain bike, snowmobile, and view cultural and natural resources. Garnet Ghost Town offers a glimpse into the past as one of Montana's most intact historic mining towns. About 25,000 people visit Garnet Ghost Town every year. Rafting, fishing, and hunting are popular activities along the nationally recognized lower Blackfoot River. About 40,000 people visit the lower Blackfoot River area every year. Big game hunting is also very popular; the BLM lands in the planning area provide excellent levels of hunting on public land. Members of the public have expressed a growing interest in connecting communities through non-motorized and

motorized trails. Non-motorized uses include hiking, mountain biking, horseback riding, and cross-country skiing. Motorized uses include off-highway vehicles and snowmobiles.

Alternative A would continue the allocation of five special recreation management areas covering approximately 52,393 acres (32 percent) cumulatively and would continue to emphasize walk-in hunting. Alternative B would allocate five Special Recreation Management Areas covering 71,632 acres (44 percent), Alternative C would allocate two Special Recreation Management Areas covering 46,523 acres (29 percent) and four Backcountry Conservation Areas covering 46,389 acres (29 percent). Alternative A provides for opportunities for motorized and non-motorized use. The Lower Blackfoot River corridor would continue to be closed to motorized use, although roads exist throughout the area with a several having seasonal road restrictions on them. The Wilderness Study Areas would continue to be allocated as Limited Motorized use, although very little motorized activity occurs in those areas.

Alternative B and C provides similar quantities of opportunities for motorized and non-motorized use, but the use is in different locations than Alternative A. Alternatives B and C would allocate the Lower Blackfoot River corridor to “Limited Motorized” use, thereby allowing opportunities at the site-specific travel planning for motorized and non-motorized use. Alternatives B and C would close the WSAs to motorized use.

Forest Products. Under all alternatives, timber harvest would be a tool for meeting forest health and restoration goals, including managing forests that are resilient to disturbance such as insect outbreaks and wildland fires. The following levels of forest product removal relate to the amount of forest health and ecosystem restoration proposed as follows. Alternative A would result in an Allowable Sale Quantity (ASQ) of 76 million board feet (MMBF) per decade. Alternative B would result in a Probable Sale Quantity (PSQ) of 79 MMBF per decade. Alternative C would result in a PSQ of 66 MMBF per decade. Under all of these alternatives, the decadal PSQ target helps to establish an annual harvest PSQ value. The annual PSQ value is not an upper limit and will vary by year. In some years, the actual sale quantity may be less or more than the annual average. For example, in Alternative B, the annual average is approximately 7.9 MMbf but the actual quantity may be up to 15 MMbf in a given year in response to a beetle infestation or wildland fire, which create large amounts of dead or dying trees that may need to be salvage harvested in a short time period.

Livestock Grazing. Under all alternatives, livestock grazing would continue in the existing allotments subject to rangeland health standards and guidelines. The BLM would achieve or be making progress toward achieving these standards, which could result in adjustments to animal unit months, changes to season of use, rest rotations, and/or removal of livestock at the site-specific level. Alternative A would allocate approximately 117,774 acres available for livestock grazing. Alternative B would allocate approximately 145,558 acres available for livestock grazing, many of which is for prescriptive grazing. Alternative C would make approximately 107,341 acres available for livestock grazing.

Lands and Realty. Over the past 30 years, the Missoula BLM has an active land tenure program with many land exchanges and acquisitions that have improved public access to BLM lands. All alternatives would allow these opportunities to continue, if in the public interest, as the majority of lands are in zone 2 (retention, limited disposal). Any special designations and lands acquired through LWCF funds would be classified as Category 1 (retention).

Alternative A had differing descriptions of right-of-way categories. Alternatives B and C manage special recreation areas (SRMAs) and Backcountry Conservation Areas (BCAs) as right-of-way avoidance areas. Alternative B manages the Lewis and Clark Trail corridor as an avoidance area. Alternative C allocates the Lewis and Clark Trail corridor as an exclusion area. All alternatives would exclude ROWs from the WSAs.

Minerals. Under Alternative A, the BLM would recommend 820 acre for withdrawal from mineral entry. Under Alternative B, the recommendation would be 283 acres for withdrawal from mineral entry to preserve the values of the Garnet Ghost Town and Limestone Cliffs. Under Alternative C, the recommendation would be 1,015 acres for withdrawal from mineral entry with an expanded boundary for Garnet Ghost Town and includes Phil Wright Rock ACEC.

Under Alternative A, mineral materials would be allowed in the majority of the planning area. Alternative B would continue that direction and provide specific management direction in areas with special designations. Alternative C would close the ACECs, Lewis and Clark National Historic Trail corridor, and Garnet Ghost Town to mineral materials.

Special Designations

How would the alternatives address special designations?

Areas of Critical Environmental Concern (ACEC). In Alternative A, the existing ACECs would continue to be managed as ACECs. This includes the Bear Creek Flats ACEC (565 acres), Phil Wright Rock ACEC (640 acres), and the Limestone Cliffs ACEC (20 acres). In Alternative B, the Phil Wright Rock ACEC would be managed as an ACEC. In Alternative C, the Phil Wright Rock and Limestone Cliffs would be managed as ACECs.

National Historic Trail. The Lewis and Clark National Historic Trail would be managed cooperatively with the NPS in accordance with national policy guidelines under all alternatives. Alternative A does not designate a trail corridor. Alternative B would designate a one-half-mile corridor on each side of the trail. Under Alternative B, the trail corridor would be a right-of-way avoidance area. Alternative C would designate a 1-mile corridor on each side of the trail. Under Alternative C, the trail corridor would be excluded from rights-of-way and closed to salable minerals. Under all alternatives, potential activities must be compatible with the trail objectives and values.

Wild and Scenic Rivers. Alternative A would continue to manage the six eligible river segments (Blackfoot River segment 1: 3.8 miles; Blackfoot River segment 2: 6.8 miles; Blackfoot River segment 3: 6.3 miles; Belmont segment: 4.5 miles; Gallagher Creek segment: 4.1 miles; and, Rock Creek segment: 2.1 miles) for its eligibility and suitability studies would not be complete.

Alternatives B and C would not recommend the three Blackfoot River segments, Gallagher Creek segment, and Belmont segment as suitable. The Rock Creek segment suitability would be deferred until the U.S. Forest Service (USFS) makes a suitability determination on their adjacent segments; this segment would continue to be managed to retain its eligibility status until a suitability determination is made.

Wilderness Study Areas. Under all alternatives, all three WSAs (Wales Creek, Hoodoos Mountain, and Quigg West) would continue to be managed according to BLM Manual 6330 in a manner so as not to impair their suitability for preservation as wilderness until such a time as Congress either designates as wilderness or releases the areas from further study.

Under Alternative B, should Congress release them from wilderness consideration, approximately 5,982 acres of Wales Creek would be managed as the adjacent special recreation management area (SRMA) and 5,602 would be managed as an area of critical environmental concern. The 11,380 acres of the Hoodoos would be managed under general multiple use and sustained yield. Under Alternative C, should Congress release them from wilderness consideration, approximately 5,982 acres of Wales Creek would be managed as the adjacent Backcountry Conservation Area (BCA) and 5,602 would be managed

as an area of critical environmental concern; and the 11,380 acres of the Hoodoos would be managed as a BCA.

Economics

How would the alternatives influence the local economy?

The payments to states/counties through the PILT program would support approximately four jobs and \$176,000 in labor income annually under all alternatives. The BLM experiences approximately 222,000 recreation visits to BLM-managed lands annually. The expenditures of local and non-local visitors would support approximately 78 jobs and \$2.3 million in labor income, annually under all alternatives.

Management actions under Alternative A would support 133 jobs from recreation, grazing, and timber, and result in approximately \$5.5 million in labor income to the local economy, annually. The level of livestock grazing would support approximately 11 jobs and \$357,000 in labor income annually in the regional economy. The forest products harvest would support 44 jobs and \$2.8 million of labor income in the local economy, annually.

Management actions under alternative B would support 144 jobs and between \$6.3 million in labor income in the local economy, annually. The level of livestock grazing would support approximately 11 jobs and \$378,000 in labor income, annually, to the regional economy. The forest products harvest would support 55 jobs and \$3.5 million in labor income in the local economy, annually.

Management actions under alternative C would support 132 jobs from recreation, grazing, and timber, and result in approximately \$5.5 million in labor income to the local economy, annually. The level of livestock grazing would support approximately 10 jobs and \$3.4 million in labor income, annually. The forest products harvest would support 44 jobs and \$2.8 million in labor income in the local economy, annually. This is similar to the estimated employment and labor income supported by forest products under alternative A.

1.6 Public Involvement, Consultation, and Coordination

Public involvement opportunities occurred during public scoping, and release of preliminary alternatives. First, the BLM engaged in over 50 listening sessions and 3 public listening workshops in spring 2016. Formal scoping began with publication of the Notice of Intent on December 12, 2006, which served to notify the public. The BLM held four scoping meetings in January 2017, in Greenough, Helmville, Missoula, and Philipsburg. During and after the official scoping period, the BLM received 196 comment letters. The BLM received a total of 67 unique submissions and 2 form letters during public scoping. Lastly, the BLM provided the public an opportunity to view an early version of the alternatives—the high-level allocations and concepts—before a full draft was complete by posting the Preliminary Alternatives to its website and hosting three public open houses in Missoula, Greenough, and Philipsburg in January 2018.

Government-to-government tribal consultation began in March 2017, with the BLM sending requests for consultation letters to all area tribes. The BLM held informational meetings with tribal representatives to discuss tribal consultation and preservation issues facing tribes and federal and state agencies. Government-to-government consultation will continue throughout the RMP development process. As required by Section 7 of the Endangered Species Act of 1973 (ESA), the BLM will consult with the USFWS on the selected alternative.

The BLM invited over forty federal, state, and local agencies and tribal governments to participate in the RMP revision as official cooperating agencies. The U.S. Forest Service Region 1, Montana Fish Wildlife and Parks Region 2, and the Missoula County signed agreements to participate as cooperating agencies to share their expertise with the BLM.

The BLM maintains a website to provide information on the RMP and planning process. In addition to outreach described above, other informal meetings, telephone conversations, and visits with agency representatives and public occurred and will continue to occur as requested.

Chapter 1. Introduction

The Department of the Interior (USDI), Bureau of Land Management (BLM), is revising the Garnet Resource Area Resource Management Plan of 1986 for the Missoula Field Office of the Western Montana District. The Missoula BLM has prepared this draft resource management plan and environmental impact statement (Draft RMP/EIS) with management direction applicable for approximately 162,611 acres of public lands and approximately 267,389 acres of federal mineral interests in western Montana.

Land use decisions developed through this RMP process are based upon the principles of multiple use and sustained yield in accordance with the Federal Land Policy and Management Act of 1976 (FLPMA). The environmental impact statement (EIS) is incorporated into this document as required by the National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality (CEQ) regulations for implementing NEPA. The BLM will consider public comments on the alternatives and analysis as it develops a proposed RMP/final EIS.

The Missoula Draft RMP/EIS establishes goals and objectives for resource management (desired outcomes) and the measures needed to achieve these goals and objectives (allowable uses and management actions) in coordination with federal, tribal, state, and local governments; local users; and interested public. The Draft RMP/EIS also provides an analysis of potential effects of these alternatives.

1.1 Planning Area

Planning Area. The Missoula RMP planning area is located in western Montana in Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Powell, Ravalli, and Sanders Counties (see Figure 1 below). Within these nine counties, the BLM will only make decisions on lands that fall under the BLM's jurisdiction including subsurface minerals. Over 99 percent of these surface acres are located in Granite, Missoula, and Powell Counties (see Figure 2). Other land managers and owners in the planning area include national forests, Glacier National Park, state, tribal, and private lands (see Table 1 and Table 2).

Analysis Area. The analysis area refers to any lands, regardless of jurisdiction, for which the BLM synthesizes, analyzes, and interprets data and information that relates to planning for BLM-managed lands. This generally includes all lands within Granite, Missoula, and Powell Counties, regardless of jurisdiction or ownership. Although the cumulative effects analysis area for a particular resource or resource use may expand beyond this general 3-county analysis area boundary, depending on the issue.

Decision Area. The decision area refers to lands within a planning area for which the BLM has authority to make land use and management decisions, which includes the approximately 162,611 surface acres of BLM-managed lands, and the approximately 267,389 acres of subsurface minerals in split estate as described above.

Figure 1. Missoula RMP planning area

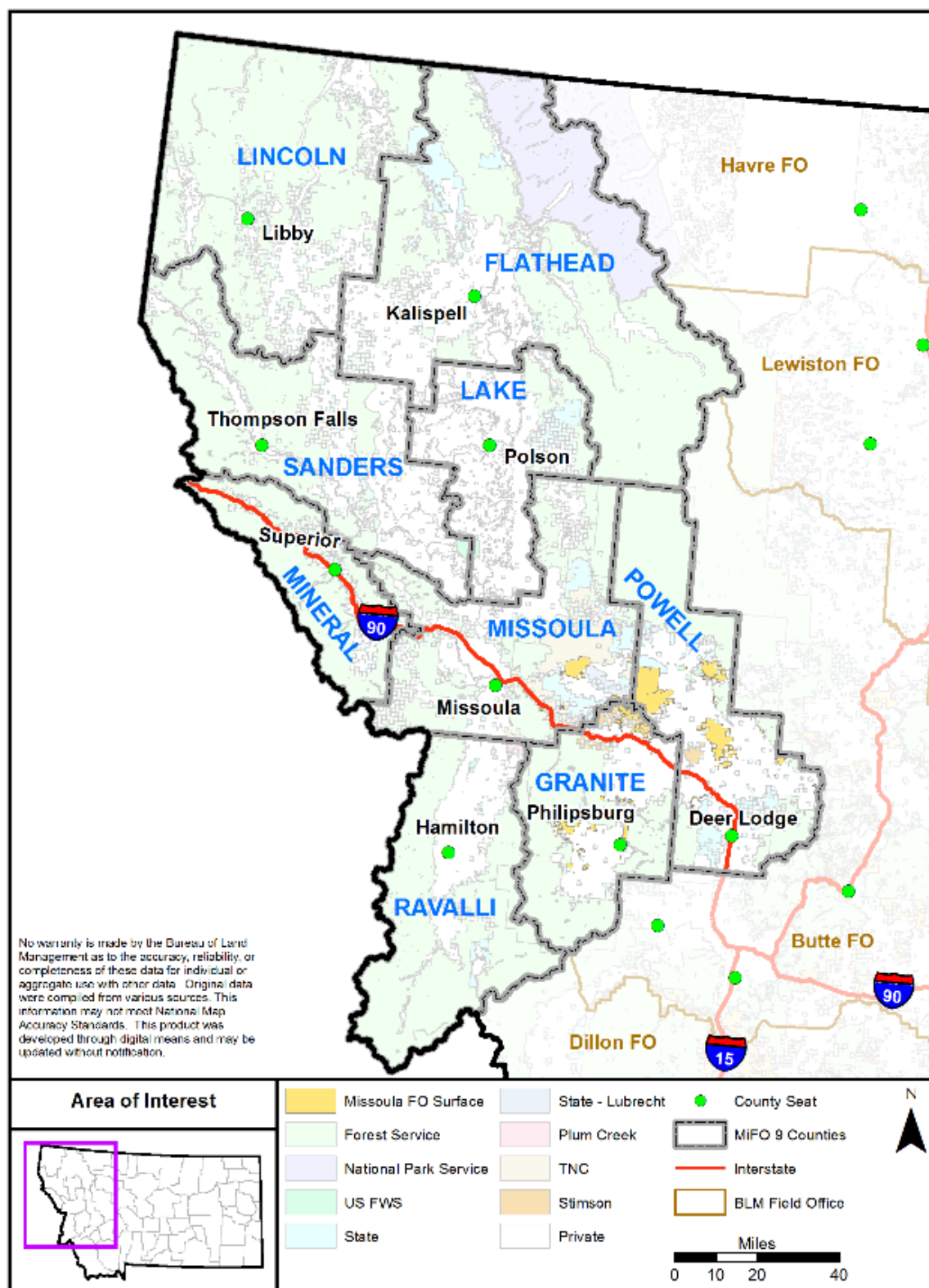


Figure 2. Missoula RMP 3-county analysis and decision areas

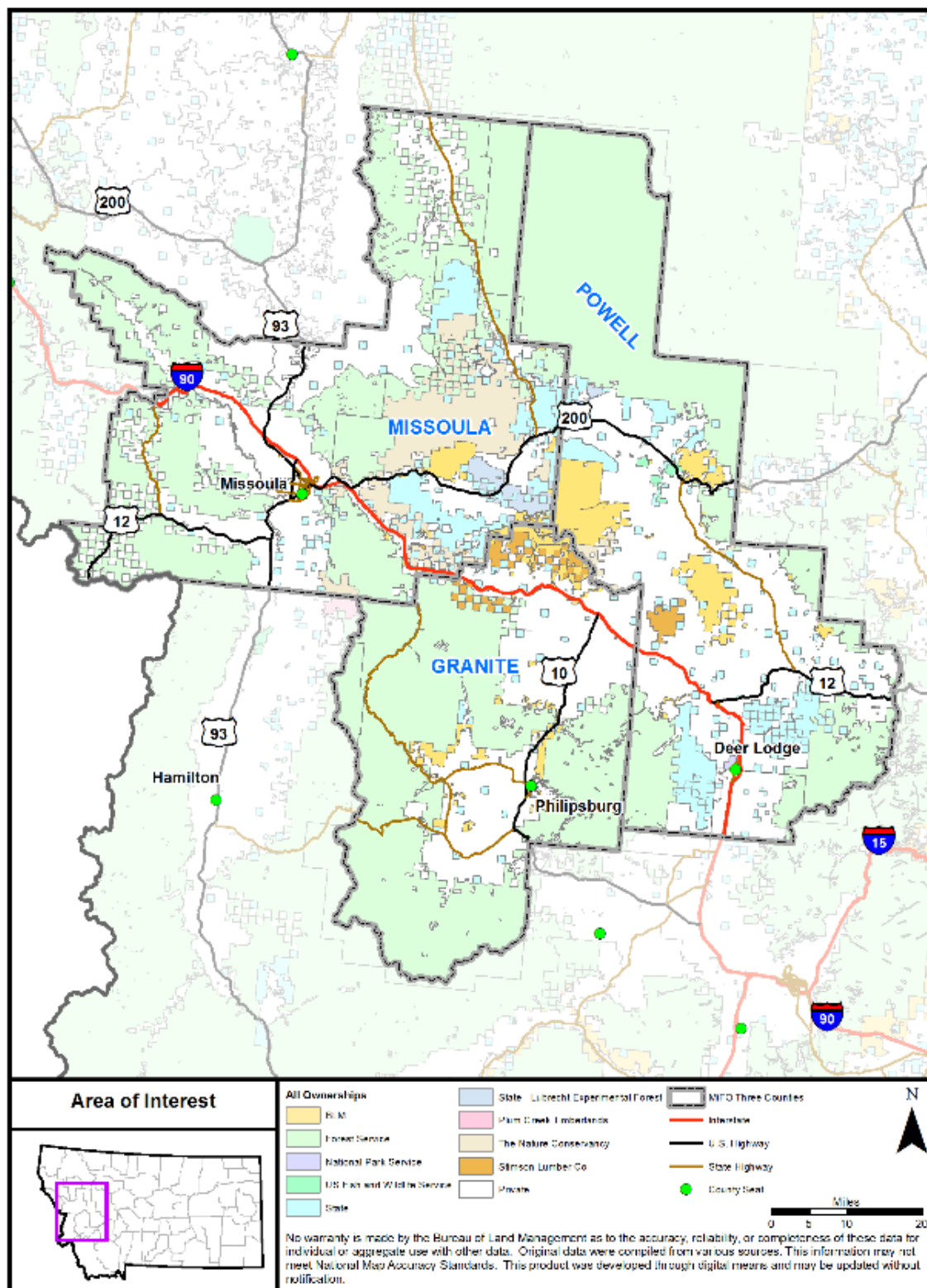


Table 1. Surface land ownership within the planning area by county

County	Total Acres	BLM (Acres)	Other Federal (Acres)	State (Acres)	Private (Acres)
Flathead	3,363,940	0	2,404,643	137,026	822,271
Granite	1,108,929	45,952	662,736	19,821	387,834
Lake	1,058,560	0	188,624	82,873	787,063
Lincoln	2,351,821	21	1,726,730	71,549	553,521
Mineral	783,144	0	638,637	68,877	75,630
Missoula	1,686,926	28,013	855,148	157,793	645,244
Powell	1,490,497	88,386	653,630	149,005	592,585
Ravalli	1,536,160	0	1,127,928	40,298	367,934
Sanders	1,785,624	4	931,545	64,910	789,165
Total	15,165,601	162,376	9,189,621	792,152	5,021,247

Source: Missoula BLM GIS and recorded legal acres.

Note: Some discrepancies may exist in total acreage due to differences in how sources calculate data.

Table 2. Mineral ownership within the planning area by county

County	BLM Surface Estate (acres)	Full Mineral Estate ¹ (acres)	Split Mineral Estate ² (acres)	Total Mineral Estate (acres)
Flathead	0	0	459	459
Granite	45,952	38,618	43,551	82,169
Lake	0	0	6	6
Lincoln	21	21	502	523
Mineral	0	0	644	644
Missoula	28,013	28,669	13,914	42,583
Powell	88,386	95,206	39,103	134,309
Ravalli	0	0	5,812	5,812
Sanders	4	4	1,085	1,089
Total	162,376	162,518	105,076	267,594

Source: Missoula BLM GIS data, and recorded legal acres.

¹ Full mineral estate includes BLM-managed land where the Federal Government owns all, or a portion of the mineral rights under BLM-managed surface ownership.

² Split mineral estate includes all lands where the BLM administers federal subsurface minerals, but the surface is owned by a non-federal entity such as state trust or private land. This acreage excludes federal mineral estate where other federal agencies have primary jurisdiction (i.e., U.S. Forest Service and National Park Service).

1.2 Purpose and Need for the Plan

The need for the revision is the result of changing land base through exchanges and acquisitions, changing resource conditions, shifting demands for resource uses, new circumstances and information relevant to public lands in the planning area since completion of the Garnet Resource Area RMP in 1986. Plan evaluations conducted in 1991 and 2001 highlighted a need to revisit plan decisions. Additional plan amendments and maintenance actions are not adequate to address these changes, which include but are not limited to:

- Updated or new regional strategies that address threatened species under the Endangered Species Act (ESA) (Canada lynx, Northern Continental Divide Ecosystem (NCDE) grizzly bear, and bull trout);
- Forest vegetation conditions and resiliency to natural disturbances such as insect and disease infestations, and catastrophic wildland fires;
- An increasing demand for fire-resilient forests for public safety, wildland firefighter safety, and wildland fire severity;
- An increasing community emphasis on recreation opportunities, and access to public lands
- A fluctuating timber supply, market conditions, and number of local mills;
- Updated information for multiple resources; and evaluations of proposed and existing Areas of Critical Environmental Concern (ACECs); identified corridors for the Lewis and Clark National Historic Trail; and evaluated eligible stream segments for suitability and consideration for Wild and Scenic River Designation.

The following purposes describe the Missoula BLM's distinctive role in the western Montana landscape in contributing to the multiple use and sustained yield mission:

Maintain or restore ecological sustainability for forests and grasslands to provide quality habitat for terrestrial and aquatic wildlife species, and productivity for sustainable timber harvest and livestock grazing. The purpose of the action is to improve and restore ecological sustainability and resiliency for forested and grassland ecosystems; to provide for clean water, air, and wildlife habitats especially for threatened and endangered species; and to promote resilient landscape patterns and forest conditions, which have the capacity to maintain or regain normal functioning and development following disturbances.

The purpose of the action is to also improve and restore ecological sustainability and resiliency for forest and grassland ecosystems to provide for domestic sources of timber and livestock, which are dependent upon the vegetative communities.

Provide for recreation opportunities and improved access. The purpose of the action includes providing recreation opportunities especially as demand for river-related recreation, hunting, fishing, mountain biking, snowmobiling, and exploring ghost towns increases.

Manage for other social and scientific values. The purpose is also to manage for scientific, scenic, historical and archeological values that contribute an important part to the broader social and scientific values of western Montana.

1.3 Decision to be made

The Missoula RMP will prescribe the allocation of and general future management direction for the resources and land uses of BLM-managed lands and minerals in the Missoula RMP planning area to guide

implementation-level activity plans and site-specific projects. Step-down activity plans and projects include NEPA analysis and public involvement.

1.4 Issues and Concerns

The BLM identified issue statements and management concerns in the Notice of Intent (December 2017). Based on public scoping and internal scoping, the BLM revised these issues and management concerns.

- ***Air Quality and Climate.*** How would the alternatives consider air quality and the changing climate in its plan?
- ***Economics and Community.*** How would the BLM consider social and economic conditions in the planning area when managing BLM lands, specifically how should the BLM contribute to local economies and infrastructure needs through recreation opportunities, rights-of-way, mineral exploration and development, livestock grazing, and forest products while managing for wildlife and aquatics habitat?
- ***Environmental Justice.*** What communities or populations, if any, will receive disproportionate impacts as an effect of RMP implementation? How would the BLM mitigate these effects if any exist?
- ***Noxious and Invasive Species.*** How would the alternatives address management to limit the spread of invasive species, including aquatic invasive species?
- ***Lands available for and recommended for withdrawal from mineral entry.*** How will the alternatives either release or recommend for withdrawal acres of interminable temporary segregation?
- ***Lands, Realty, and Access.*** How should the BLM-managed lands improve public access and resource management, including hunting opportunities, through land tenure actions?
- ***Lands with Wilderness Characteristics.*** How would the alternatives address lands with wilderness characteristics?
- ***Paleontological Resources.*** How would the alternatives address surface disturbing activity and paleontological resources?
- ***Partnerships.*** How would the alternatives address local, state, tribal, and national partnerships to achieve shared goals for priority watersheds and forest vegetation projects?
- ***Recreation.*** How would the alternatives provide for public demands for access and recreation, specifically hunting, fishing, mountain biking, snowmobiling, off-highway vehicles, hiking, and river-related recreation?
- ***Special Designations.*** How should special designations be managed to protect values that warrant special designation status?
- ***Visual Resources.*** How would varying types and intensities of resource uses in the RMP alternatives impact visual resource quality on BLM-managed lands in the planning area?
- ***Vegetation Management.*** What is the appropriate intensity of active forest management to achieve natural range of variability in order to achieve fish and wildlife habitat objectives, and also to provide a sustainable supply of forest products and forage for wildlife and domestic livestock?
- ***Watershed Management.*** How could the BLM-managed lands be managed to contribute to restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters, safe drinking water supplies, soil and vegetation health, and the proper functioning condition of riparian-wetlands.

- ***Wildlife and Aquatics Species and Habitats.*** How would the alternatives manage for ecologically resilient fish and wildlife habitat, including contribution to the recovery of Canada lynx, grizzly bear, and bull trout, big game species, and other Bureau sensitive species?

1.5 Issues Considered but Not Further Analyzed

Section 3.5 of the Missoula Resource Management Plan Scoping Report (USDI-BLM 2017) contains a comprehensive list of the issues, concerns, and questions by the public that are outside of the scope of this RMP, which is incorporated here by reference. These are the key issues considered, but not analyzed in detail:

Reintroduce bison

At this time, the state of Montana has not proposed to reintroduce wild bison on any BLM lands managed by the Missoula Field Office. Bison in private ownership are considered livestock, and as such, are permitted by the BLM pursuant to 43 CFR 4130.3-2(e).

Site-Specific Travel Management

The RMP will designate off-highway vehicle (OHV) allocations. Specifically, this RMP will allocate BLM-managed lands in the planning area as either: (a) Open motorized travel, (b) Closed to motorized travel, or (c) Limited motorized travel. These allocations set the stage for subsequent step-down travel management plans. Travel management designations (e.g., motorized or non-motorized trails, types of vehicles or use per route, seasonal restrictions, etc.) are implementation-level decisions, which align with the RMP allocations and are subject to site-specific NEPA analysis and public involvement.

Fluid Mineral Leasing

The BLM has not received an expression of interest in fluid leasable minerals since 1985 and there is no reasonably foreseeable future expression of interest. Thus, fluid mineral leasing is considered but not analyzed further in this document. If in the future the BLM were to receive an expression of interest, the BLM would proceed with the requisite environmental analysis and public involvement process at that time.

Wind and Solar Renewable Energy

The BLM has not received an expression of interest for wind or solar development. There is no known infrastructure in the BLM-managed lands to support any development. At this time, there is no reasonably foreseeable future demands for wind or solar energy on the BLM-managed lands. Thus, provisions specific to wind and solar developments are not addressed further in this document, and no allocations of preferred areas for competitive leasing, known as designated leasing areas, will be made in this land use plan. Any applications for testing or development would be addressed on a case-by-case basis with the requisite NEPA analysis and public involvement.

Release Wilderness Study Areas or designate Wilderness

Only Congress can designate lands as “Wilderness” and only Congress can release Wilderness Study Areas (WSAs). With the passage of FLPMA, Congress mandated that the BLM conduct a wilderness review of its administered public lands. The BLM studied the Wales Creek area and the Hoodoo

Mountain area under the authority of Section 603 of FLPMA, which directs the BLM to inventory, study, and report to Congress the suitability of certain lands for wilderness preservation. The BLM studied Quigg West under Section 202 of FLPMA. The WSAs are managed under BLM Manual 6330 until Congress decides whether to designate these areas as wilderness or release them to multiple use management. The BLM will prepare a wilderness management plan for any areas designated as wilderness by Congress. Thus, designating lands as wilderness or removing the WSA designations is outside the BLM's authority and beyond the scope of this revision.

1.6 Planning Criteria

The BLM will develop action alternatives to meet the purposes for the action, described above in section 1.2. Reasonable alternatives must make a substantial and meaningful contribution to meeting each of the purposes, rather than a minimal contribution. The alternatives will explore various ways of contributing to these purposes and meeting the requirements of the management guidance provided in this document.

In developing action alternatives, the BLM will:

- Complete the plan and associated environmental impact statement in compliance with the Federal Land Policy and Management Act (FLPMA); the National Environmental Policy Act (NEPA); the National Historic Preservation Act; the National Trails Act; Wild and Scenic Rivers Act; Endangered Species Act; Clean Water Act; Clean Air Act; Migratory Bird Treaty Act; Minerals Leasing Act; and other federal laws, regulations, and policies as required.
- Establish new guidance and identify existing guidance upon which the BLM will manage public lands within the Missoula Field Office.
- Provide opportunities for public participation throughout the planning process, including a preliminary alternatives outreach.
- Recognize and manage for valid existing rights.
- Work cooperatively with state and federal agencies, tribes, and local governments. Working closely with the U.S. Fish and Wildlife Service, the BLM will develop the action alternatives to provide sufficient detail in the analysis to facilitate RMP-level endangered species consultation. Working closely with the Montana Department of Environmental Quality, in coordination with the Environmental Protection Agency, the BLM will develop the action alternatives to satisfy state and federal water quality rules and regulations at the RMP level.
- Initiate consultation with Native American tribes to identify and discuss management options for any sacred sites located on BLM lands within the decision area.
- Consider relevant plans and policies of adjacent conservation system units, landowners, and local governments so that RMP decisions will be consistent to the degree reasonably practical.
- Consider public access and recreational opportunities when evaluating land tenure decisions consistent with Secretarial Order 3373.
- Conform to the BLM's H-1601-1 Land Use Planning Handbook, Appendix C; program-specific and resource-specific decision guidance; and applicable BLM manuals and handbooks as updated by program guidance.
- Incorporate by reference the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana/Dakotas; the BLM's H-9214-1 Fuels Management and Community Assistance Handbook; Best Management Practices for Forestry in Montana; the Montana Streamside Management Zone Law and Rules, and the Vegetation Treatments Using Herbicides FEIS.

- Create wildlife habitat management consistent with U.S. Department of the Interior guidance and the Montana Department of Fish and Wildlife objectives. Coordinate with the Montana Department of Fish, Wildlife, and Parks pursuant to Secretarial Order 3362 to enhance and improve the quality of big-game winter range and migration corridors on federal lands.
- Consider efforts to expand hunting, fishing, and recreational opportunities consistent with Secretarial Order 3347, Secretarial Order 3356, and Secretarial Order 3366.
- Geospatial data will be automated within a geographic information system (GIS) to facilitate discussions of the affected environment, alternative formulation, analysis of environmental consequences, and display of the results.
- Consider resource allocations that are reasonable and achievable within available technological and budgetary constraints.
- Incorporate environmental justice considerations in the action alternatives to respond to environmental justice issues facing minority populations, low-income communities, and Native American tribes living near public lands and using public land resources. The environmental justice analysis will use guidance provided in H-1601-1, Appendix D, Social Science Considerations in Land Use Planning Decisions.
- Incorporate best management practices (BMPs) for road drainage, grazing, Water Quality BMPs for Montana Forests, fire rehab, fire management, wind energy, power lines, and ESA-listed species.
- Develop action alternatives and provide cumulative effects analysis to provide a framework to simplify and facilitate project-level NEPA analysis for management actions implementing the RMP.
- Incorporate measures to protect against catastrophic wildfires consistent with Secretarial Order 3372.

1.7 Major Laws, Policies, and Plans

The Federal Land Policy and Management Act (FLPMA) has been the statutory authority for management of the BLM-managed lands since 1976. Subsequent laws affect management of the BLM-managed lands to varying degrees. Other laws, such as the Endangered Species Act and Clean Water Act, are directly applicable to how the BLM exercises its statutory authorities in managing the BLM-managed lands, but none of these laws repealed the underlying primary direction and authority in FLPMA. In addition to laws, the BLM has an array of other policies and plans that they consider throughout the RMP process. Other key laws, regulations, secretarial orders, and executive orders considered that may have a substantial effect on the development and design of the alternatives in this revision are summarized in Appendix F.

1.8 Relationship to other BLM Policies, Plans, and Programs

Under each alternative, this revision will not alter existing decisions with separate NEPA processes to support those decisions. The following BLM decisions will remain valid for continued implementation within the decision area until a future or separate BLM amendment or revision process:

- Approved Resource Plan Amendments/Record of Decision for Designation of Energy Corridors on Bureau of Land Management-administered lands in the 11 Western States (USDI-BLM 2009).
- 2016 ROD “Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States EIS” (USDI-BLM 2016).
- Record of Decision for Vegetation Treatments Using Herbicides on BLM Lands in Seventeen Western States (USDI-BLM 2007).

- Standards for Rangeland Health and Guidance for Livestock Grazing Amendment/EIS (USDI-BLM 1997).
- Secretarial Order 3347, *Conservation Stewardship and Outdoor Recreation*
- Secretarial Order 3356, *Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes and Territories*
- Secretarial Order 3362, *Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors*
- Secretarial Order 3366, *Increasing Recreational Opportunities on Lands and Waters Managed by the U.S. Department of Interior*
- Secretarial Order 3372, *Reducing Wildfire Risks on DOI Land through Active Management*
- Secretarial Order 3373, *Evaluating Public Access in Bureau of Land Management Disposals and Exchanges*

Chapter 2. Alternatives

For an RMP, there are potentially endless variations in design features or combinations of different plan components. The BLM has designed the range of alternatives in this draft RMP/EIS to span the full spectrum of alternatives that would respond to the purpose and need for the action. The BLM has developed the alternatives to represent a range of overall management approaches, rather than exemplify gradations in design features. Nevertheless, the alternatives do not provide all possible combinations of plan components. There are components of the alternatives that are somewhat separable, and the BLM may combine management objectives and management direction from these alternatives in developing the eventual Proposed RMP. In addition, the BLM could consider components of the No Action alternative for inclusion in the eventual Proposed RMP, along with any of the components of the alternatives.

2.1 Features Common to Action Alternatives

The action alternatives will:

- Comply with state and federal laws, regulations, standards, and Secretarial Orders, including but not limited to FLPMA multiple-use and sustained yield mandates.
- Preserve valid existing rights, which include any leases, claims, or other use authorizations established before a new or modified authorization, change in land designation, or new or modified regulations is approved.
- Continue management of the Garnet Winter Back Country Byway, which is part of the national scenic byway system. The goal of the Garnet Winter Back Country Byway is to highlight and interpret scenic, historic, archaeological or other interest values associated with Garnet Winter Back Country Byways in partnership with communities, interest groups, and state and federal agencies. The BLM manages it as a Type IV byway, specifically for winter use, and accommodate snowmobiling and cross-country skiing along the byway, and to enhance visitor experiences, while evaluating future trails or roads for potential inclusion to this byway.

Under action alternatives, the BLM would implement administrative actions at approximately the same levels as during the past decade. Administrative actions are routine transactions and activities that are required to serve the public and to provide optimum management of resources, including:

- Administrative access for BLM staff and authorized leases/permits/etc.
- Competitive and commercial recreation activities
- Special forest product collection permit issuance
- Lands and realty actions (including the issuance of grants, leases, and permits)
- Unauthorized use resolution
- Facility maintenance and improvements
- Road maintenance
- Hauling permit issuance
- Recreation site maintenance and improvement
- Hazardous materials removal

- Law enforcement
- Legal land or mineral estate ownership surveys
- Engineering support assistance in mapping field visits for the design of projects, include clearance inventories
- Tree sampling
- Project implementation and plan effectiveness monitoring
- Incidental live or dead tree removal for safety or operational reasons
- Wildlife, fisheries, or plant population or habitat monitoring.

2.2 No-action Alternative (Alternative A)

Alternative A is the No-action Alternative. Alternative A focused on forest management with an emphasis on forest products and big game habitats. Active vegetation management was important. Recreation, particularly hunting and fishing, was important as well as indicated by the five special management areas— Blackfoot River/Lewis and Clark Trail, Garnet National Winter Recreation Trails, Garnet Ghost Town, Blackfoot Block Management Area, and the Clark Fork River SRMAs. The BLM amended the plan to incorporate listed species under the ESA including the grizzly bear and Canada Lynx. The Lewis and Clark National Historic Trail was part of the Blackfoot River SRMA.

The land use allocations and management actions in the 1986 Garnet Resource Area RMP, as amended, are hereby incorporated by reference. Appendix N summarizes the key features of the no-action alternative, and section 2.7 includes a comparison of the no-action alternative to the action alternatives.

The 1986 Garnet RMP emphasized management areas. The action alternatives move away from the management area concept, and include allocations aligned with current regulation and policies. Additionally, the action alternatives provide a more criteria-based approach for habitats, particularly providing criteria for activities within habitats.

Table 3. Management areas in the 1986 Garnet RMP (alternative A: no-action alternative)

Management area number	Management area emphasis	1986 Garnet RMP (acres)	2018 actual acres (after land acquisitions/exchanges /disposals)
1	Riparian Protection Zone , with goals to: <ul style="list-style-type: none"> - Manage riparian areas to maintain or enhance their value for wildlife, recreation, fishery and aquatic habitat; - Provide some elements of old-growth or mature forest for wildlife habitat; - Provide opportunities to improve wildlife and fisheries habitat through specifically prescribed vegetative manipulation; and - Maintain or enhance site productivity, water quality, and stream stability. 	1,000	1,712

Management area number	Management area emphasis	1986 Garnet RMP (acres)	2018 actual acres (after land acquisitions/exchanges/disposals)
2	Riparian Multiple Use Zone , with goals to: <ul style="list-style-type: none"> - Manage riparian areas to maintain or enhance their value for wildlife, recreation, fishery, and aquatic habitat; - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions that maintain or improve riparian zone values; - Provide elements of old-growth or mature timber for wildlife habitat; and - Maintain or enhance site productivity, water quality, and stream stability. 	2,500	4,403
3	General Forest , with goals to: <ul style="list-style-type: none"> - Under the principles of sustained yield, management suitable and available commercial forest land with operational restrictions that maintain or improve riparian zone values; - Maintain or enhance site productivity, water quality, and stream stability; - Provide disperse recreation opportunities, wildlife habitat, and livestock use within the constraints of 1 and 2 above (other direction); and - Provide elements of old growth wildlife habitat in the immediate vicinity of important big game summer and fall habitat features such as wallows, licks, security areas, etc. 	36,900	27,063
4	Elk Summer and Fall Habitat Components , with goals to: <ul style="list-style-type: none"> - Maintain or improve elk summer and fall habitat components through specifically prescribed vegetative manipulation; - Provide elements of old growth or mature timber for wildlife habitat in the immediate vicinity of elk for summer and fall habitat components; - Manage riparian areas to maintain or enhance their value for wildlife, fisheries, aquatic habitat, recreation, watershed protection and water quality - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions that consider long-term requirements for elk summer and fall habitat components, including habitat conditions on adjoining lands; and - Maintain site productivity, water quality, and stream stability 	8,300	8,906

Management area number	Management area emphasis	1986 Garnet RMP (acres)	2018 actual acres (after land acquisitions/exchanges/disposals)
5	Big Game Summer and Fall Range , with goals to: <ul style="list-style-type: none"> - Provide a beneficial arrangement of forage and cover for big game summer and fall range through timber management activities; - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions that consider the long-term requirements of big game summer and fall habitat including habitat conditions on adjoining lands; and - Provide for dispersed recreation opportunities nongame wildlife habitat, and livestock use; - Maintain site productivity, water quality, and stream stability. - Provide elements of old growth or mature forest for wildlife habitat in the immediate vicinity of big game summer habitat components. 	48,850	57,801
6	Big Game Winter Range , with goals to: <ul style="list-style-type: none"> - Enhance forage production and cover for deer, elk or bighorn sheep on winter range; - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions for the maintenance or improvement of big game winter range; - Maintain site productivity, water quality, and stream stability; and - Provide for dispersed recreation opportunities, nongame wildlife habitat, and livestock use 	23,300	35,701
7	Non Commercial Forest & Timber Production Capability Classification withdrawn commercial forest , with goals to: <ul style="list-style-type: none"> - Maintain site productivity, water quality, and stream stability; - Provide for the harvest of wood products from noncommercial forest and timber production capability classification withdrawn commercial forest while maintaining or enhancing other woodland resource values; - Maintain old-growth, mature forest, and unique features for wildlife habitat; and - Provide opportunities for dispersed recreation activities. 	5,800	2,586
8	Areas recommended for Wilderness designation (Quigg West WSA) , with a goal to: <ul style="list-style-type: none"> - Manage in accordance with the Wilderness Act of 1964 and USDI BLM Wilderness Management Policy. These include the following basic concepts: preserve wilderness character in an unimpaired condition, provide opportunities for public use and enjoyment, and allow nonconforming but accepted uses in a manner that will prevent unnecessary or undue degradation of wilderness character. 	520	520

Management area number	Management area emphasis	1986 Garnet RMP (acres)	2018 actual acres (after land acquisitions/exchanges /disposals)
9	Special Management Areas , with a goal to: <ul style="list-style-type: none"> - Manage the special and unique features or values within that particular area. 	8,140	9,471
10	Developed and undeveloped recreation sites , with goals to: <ul style="list-style-type: none"> - Maintain and enhance the present variety and quality of recreation sites to contribute to public enjoyment of the resource area. - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions to maintain or improve recreational opportunities and scenic quality. - Maintain site productivity, water quality, and stream stability. 	41 sites	812
11	Historic and Cultural Sites , with a goal to: <ul style="list-style-type: none"> - Ensure that eligible historical and cultural sites are preserved and protected. 	160	219
12	Visual Corridor , with goals to: <ul style="list-style-type: none"> - Maintain or improve visual quality for highly sensitive, scenic areas; - Under the principles of sustained yield, manage suitable and available commercial forest land with operational restrictions to maintain or improve visual qualities; - Provide for dispersed recreation opportunities, wildlife habitat, and livestock use within the constraints of Goal 1; and - Maintain site productivity, water quality, and stream stability. 	7,850	12,177
13	Non forest habitat , with goals to: <ul style="list-style-type: none"> - Manage non-forest habitat to maintain or enhance forage for livestock and wildlife; - Maintain or enhance adjoining timber stands for wildlife cover; - Maintain site productivity, water quality, and stream stability; and - Provide opportunities for a variety of dispersed recreation activities in a natural setting. 	1,300	420
14	Mineral Production Area , with goals to: <ul style="list-style-type: none"> - Manage or utilize other resources to a degree compatible with mineral production; and - Restore water quality and rehabilitate site productivity and stream stability through reclamation. 	1,000	820
Total		145,661	162,611

2.3 Features common to Alternatives B and C

The two action alternatives comprise a range of management strategies the BLM designed to meet the purpose and need discussed in chapter 1, and to respond to input received during external and internal

scoping. These action alternatives examine potential management strategies through land use allocations, management objectives, and management direction. Some land use allocations, management objectives, and management direction are common to action alternatives, and some vary by action alternative, as described below. Each of the action alternatives described below include land use allocations designed to respond to the need and purposes for action.

The following section summarizes features that are common to action alternatives. The subsequent section contains a description of the features that differ among the action alternatives based on the key issues that address unresolved conflicts concerning alternative uses of available resources.

Air Quality

Objectives

01. Protect air quality related values in federal mandatory Class I areas. Ensure authorizations and management activities comply with federal and state-mandated air quality regulations and requirements. Class I areas or federal land manager-specified sensitive Class II areas.
02. Prevent exceedances of national, state, or local ambient air quality standards.
03. Follow the BLM's climate-related policies addressing greenhouse gas emissions and carbon storage.

Management Actions and Allowable Uses

01. Actions would comply with the Clean Air Act requirements, including compliance with the National Ambient Air Quality Standards (NAAQS), Montana Ambient Air Quality Standards (MAAQS), and the Montana State Implementation Plan.
02. For prescribed burns, continue to participate in the Montana Idaho Airshed Group to manage smoke impacts and coordinate with the Montana Department of Environmental Quality (MDEQ).
03. Use BMPs to reduce dust from unpaved road surfaces during extended management operations, such as timber sales and wildfires (Appendix P).
04. Follow the Air Resource Management Plan for activities that could negatively affect the status of air quality non-attainment or maintenance area.

Aquatic Habitat and Special Status Species

The BLM developed many of the management goals, objectives, and actions in this section based on those defined in INFISH (abbreviations in parenthesis indicate INFISH standards and guidelines carried forward in this plan). The Aquatic Conservation Strategy is located in Appendix B. Additional design features and best management practices are in Appendix P.

Goals

01. Contribute to the conservation and recovery of species and their habitats that are Endangered Species Act (ESA)-listed, proposed, and sensitive species including candidate species.
02. Provide healthy, functioning aquatic, riparian, and wetland areas that support native and desired non-native aquatic and terrestrial wildlife, and rare plant species populations and communities.

Objectives

01. Manage special status fish and other special status riparian-associated species in accordance with USFWS recovery plans, conservation agreements, and designated critical habitat.
02. Maintain and restore riparian areas, stream channels and wetlands by providing forest shade, sediment filtering, wood recruitment, stability of stream banks and channels, waters storage and release, vegetation diversity, nutrient cycling, and cool and moist microclimates.

Management Actions and Allowable Uses

01. Conduct habitat restoration projects to improve aquatic special status species in fish key watersheds as appropriate.
02. Apply project-level design features and BMPs as appropriate (Appendix P).

Riparian habitat conservation areas

01. Delineate riparian habitat conservation areas (RHCAs) at the project or activity level in response to potential issues for aquatic species and habitat; and develop site-specific riparian management objectives (RMOs) giving primary emphasis to riparian-dependent resources.
02. Design activities to maintain existing aquatic habitat; develop restoration projects ~~is~~ when aquatic habitat is not meeting desired conditions.
03. Activities in an RHCA shall not result in long-term degradation to aquatic conditions although limited short-term effects from activities may be acceptable when outweighed by long-term benefits.
04. Apply project design features and best management practices as appropriate at the project level (Appendix P).
05. Apply chemical herbicides, pesticides and toxicants in a manner that avoids adverse biological effects and does not retard or prevent attainment of RMOs. (RA-3)

Aquatic Invasive Species

01. Collaborate with partners to maintain aquatic habitats free of invasive species (zebra mussels, New Zealand mud snails, quagga mussels, etc.) and prevent expansion into water bodies.
02. Use BMPs for aquatic invasive species prevention and follow aquatic nuisance species management plans (appendix P).

Minerals Management

01. Prevent undue and unnecessary degradation to aquatic species and their habitat for locatable mineral exploration and development by determining RHCAs and the associated management objectives at the project level.

Roads and Infrastructure

01. Maintain desired aquatic conditions to meet RMOs and avoid adverse effects to special status aquatic species for existing and planned roads. (RF-2)
02. Manage for elimination, reduction, or minimize adverse effects from roads on aquatic resources, and address closure and rehabilitation of unneeded roads (RF-3c)

03. Maintain or improve roads in a condition that will not contribute sediment to streams that will hinder spawning habitat for fish. This could include maintaining vegetated ditch lines, improving road surfaces and installing cross drains at appropriate spacing. (RF-3b)

Vegetation and Wildland Fire Management

01. Vegetation management activities (fuel treatments, wildland fire suppression, harvest, fuelwood cutting, salvage, etc.) within the RHCAs will not prevent attainment of RMOs, and will be designed to minimize disturbance of riparian ground cover vegetation. (TM-1b)
02. Immediately establish an emergency or BAER team and develop a rehabilitation treatment plan to attain RMOs whenever RHCAs have been substantially damaged by a wildfire. (FM-5)

Lands and Rights-of-Way

01. Issue land use authorizations (leases, permits, rights-of-way) to avoid effects that would retard or prevent attainment of desired RMOs and avoid adverse effects on special status aquatic species or critical habitats. Where the authority to do so was retained, adjust existing leases, permits, and rights-of-way to eliminate effects that would retard or prevent attainment of desired RMOs, and avoid adverse effects on special status aquatic species. Where the authority to do so was not retained, negotiate to make changes in existing leases, permits, and rights-of-way to eliminate effects that would retard or prevent attainment of desired RMOs and avoid adverse effects on special status aquatic species. (LH-3)
02. Use land acquisition, exchange, and conservation easements to attain desired RMOs and facilitate restoration of special status aquatic species habitat. (LH-4)

Fish and Wildlife Habitat Restoration

01. Design and implement restoration projects in a manner that promotes the long-term ecological integrity of habitats, provides for the genetic integrity of native species, and contributes to attainment of RMOs. (FW-1, WR-1)
02. Cooperate with federal, tribal, and state fish management agencies to identify and eliminate adverse effects on aquatic special status species associated with habitat manipulation, fish stocking, fish harvest, and poaching. (FW-4)
03. Fish key watersheds would be a high priority for restoration when funding is available.

Cave and Karst Resources

Goals

01. Identify, protect, or restore significant cave and karst resource values, and ensure the resource is available for appropriate use by present and future generations.

Objectives

01. Ensure that proposed land uses initiated or authorized by the BLM avoid damage to significant cave and karst resources. Inventory and survey cave and karst resources to identify significance in accordance with the Federal Cave Resources Protection Act.
02. Provide opportunities for appropriate recreational use, scientific research, or educational study while protecting other significant resource values.

Management Actions and Allowable Uses

01. When appropriate, develop cave management plans for significant cave and karst resources.
02. Maintain a database of significant cave and karst features.
03. Monitor significant cave and karst resources to assess potential adverse impacts and develop responses as appropriate.

Cultural and Heritage Resources

Goals

01. Preserve, protect, and interpret cultural resources and ensure that they are available for appropriate uses by present and future generations.

Objectives

01. Reduce imminent threats from natural or human-caused deterioration, and/or reduce potential conflict with other resources by ensuring that authorizations for land and resource use.
02. Promote stewardship, conservation, and appreciation of cultural resources through education and public programs in accordance with the BLM Heritage Education Program.
03. Manage important archeological and historic sites, or areas of concentration of cultural resources occur, for the use based on the nature of the cultural resource and relative preservation value.

Management Actions and Allowable Uses

01. Evaluate documented cultural resources for NRHP eligibility. Protect NRHP eligible or listed sites through avoidance or other protection measures.
02. Comply with Section 106 of the NHPA for actions that have the potential to effect Historic Properties. Managers shall consider prudent and feasible alternatives to avoid adverse effects on cultural resources or their uses
03. Manage cultural resources in a stewardship role for public benefit. The public benefit is to analyze the scientific and sociocultural values of cultural resources; to provide a basis for allocation of cultural resources; to make cultural resources an important part of the planning system; and to identify information needed when existing documentation is inadequate to support a reasonable cultural resource-based land use allocation.
04. Assign identified or recorded cultural resources to cultural resource use categories in accordance with BLM Manual 8110 into one of the use allocations in Table 4.

Table 4. Cultural resource use allocations

Use Allocations	Desired Outcome	Management Action
Scientific use	Preserved until research potential is realized	Permit appropriate research including data recovery
Conservation for future use	Preserved until condition for use are met	Proposed protection measures/designations
Traditional use	Long-term preservation	Consult with Tribes; determine limitations; nomination priority is determined with consultation with appropriate cultural group
Public use	Long-term preservation, on-site interpretation	Determine limitations, permitted uses; high nomination priority
Experimental use	Protected until used	Determine nature of experiments; low nomination priority
Discharged from management	No use after recordation, not preserved	Remove protection measures

Forest Vegetation and Special Status Plant Species

Goals

01. Restore or maintain forests within the natural range of variability (NRV) for each habitat type group in terms of species composition, structure, density, and disturbance patterns. Emulate disturbance patterns in terms of intensity, frequency, and scale.
02. Create or maintain a mosaic of differing successional pathways across the landscape consistent with natural disturbance regimes for each habitat type group over space and time as appropriate to create and maintain wildlife habitat.
03. Create, maintain, and restore vegetative communities that are resilient to changing disturbance regimes (e.g., drought, wildfire, insects, and pathogens), allowing for shifting of plant communities, structure, and ages across landscapes.
04. Maintain, monitor, and restore populations of vegetative species listed as threatened or endangered by the U.S. Fish and Wildlife Service or listed as sensitive by BLM across the planning area.

Objectives

01. Increase the number of acres in each habitat type group that are within the mid-range natural range of variability for that habitat type group to restore ecological conditions consistent with suitable disturbance regimes.
02. Increase acres of treatment on the landscape where appropriate through management opportunities (mechanical, as well as prescribed fire) to emulate or restore natural disturbance patterns.
03. Manage wildland fires based on the objectives for the relevant fire management zone.
04. Manage vegetation structure, density, species composition, patch size, pattern, and distribution to reduce impacts of wildland fires and forest insect outbreaks that are outside the NRV.
05. Protect and maintain the genetic diversity of whitebark pine. Increase white pine blister rust resistance in future whitebark pine populations.

06. Promote development of fire-resilient forests for public safety, wildland firefighter safety, and to reduce the risk of catastrophic wildland fire. Work collaboratively with all land management partners to manage public, private, and tribal lands. Apply prescribed burns and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate levels to retain fire resilient conditions.

Management Actions and Allowable Uses

01. Apply site-specific treatments to emulate historic disturbance patterns within the historic range of variability in terms of intensity, frequency, and scale.
02. Design vegetation manipulation projects to improve wildlife habitat when and where possible. For example, create early stand initiation and mature multi-story for Canada lynx or other species.
03. To maintain nutrient cycling and provide for wildlife habitat features scatter materials not utilized as commercial forest products (seedlings, saplings, tops, branches, cull logs, and down woody material) on the forest floor where and when it would not contribute to fire hazard.
04. Strive to maintain or create the quantity of mature (late-successional) forest structure that is consistent with NRV for a given habitat type group to maintain or enhance habitat for species dependent upon mature forest structures. Location of these stands would shift across the landscape over time.
05. In the wildland-urban interface (WUI), prioritize fuels reduction to address site-specific conditions and objectives for public safety rather than moving vegetation toward NRV or managing for any other objectives.
06. Prioritize stands with characteristics indicating a high risk of developing epidemic levels of forest insects and/or disease for treatments to reduce risk across all habitat type groups.
07. Manage slash to be conducive to revegetation and advantageous to the passage of wildlife. Dispose of slash when necessary to reduce fire hazard in the WUI or to accomplish other resource objectives.
08. Document conditions of current and potential whitebark pine habitats. Protect potential or known rust-resistant seed sources. Use silvicultural practices, including prescribed fire, outlined in the BLM technical reference Conservation and Management of Whitebark Ecosystems on Bureau of Land Management Lands in the Western United States to restore and maintain WBP populations.
09. Refer to the Visual Resource section for management actions pertaining to forest vegetation management.
10. Maintain or, where practical, enhance site productivity on lands available for harvest:
 - (a) minimize insect and disease losses with harvesting and management practices;
 - (b) precommercially thin stands to maximize growth on crop trees; and (c) participate in tree-improvement cooperatives and use genetically improved seedlings in reforestation of these lands.
11. Apply project-level design features as appropriate (Appendix P).

Noxious and Invasive Plant Species

Goals

01. Prevent, reduce, and minimize the introduction of invasive species and the spread of existing invasive species infestations on BLM-managed lands.

Objectives

01. Treat infested areas in partnership with adjacent land managers.
02. Manage noxious weeds and invasive plants according to the principles of Integrated Weed Management.

Management Actions and Allowable Uses

01. Implement measures to prevent, detect, and rapidly control new infestation of noxious weeds in healthy plant communities (approximately 0 to 5 percent infestation) as a high priority.
02. Emphasize Integrated Weed Management efforts on species identified on the Montana State Noxious Weed List, county noxious weed lists, and the BLM invasive species list where feasible.
03. Prioritize Weed Management Areas (areas with agreement between landowners to manage for weeds) for treatments.
04. Use manual, mechanical, cultural, chemical, and biological (includes classical and targeted grazing by cattle, goats) treatments to manage invasive species infestations.
05. Treat invasive plants and host species for invasive forest pathogens in accordance with the most current vegetation treatment BLM EIS/amendment; implement the standard operating procedures described in the Record of Decision for the Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement.
06. Provide opportunities for education and awareness.
07. Use weed seed-free forage (hay, grains, cubes, pelletized feeds, straw, and mulch) on BLM-managed lands.
08. Maintain an updated inventory of and monitor treatment of noxious weeds on BLM-managed lands in partnership with other federal, state, and county partners.
09. Follow BMPs when conducting planned or permitted activities within BLM-managed lands whether conducted by BLM personnel or contractors. (See Appendix P.)
10. Continue cooperative agreements with county and state entities. Coordinate efforts, including education and outreach, with federal, state, county, and private landowners.

Paleontological Resources

Goal

01. Identify, preserve, and protect paleontological resources, and ensure they are available for appropriate use by present and future generations.

Objectives

01. Ensure that proposed land uses initiated or authorized by the BLM avoid inadvertent damage to significant paleontological resources.
02. Identify and prioritize areas for inventory based on paleontological resource potential for occurrence and known fossil localities.
03. Promote the stewardship, conservation, and appreciation of paleontological resources through appropriate educational and public outreach programs.

Management Actions and Allowable Uses

01. Require permits for individuals or institutions conducting paleontological investigations for scientifically significant fossils.
02. Require appropriate BMPs or design features for paleontological resources for proposed land uses initiated or authorized by the BLM (Appendix P)
03. Maintain a database of paleontological sites and localities.
04. Monitor known paleontological locales to assess potential adverse impacts and develop design features as appropriate.

Grassland and Shrubland Vegetation

Goals

01. Manage upland vegetation communities to move toward or remain in proper functioning condition, including a full range of herbaceous and shrub species.

Objectives

01. Maintain or enhance plant communities, by managing for priority plant species and their habitats (including but not limited to bitterbrush, rough fescue, and bluebunch wheat grass) to achieve desired ecological functions and vegetative conditions.
02. Protect BLM special status plant species and their habitats.
03. Manage upland vegetative communities to maintain or improve quality and quantity of domestic livestock and wildlife forage.
04. Manage plant communities that reflect the desired plant community appropriate for the ecological site. Where appropriate, use fire as a management agent to achieve or maintain disturbance regimes supporting healthy functioning vegetation conditions.
05. Improve or maintain the ecological status of BLM-managed land in the uplands to Standards for Rangeland Health (USDI-BLM 1997).

Management Actions and Allowable Uses

01. Design vegetation treatments to enhance vegetative health and/or habitat diversity consistent with desired conditions for vegetation and wildlife habitat.

Soil, Water, and Riparian-Wetlands

Goals

01. Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.
02. Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, to support healthy biotic populations and communities.

03. Water quality complies with federal and Montana State water quality standards, and achieves or is making significant progress toward achieving BLM management objectives.
04. Hydrologic function is retained within the NRV in coordination with management of basin vegetation.
05. There are adequate water rights for support of multiple uses and state-designated beneficial uses.
06. Riparian-wetland areas achieve, or make significant progress toward meeting, proper functioning condition, the minimum acceptable condition (USDI 2015).

Objectives

01. Maintain and secure water rights as needed for beneficial and multiple uses.
02. Manage water quality in cooperation with Montana DEQ for sampling, monitoring, and determinations according to terms of the Memorandum of Understanding.
03. Conduct soil rehabilitation and site restoration where feasible.
04. Manage public lands administered by BLM to not contribute to water quality impairment in 303d or TMDL waterbodies.
05. Inventory riparian-wetlands, assess for condition, and prioritize for management action; select and implement actions necessary to attain PFC objective(s); and conduct riparian-wetland restoration where feasible for areas deemed nonfunctional or functioning-at-risk.

Management Actions and Allowable Uses

01. Implement standards and guidelines for grazing administration as directed for soil and water resources.
02. Incorporate design features and best management practices in project design features, terms and conditions for activities such as livestock grazing, harvest, and others that may impact the soil, water, or riparian-wetlands (Appendix P). Develop site-specific BMPs when needed for project design to meet resource objectives.
03. Manage vegetation, soils, streams, and riparian-wetlands such that hydrologic function and character at multiple scales (basin, hillslope, stream reach, riparian/wetland site) is retained within the NRV. Identify site-specific management opportunities and priorities using a watershed approach and watershed assessment information.

Riparian

01. Manage riparian habitat conservation areas in coordination with upland vegetation and soils in consideration of overall watershed hydrologic function and NRV.
02. Manage all riparian habitat conservation areas to contribute to the support of state-designated beneficial uses, water quality, and habitat quality for aquatic and terrestrial fauna.
03. Manage BLM resource activities and uses such that riparian-wetland areas meet, or make significant progress toward meeting, proper functioning condition.
04. Use riparian assessment data to develop needed changes in resource management, as well as the design and implementation of monitoring efforts and restoration or enhancement projects.
05. Establish and maintain an inventory of riparian-wetland areas. Periodically assess the ecological status and functioning condition at no more than 10-year intervals.

06. Permit livestock grazing when compatible with meeting, or making significant progress toward meeting, proper functioning condition and attaining riparian management objectives.

Soils

01. Use soils and ecological site description information. Information is to be used (1) in conducting land health assessments to help achieve aquatic, riparian, and upland health; (2) to plan and implement emergency stabilization and land restoration affected by wildfire and other disturbances; (3) to evaluate and plan for potential effects of proposed land uses on system productivity and integrity; (4) to reduce, avoid or minimize potential adverse effects of BLM management actions; and, (5) to maintain the productivity of soil resources by minimizing physical, biological, and/or chemical degradation, and accelerated erosion.
02. Maintain soil productivity. Prioritize and develop activity plans to correct soil or water problems.
03. Use the Natural Resources Conservation Service Soil Survey to identify soil properties and limitations for silvicultural practices.

Water Quality

01. Implement management actions to reduce non-point source pollution and improve water quality where BLM-managed public lands or authorized activities are contributing to impairment of waterbodies listed as impaired by the State of Montana.
02. Restore water quality and rehabilitate site productivity and stream stability through reclamation. Apply corrective measures where unsatisfactory watershed conditions are identified.
03. Manage water quality under the MOU with Montana DEQ.
04. Report biannually to Montana DEQ on actions taken to improve water quality. Identify site-specific or basin-specific BMPs and rehabilitation techniques to meet water quality requirements.
05. Manage uses in Source Water Protection Areas in compliance with the Montana DEQ Source Water Protection program

Wildlife Habitat and Special Status Species

Goals

01. Manage habitat to conserve and recover species listed under the Endangered Species Act (ESA). Grizzly bear, Canada lynx, yellow-billed cuckoo, and red knot are listed threatened under the ESA. Wolverine are proposed for listing, candidate species are not represented, and Canada lynx critical habitat is designated. Missoula Field Office coordinates with United States Fish and Wildlife Service (USFWS) and Montana Fish, Wildlife, and Parks on ESA related issues.
02. Manage sensitive species and their habitats to prevent listing under the ESA by improving, maintaining, and restoring sensitive species habitats.
03. Manage long-term goals for NRV by providing diverse and well-distributed plant communities across the landscape by implementing principles of ecological forestry; while also ensuring there is habitat for native wildlife in sufficient quantity and quality to enhance biological diversity and conservation, and to sustain ecological, economic, and social values.
04. Manage to provide diverse and well-distributed plant communities across the landscape. Implement sound ecological principles, focusing on ecological forestry, when designing vegetation treatments, to emulate natural disturbance and plant community development.

05. Manage wildlife habitat in cooperation and partnership with local, state, federal, tribal, and non-governmental organizations.

Objectives

01. Contribute to the conservation and recovery of listed terrestrial wildlife species and their habitats through the current and future USFWS recovery plans or interagency strategies such as the Canada Lynx Conservation Assessment and Strategy, Canada lynx critical habitat designation, and the final NCDE Grizzly Bear Conservation Strategy in coordination with the USFWS through Section 7 consultation.
02. Reduce, minimize, or avoid fragmentation of large intact security habitat, important to special status species and other wildlife. Maintain functional blocks of security habitat for special status species and other wildlife across the landscape.
03. Manage travel corridors, such as ridges, saddles, and riparian areas, to link landscapes and geographic areas for wildlife movement, especially Canada lynx and grizzly bear. Avoid, minimize, or mitigate impacts to sensitive species travel habitats, travel corridors and linkages. Consider opportunities to avoid, minimize, or mitigate negative impacts to Montana species of concern.
04. Where appropriate, active management techniques consistent with Secretarial Orders 3362 and 3372 would be used to achieve, maintain and restore habitats.
05. Manage terrestrial special status species in a manner consistent with restoration, conservation, recovery plans, and conservation agreements; inventory and monitor in cooperation with USFWS; Forest Service; Montana Fish, Wildlife, and Parks; and Montana Natural Heritage Program.
06. Sensitive species are priority species and their habitats. Provide for priority terrestrial wildlife habitats including caves, cliffs, snags, down woody debris, sagebrush, and bitterbrush communities.
07. Follow the BLM manuals 6500, 6840, and 1745 or as amended.
08. Improve, maintain, and restore habitat for terrestrial wildlife in warm/dry, cool/moist, and cold/moist habitat type groups, also including upland vegetation. Mitigate (minimize or avoid) potential adverse effects.
09. Improve, maintain, and restore important wildlife habitat such as rare or limited seasonal habitats, corridors, linkages, blocks of intact functional habitat across the landscape, areas of low open road density, foraging areas, seasonal habitat components, and riparian areas.
10. Provide habitat to maintain viable and diverse populations of native plant and animal species, including special status species. Comply with Rangeland Health Standards, Standard #5 (USDI-BLM 1997).

Canada Lynx Specific

01. Develop vegetation management projects in Canada lynx habitat within lynx analysis units, and lynx critical habitat, to enhance and restore dense early stand initiation forage habitat and dense mature multistory forage and den habitat, in a mosaic pattern across the landscape over space and time.
02. In Canada lynx habitat within lynx analysis units, and in lynx critical habitat, mitigate surface-disturbing activities to avoid, minimize, or reduce potential adverse effects.

Grizzly Bear Specific

01. Follow the final interagency NCDE Grizzly Bear Conservation Strategy.
02. Develop a monitoring plan for the life of mineral activity within zone 1, where it is determined there is potential for adverse effects to the grizzly bear or its habitat resulting from leasable or locatable mineral activities. The monitoring plan would outline how changes in habitat and/or disturbance to bears will be monitored and how efforts to reduce or minimize effects (e.g., monitoring of mining reclamation measures) will be identified and funded.
03. Monitor the density of motorized routes open for public use during the non-denning season on BLM-managed lands and compare with the 2011 baseline.
04. Manage BLM-managed lands within zone 1 so there shall be no net increase above the 2011 baseline in open motorized route density (roads and trails) open to public during the non-denning season (April 1 to November 30). This does not apply to the following:
 - A. Motorized use by agency personnel or others authorized by the appropriate agency personnel;
 - B. Temporarily opening a road for a short period of time to allow for public firewood gathering and other authorized use;
 - C. Updated or improved road data without an actual change on the ground;
 - D. Changes in technology or projections that result in changed calculations without actual change on the ground (e.g., a switch in geodetic systems from the North American Datum of 1927 to the North American Datum of 1983);
 - E. A road closure location is moved a short distance to a better location (e.g., to the nearest intersection or turnout) to allow a turn-around providing for public safety, to reduce vandalism, or to improve enforcement of the road closure;
 - F. The agency exchanges, acquires, buys, or sells lands with motorized routes;
 - G. A change in an open road necessary to comply with federal laws;
 - H. Motorized use for mining activities (as authorized under the Mining Law of 1872) conducted in accordance with valid existing rights and applicable standards and guidelines;
 - I. A change in a motorized route necessary to address grizzly bear-human conflicts, resource damage, or human safety concerns;
 - J. Use of motorized routes in emergency situations as defined by 43 CFR 8340; and,
 - K. Temporary roads (see glossary).
05. Implement a food storage order in accordance with BLM policy.
06. Allow no new sheep allotments on BLM-managed lands in Zone 1. Allow no new livestock grazing allotments within Zone 1, except on acquired lands that had active cattle grazing at the time of the acquisition.
07. Reduce, minimize, or avoid impacts to habitat availability, such as foraging, denning, and cover, from surface-disturbing activities, with special emphasis given to spring and den habitat.
08. Adjust livestock lease terms and conditions on grizzly bear spring habitat to prevent or avoid adverse impacts.

Management Actions and Allowable Uses

01. Implement measures to prevent detect, and rapidly control new infestation of noxious weeds in healthy plant communities (approximately 0 to 5 percent infestation) as a high priority.
02. Identify timing and spatial restrictions at the project level for activities that might impact special status species and their habitats. Avoid, minimize, or mitigate human activities disrupting special status species habitats during their season of use, particularly during the breeding, and winter seasons.
03. Implement design features to restore habitats, and to avoid or reduce impacts to Bureau sensitive species, priority species, and migratory birds (Appendix P); develop site-specific design features or best management practices as appropriate.
04. Conduct wildlife habitat vegetation projects to:
 - A. Restore, maintain, or improve unsatisfactory or declining wildlife habitat;
 - B. Improve desired ecological conditions of plant communities for the purpose of maintaining or improving forage, nesting, breeding, security habitat, hiding and thermal cover, and travel corridors for a wide variety of terrestrial wildlife; and,
 - C. Improve, maintain, and restore NRV within habitat type groups.
 - D. Short-term effects with long-term benefits may occur during habitat improvement projects.
05. Use project management techniques aimed at restoring, maintaining, or improving habitats that include but are not limited to prescribed fire and managed wildland fire, prescriptive livestock grazing, planning, exclusion to intense disturbance, timber harvest and other mechanical methods.
06. Consider effects to native pollinators and appropriate BMPs or other design features for surface-disturbing activities (Appendix P)
07. Collaborate with USFWS and MFWP on pollinator data collection and management.
08. Provide habitat of sufficient quantity and quality, including connectivity and wildlife movement corridors, habitat complexity, forest openings, edges, and ecotones, to enhance biological diversity and provide quality, sustainable habitat for native wildlife species.
09. Create or maintain a mosaic of early, mid and late-succession forest conditions across the landscape consistent with natural disturbance regimes to create and maintain desired forest conditions for priority wildlife species.
10. Retain to the extent practicable, trees and snags with old-growth forest structure in grasslands/shrublands undergoing vegetation treatments, such as removal of conifer encroachment through mechanical thinning or prescribed burning.
11. Partner with Montana Department of Transportation and MFWP on wildlife crossings for forest carnivores and other wildlife as appropriate.

Big Game Specific

01. Across cool/moist habitat type groups, provide hiding and thermal cover habitat components near quality elk summer and fall habitat (such as wallows, mineral licks, corridors, etc.).
02. Across warm/dry habitat type groups, provide areas with dense early to mid-successional conditions on aspects to provide elk thermal and hiding cover near quality elk forage in winter range.

03. Across all habitat type groups, provide mature and late-successional forest components for security habitat near harvest units, parks, meadows, and grasslands.
04. Base the size of harvest units, except single tree or group selection, and thinning units upon natural disturbance patterns and ensure that they will have irregular shapes or reserve blocks within units to increase edge effect and maintain proper sight distances.
05. Retain large blocks of big game security habitat.
06. Consider objectives to maintain or improve big game summer and fall habitat during forest management activities.
07. Limit timber sale activity in big game winter range to as short a period as possible to minimize disturbance.
08. Dispose of road right-of-way slash in such a way that it does not pose a barrier to big game travel.

Livestock Grazing and Wildlife

01. Manage livestock allotments to mitigate negative impacts to riparian vegetation, upland vegetation, and big game winter and summer range.
02. Improve wildlife habitat, where necessary, by adjusting livestock lease terms and conditions to prevent or avoid negative impacts. This could include changes to the AUMs, season of use, or removal of livestock for a period of time.
03. Build new fences to standard specifications to allow safe passage and/or to keep native wildlife out of an area (Appendix P)
04. Install wildlife escape ramps in new and old livestock water developments.

Bats

01. Restore special habitat components or features contributing to bat species productivity.
02. Survey and assess caves, abandoned mines, talus, and late-succession forest for bat use at the project level. BLM would determine the need for bat-friendly closures for activities affecting bat use (foraging and roosting), such as caves and abandoned mines.
03. Use bat gates or other suitable devices to maintain bat habitat when bat use of caves or abandoned mines is determined. Public health and safety would take precedence over bat habitat if hazardous mine openings cannot be remedied with bat gates.
04. Collaborate with state and federal agencies in response to the spread of white-nose syndrome in bats.

Raptors

01. New and existing powerlines and substations constructed on BLM lands would comply with the most current raptor protection standards developed by the Avian Power Line Interaction Committee (APLIC 2012). See the Visual Resource section for management actions pertaining to forest vegetation management. Comply with BMPs and project design features for raptors when designing projects, resource management, decisions, monitoring, and restoration or enhancement projects.

Visual Resources

Goals

01. Manage visual resources in accordance with the objectives established for visual resource management classes.

Objectives

01. Manage the visual resources for overall multiple use in accordance with VRM classification objectives (currently described in the BLM Visual Resource Inventor Handbook (H-8410-1)).
 - A. VRM Class I - Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the landscape should be very low and must not attract attention.
 - B. VRM Class II - Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
 - C. VRM Class III - Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
 - D. VRM Class IV - Provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Management Actions and Allowable Uses

01. Allow forest management activities in VRM Classes II, III, and IV. For forest activities in VRM Class II, design activities to maintain or improve visual qualities and retain the character of the landscape over the long term. Short-term impacts are allowed as long as there is a long-term scenic quality character attainment.
02. Implement design features and best management practices for activities potentially impacting visual resources (Appendix P).

Wildland Fire Management

Goals

01. Emphasize firefighter and public safety as the first priority in every wildland fire and fuels management activity.
02. Restore and maintain desired ecological conditions consistent with appropriate fire regimes.
03. Manage wildland fire and fuels to reduce the risk of uncharacteristic wildland fires, as well as to protect, maintain, and enhance resources.
04. In partnership with local, State, and Federal partners, conduct fire mitigation and fire prevention activities to reduce human-caused wildfire ignition and improve public safety.
05. Minimize the adverse effects of wildland fire and wildfire suppression activities on resources.

06. Promote seamless wildland fire management planning across jurisdictions within the boundaries of BLM with interested parties.
07. Protect life and property by treating hazardous fuels on BLM-managed lands.

Objectives

01. Use FMZs and WUI to guide and prioritize wildland fire and fuels management activities. FMZ1 and the WUI would be the highest priority, while FMZ3 the lowest. Treatments include wildland fire, mechanical, manual, biological, and chemical.
02. Use rehabilitation to mitigate the adverse effects of wildland fire to soil, vegetation, and water resources in a cost effective manner.

Management Actions and Allowable Uses

01. In general, manage wildfires according to Fire Management Zone classification. Although the FMZ determination does not dictate exactly how every wildfire is to be managed, it will be used to guide and prioritize wildfire response and fuels management. Taking actions to limit fire growth is always an option for any wildfire in any FMZ. The strategy for any wildfire depends on many factors including the FMZ, current vegetation conditions, time of year, condition of fuels, risk management, resource availability, safety, protection agency, geographical area and national wildland fire activity, and smoke impacts.
 - A. FMZ1: High values at risk, or areas at high risk of catastrophic fire due to current vegetation conditions, where an unplanned wildland fire is likely to cause negative effects. These lands would generally be under a full suppression strategy. These lands are adjacent to and close proximity to the WUI, intermingled with private and state lands, and contain important cultural, recreational, economic, or biological resources. Fuels treatments including mechanical and prescribed fire will play a major role in these areas.
 - B. FMZ2: Wildland fire is desired to manage ecosystems, but there are constraints to using wildland fire. Constraints are many and vary greatly including current vegetation conditions, time of year, condition of fuels, risk management, resource availability, safety, protection agency, geographical area and national wildland fire activity, and smoke impacts. Prior vegetation treatments will aid in allowing wildland fire to be utilized to manage vegetative communities, and wildland fire is needed to maintain some of these prior vegetation treatments. The full range of fuels treatments including mechanical and prescribed fire on lands in this category will be important to the success of wildland fire management.
 - C. FMZ3: Wildland fire is desired to manage ecosystems, and there are fewer constraints to using wildland fire. In these areas, wildland fire could be allowed to play its natural role on the landscape. These lands include wilderness study areas, protected lands with wilderness characteristics, areas geographically far from values at risk, and where current vegetation conditions are favorable to meet resource objectives by carefully managing wildfires. While fuels treatments can and could occur here, management of wildfire would be the preferred treatment method.
02. Assist communities in developing and maintaining community wildfire protection plans.
03. Prioritize fuels reduction in WUI areas in conjunction with completed community wildfire protection plans.
04. Use the BLM's Emergency Fire Rehabilitation Handbook (H-1742-1) and Appendix J for implementing emergency fire rehabilitation projects following wildland fires. Separate

environmental analysis will only be completed for emergency fire rehabilitation projects that are outside the scope of activities described in Appendix J.

05. Locate incident bases, camps, helibases, staging areas, and other incident management activities outside of riparian areas. Exemptions will require line officer approval.
06. Avoid using retardant in WSAs, protected lands with wilderness characteristics, and ACECs. Exemptions will require line officer approval.
07. Select fire suppression methods to minimize or eliminate the impact on significant historic properties, ACEC values, and riparian areas.
08. Prescribed fire may be used to accomplish wildlife habitat and livestock forage objectives.

Minerals

Goals

01. Provide land use opportunities to explore and develop locatable minerals while preventing undue or unnecessary degradation to other resources.
02. Provide land use opportunities to explore and develop solid leasable and salable minerals while preventing or minimizing impacts to other resources.

Objectives

01. Identify resource-specific or mining best management practices (BMP), required design features to help in preventing unnecessary or undue degradation from locatable mineral exploration and development (Appendix P).
02. In accordance with 43 CFR 3809.2(a), review areas of interminable “temporary” segregation from the mining laws and restore these lands by opening to locatable mineral entry if a withdrawal is not recommended.
03. For areas requiring special management, identify required design features for leasable and salable mineral projects to meet other resource goals and objectives.

Management Actions Common to All Alternatives

01. See appendix P for a list of design features that are potentially applicable (determined at the project level) under energy and mineral exploration and development.
02. Coal: Under the first regulatory screening procedure at 43 CFR 3420.1-4(e), only the areas that have development potential may be identified as acceptable for further consideration for coal leasing; therefore, if a coal lease application is submitted to the BLM, the applicant must be able to adequately demonstrate development potential and the merit of their data. If the application is determined to be adequate and passes the remaining screening and unsuitability assessment procedures required by regulation, a land use plan amendment would be required before the BLM could issue a coal lease.

Forest Products

Goals

01. Manage forest resources to provide a sustainable flow of timber to support local economies through timber harvest.

02. Manage forested lands for multiple uses including commercial timber and other forest products commodity production, wildland fire resiliency, terrestrial and aquatic wildlife habitat, recreational uses and cultural resources.
03. Collaborate with all land management partners (federal, state, private, and tribal) to increase effectiveness and amount of lands treated to promote forest health.
04. Provide sales opportunities for special forest products that maintain a balance between public demand and desired vegetation conditions. Examples of special forest product sales include but are not limited to firewood, Christmas trees, house logs, posts and poles, vegetative cuttings, and conifer boughs.

Objectives

01. Manage forest resources to provide a sustainable flow of timber to support local economies through timber harvest. Maintain and annually update a 5-year sale plan to facilitate planning for and implementing timber sales. Establish a Probable Sale Quantity that will serve as a tool for sustainable flow of timber; the annual PSQ is not an upper limited as timber sale quantities will vary depending on fluctuations in timber market conditions, insect and disease epidemics, wildland fires, funding and staffing levels and other objectives.
02. Collaborative planning with land manager partners and response to forest health conditions related to catastrophic wildland fire and insect and disease epidemics will be a priority.

Management Actions and Allowable Uses

01. Implement project design features and best management practices to improve habitats for or to minimize effects to wildlife, aquatics, riparian areas, and other resources from forest management activities (Appendix P).
02. Commercial harvest of forest products is typically associated with vegetative restoration to a NRV and would be designed to meet multiple objectives some of which would include; forest management, wildlife habitat management, hazardous fuels reduction, hazard tree removal, special status species management, visuals, recreation, and travel management. However, commercial harvest of forest products would be the primary objective of management activities in some instances to meet goals and objectives of supporting local economies.
03. Timber salvage project areas would have some areas that are left untreated as retention patches to maintain wildlife habitat.
04. In areas with dead and dying trees (including retention patches), tree cutting would be allowed for human safety, fire rehabilitation and stabilization, and forest or stream restoration activities.
05. Silvicultural prescriptions would be created and implemented for commercial harvest activities and would be consistent with professionally acceptable methods related to site, species, habitat types, and regeneration methods appropriate in a given area.
06. Only standing dead and dying trees would be allowed to be taken as firewood unless live trees cutting area are designated. The BLM could designate specific areas for firewood cutting of live trees to meet resource objectives or BLM authorized uses such as leases and right-of-way.
07. To protect snag habitat for wildlife, dead trees greater than 24 inches d.b.h. would not be permitted to be cut for firewood unless they are within two tree lengths of an open road.
08. See Recreation section for firewood exception areas.

09. Montana forestry BMPs would be followed during implementation of commercial timber harvest or special forest product sales activities.
10. Insect and disease suppression treatments would be permitted to contain outbreaks and reduce the risk to other forest stands in the vicinity.

Livestock Grazing

Goal

01. Manage the public rangelands to provide for a sustainable level of livestock grazing consistent with multiple use and sustained yield.

Objective

01. The BLM would manage allotments in compliance with Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana/Dakotas (USDI-BLM 1997).

Management Actions and Allowable Uses

01. Allotments where Standards for Rangeland Health (USDI-BLM 1997) are not met and livestock grazing is a significant causal factor for non-achievement, then the BLM will take appropriate action to achieve or make progress toward achieving unmet rangeland health standards. Adjustments to the leases terms and conditions may include but is not limited to changes to animal unit months (AUMs), season of use, rest rotations, or removal of cattle from a portion or all of the allotment for a duration of time. Implementation or maintenance of range improvement projects may be required. Adjustments could occur at the project or activity-level.
02. Exclude developed recreation sites from livestock grazing, except where grazing is needed to maintain the desired plant community. Manage grazing by horses and other livestock used by recreationists in developed recreation sites through specific activity plans.
03. Livestock grazing use could be suspended after wildfire, prescribed fire, or non-fire vegetative treatments until grazing could continue as Standards for Rangeland Health were met.
04. The BLM will follow the BLM's 1997 Record of Decision for Standards for Rangeland Health and Guidelines for Livestock Grazing Management Final Environmental Impact Statement for Montana and North and South Dakota.
05. Modify grazing schedules and livestock management practices as necessary during drought conditions according to Bureau policy/guidance.
06. Newly acquiring lands would be evaluated to determine if they should be allocated for grazing, or designated as unavailable for livestock grazing in consideration of the management needs and objectives for the acquisition.
07. At the time a lessee voluntarily relinquishes a lease, the BLM would consider either the public lands where that permitted use was authorized should remain available for livestock grazing or be used for other resource management objectives. Follow current BLM policy and guidance in relinquishment process.
08. Changes to categories of allotments (I, M, C) would occur through plan maintenance.

Recreation and Visitor Services

Goals

01. Maintain and enhance a diverse array of quality recreation opportunities and benefits while providing educational opportunities, minimizing user conflicts, and promoting public safety.
02. Develop and maintain appropriate recreation facilities, balancing public demand, protection of Public Land resources, and fiscal responsibility.
03. Continue existing partnerships, and develop and maintain additional cooperative relationships with national, state and local recreation providers, non-profit organizations, other federal and state agencies, historic preservation groups, tourism entities and local recreational groups.
04. Pursuant to Secretarial Orders 3347 and 3356, provide opportunities for outdoor recreation that add to the participants' quality of life while contributing to local economies.

Objectives

01. A variety of dispersed and water based recreation activities are permitted and may be supported by the development of river access, trails, and trailhead facilities. Cooperative river management for recreation will be encouraged with appropriate BLM participation on the Clark Fork River, Blackfoot River, and Rock Creek.

Management Actions and Allowable Uses

01. Manage lands designated as a SRMA, ERMA or BCA – see Appendix L Recreation Management Areas for specific management direction.
 - A. Special Recreation Management Areas (SRMAs) are managed to protect and enhance a targeted set of activities, experiences, benefits and desired recreation setting characteristics. SRMAs may be subdivided into recreation management zones (RMZs) to further delineate specific recreation opportunities. Within an SRMA, recreation and visitor services management is a recognized and predominant land use plan focus, where specific recreation opportunities and recreation setting characteristics are managed to be protected on a long-term basis.
 - B. Extensive Recreation Management Areas (RMAs) are administrative units that require specific management consideration in order to address recreation use, demand, or recreation and visitor service program investments.
 - C. Backcountry Conservation Areas (BCAs) are managed to protect and enhance wildlife-dependent recreation.
02. Manage lands not designated a SRMA, ERMA or BCA to reduce user conflict and to provide visitor health and safety.
03. No outfitter and guide permits will be issued for hunting except in conjunction with adjoining Forest Service lands.
04. If the BLM acquires lands that are adjacent to special recreation management areas (SRMA), the BLM would manage acquired lands in accordance to the designated SRMA.

Travel and Transportation Management

Goals

01. Provide a balanced approach to travel management that offers a sustained flow of local economic benefits and minimizes or mitigates user conflict, safety concerns, and resource effects while

taking into consideration the unique attributes and values of the various travel management planning areas.

Objectives

01. Designate areas as Open, Closed, or Limited for motorized and non-motorized travel to minimize resource effects and conflicts of use. Motorized use includes snowmobiles and other off-highway vehicles.
 - A. Open: Motorized vehicle travel is permitted yearlong anywhere within an area designated as “open” to OHV and snowmobile use. Open designations are used for intensive OHV use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel (see 43 CFR 8340.05).
 - B. Limited: Motorized vehicle travel within specified areas and/or on designated routes, roads, vehicle ways, or trails is subject to restrictions. The limited designation is used where OHV and snowmobile use must be restricted to meet specific resource management objectives. Examples of limitations include: number or type of vehicles; time or season of use; permitted or licensed use only; use limited to designated roads and trails; or other limitations if restrictions are necessary to meet resource management objectives, including certain competitive or intensive use areas that have special limitations (see 43 CFR 8340.05).
 - C. Closed: Motorized vehicle travel is prohibited in the area. Access by means other than motorized vehicle is permitted. Areas are designated closed if closure to vehicular use is necessary to protect resources, promote visitor safety, or reduce use conflicts (see 43 CFR 8340.05).
02. Utilize an interdisciplinary approach to address resource and administrative access needs for completion of Comprehensive Travel and Transportation Management planning. Consider and address the full range of various modes of travel on public lands, motorized and non-motorized, including over-land, over-snow and fly-in access, as well as recreational opportunities and the demands for such uses.
03. Use a systematic process that considers the unique resource issues and social environments of each route-specific travel planning within Travel Management Areas.

Management Actions and Allowable Uses

01. Maintain the current management of the Travel Management Plan until subsequent Travel Management Planning at the activity-level with appropriate public involvement and NEPA analysis.
02. Update and maintain the road and trail database to correct mapping errors and refine decisions.
03. Restrictions and closures will be established for specific roads, trails or areas based on consideration of the following criteria: the need to promote user enjoyment and minimize use conflicts; the need to minimize damage to soil, watershed, vegetation, road beds or other resource values; the need to minimize harassment of wildlife or significant degradation of wildlife habitat; the need to promote user safety; and the need to cooperate with adjoining landowners.
04. Promote the use of shared trails whenever possible.
05. Manage the road system and implement road infrastructure and design features and best management practices (Appendix P).

06. Allow for temporarily opening a road for a short periods of time to allow for public firewood gathering and other authorized uses.
07. A road closure location is allowed to be moved a short distance (e.g., to the nearest intersection or turnout) to a better location to allow turn-arounds providing for public safety, to reduce vandalism, or to improve enforcement of the road closure
08. Any land acquired by the BLM over the life of the resource management plan will be managed similarly to the existing OHV area designations of adjoining BLM lands or as stated, or implied, in the transfer. Where clarification is absent, the BLM will manage acquired lands under the OHV limited area designation. The types of limitation will be set by implementation-level decisions; until these decisions are made, use may continue in the same manner and degree consistent with the purposes for which the acquisition was made
09. Cooperate with MFWP to adjust seasonal travel restrictions in accordance with big game hunting season extensions.

Withdrawals and Other Segregations

Goals

01. Protect significant resources or government investments.

Objectives

01. Utilize withdrawal recommendations with the least restrictive measures and of the minimum size necessary to accomplish the required purpose.

Management Actions Common to all Alternatives

01. Approximately 1,193 acres of Powersite Reservations and Federal Energy Regulatory Commission withdrawals under the authority of the Federal Power Act would remain in effect.
02. New withdrawal proposals that result in a transfer of jurisdiction to another federal agency will be considered on a case-by-case basis. Other agency requests for new withdrawals, or modification, extension, or revocation of existing withdrawals will be considered.
03. Existing withdrawals will be reviewed prior to their expiration to determine if a need exists to extend and/or modify the withdrawal. Should the review indicate that the purpose for which the lands were withdrawn is no longer valid, the withdrawal would be allowed to expire. If the purpose remains valid for a portion of the withdrawn lands, the withdrawal would be modified and extended.

Land Tenure

Goal

01. Improve resource management efficiency and provide public benefit as opportunities arise

Objectives

01. Retain public lands with high resource values, adjust land ownership to consolidate public lands, acquire lands with high resource values, and meet public and community needs.

02. Manage BLM lands according to its identified land tenure category: Category 1 (retention), Category 2 (retention-limited disposal), Category 3 (disposal). See Appendix Q for criteria and legal descriptions and Appendix H for maps.

Management Actions and Allowable Uses

01. Lands will be classified into three categories: Category 1 (Retention), Category 2 (Retention-Limited Disposal) and Category 3 (Disposal).
 - A. The BLM would retain Category 1 lands. Disposal would not be permitted.
 - B. The BLM would generally retain Category 2 lands. Exchanges and other conveyances would be permitted if in the public interest; FLPMA Sales would not be permitted.
 - C. The BLM would allow methods of land tenure actions, including sales, for Category 3 lands.
02. Managed newly acquire lands similar to adjacent BLM lands and the following criteria:
 - A. Lands acquired within special management areas with specific Congressional mandates (such as NHT) would be managed in conformance with established guidelines for those areas.
 - B. Lands acquired adjacent to administratively designation management allocations (such as BCAs or SRMAs) will be managed the same as the adjacent allocation.
 - C. Lands acquired without special values or management goals would be managed in the same manner as comparable surrounding public lands.
 - D. To the extent possible, management direction would be extended to newly acquired lands through plan maintenance.
03. Acquisitions and exchanges will adhere to law, regulation, and policy using appropriate and available funding sources including but not limited to the Land and Water Conservation Fund.
04. Acquisition will primarily be accomplished through purchase of land or interests in land from willing landowners using the Federal Land Transaction Facilitation Act (FLTFA) account if available, the Land and Water Conservation Fund (LWCF), or other funding sources. Acquisition of land may also be accomplished through donations to the BLM by nonfederal landowners. The BLM may acquire conservation easements to preserve open space, enhance public access, and protect important resource values.
05. BLM would generally reserve access rights in conveyance of lands that contain public access routes.
06. Land Tenure actions can be initiated by public request or proposal. These requests or proposals are considered on a case-by-case basis. The land tenure categories identify where land acquisitions could move forward for consideration of whether they are in the public interest. Consistent with Secretarial Order 3373, ensure that public access and recreational opportunities are important consideration of any land tenure adjustment (See land tenure criteria listed in Appendix Q).
07. Disposal, other than exchange, will be considered on a case-by-case basis through sale (by competitive, modified competitive, or direct methods). Applications for R&PP, jurisdictional transfer to other federal agencies, Color-of-Title, Carey Act Grant, State Grant, Railroad Grants, and Airport Grants would be considered and reviewed on a case-by-case basis.
08. Land ownership adjustment proposals, whether land exchange, acquisition of land or interests in land, or disposal, will be subject to environmental review including biological reports, cultural

and paleontological inventories, and hazardous materials assessments, as well as water rights documentation and minerals appraisal, if the mineral estate is included in the proposal

09. No BLM land in the Missoula Field Office is suitable for Desert Land Entry and Indian Allotments.

Access

Goals

01. Address public and administrative access needs across nonfederal lands.
02. BLM-managed lands would have reasonable access, while providing a balance of use, enjoyment and protection of resource.

Objectives

01. Acquire and maintain access to BLM-managed lands to improve management efficiency in coordination with other federal agencies, state and local governments, and private landowners

Management Actions and Allowable Uses

01. Legal public or administrative access would be pursued from willing landowners on a case-by-case basis as the need or opportunity arises. Acquisition efforts would be focused on Category 1 and 2 lands where no legal public or administrative access exists or where additional access is necessary to meet management objectives.

Land Use Authorizations

Goal

01. Consider requests for rights-of-way, land use permits, and leases.

Objectives

01. Designate transportation and utility corridors, as well as avoidance and/or exclusion areas.
02. Designate lands as exclusion or avoidance areas as appropriate.
03. Respond to public needs for use authorizations such as rights-of-way, leases, and land use permits while balancing for other resource use and protection.

Management Actions and Allowable Uses

01. Manage lands according to ROW Exclusion and Avoidance Areas:
 - A. ROW Exclusion Area: The BLM would manage ROW exclusion areas as unavailable for rights-of-way.
 - B. ROW Avoidance Areas: The BLM would manage ROW avoidance areas as generally not available for large-scale infrastructure; exceptions may be permitted based on type of and need for facility proposed; conflicts with other resource values and uses, including potential values and uses; and availability of alternatives and/or design features. ROWs may also be allowed if they support or promote management objectives for the area and/ or if the ROW does not impact the goals and objective of the area. For example, during site-specific planning, the BLM would allow an ROW only if compatible with riparian habitat conservation areas' RMOs, or if the historical and cultural values were not compromised.

02. Consider ROWs outside of avoidance and exclusion areas on a case-by-case basis with appropriate stipulations.
03. New right-of-way facilities will be located within or adjacent to existing rights-of-way, or corridors, to the extent practical, in order to minimize adverse environmental effects and the proliferation of separate rights-of-way.
04. Nonfederal landowners who are surrounded by BLM land will be allowed a degree of access that will provide for the reasonable use and enjoyment of the nonfederal land (BLM Manual 2801).
05. Requests for land use authorizations (rights-of-way, leases, or permits) will be analyzed and design features applied on a case-by-case basis through the environmental review process with applicable terms and conditions (Appendix P).
06. Manage ROW to the latest version of Suggested Practices for Avian Protection on Power Lines (APLIC 2006).
07. *Communication Sites*: Communication sites would be considered on a case-by-case basis consistent with management objectives of the area. New communication site users will be grouped into suitable existing sites to reduce impacts and expedite application processing. Communication site management plans will be completed prior to authorizing communication site uses in new areas.
08. *ROW Corridor*: The Approved Resource Management Plan Amendments/Record of Decision (ROD) for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States (USDI-BLM 2009) was approved on January 14, 2009. The Garnet RMP designated corridor was for electric only (Corridor 229-254).
09. *Revised State (R.S.) 2477*: Revised Statute (R.S.) 2477, which provided that “[t]he right of way for the construction of highways over public lands, not reserved for public uses, is hereby granted,” was repealed on October 21, 1976, by the Federal Land Policy and Management Act. FLPMA did not terminate valid rights-of-way established under R.S. 2477 prior to its repeal.
10. *Revised State (R.S.) 2477*: Current guidance is contained in WO IM No. 2006-159: Non-Binding Determinations of R.S. 2477 Right-of-Way Claims. Briefly, this guidance states that the BLM does not have the authority to make binding determinations on the validity of R.S. 2477 right-of-way claims. The BLM may make informal, non-binding determinations for its own land use planning and management purposes. A non-binding determination that the right-of-way exists is required before completing consultation with states or counties on any proposed improvements to a claimed R.S. 2477 right-of-way (i.e., any work beyond routine maintenance). It may also be appropriate before taking action to close or otherwise restrict the use of a claimed R.S. 2477 right-of-way.
11. *Unauthorized Use*: Attempt to reduce trespass through prevention, detection, and resolution. The priority for resolving trespass in an area is accorded to newly discovered ongoing uses, developments, or occupancies where resource damage is occurring and/or where there is a significant loss of revenue to the United States. In such cases, resolution is needed to halt and prevent further environmental degradation or revenue loss. Historic trespass cases where little or no resources damage is occurring are resolved as workloads permit.

Roads and Facilities

Goal

01. Manage facilities, including roads and trails, to provide for public access or administrative needs, while maintaining or protecting resource values and in coordination with other federal agencies, state and local governments, and private landowners.

Objective

01. Provide and maintain a road transportation system that serves resource management needs (administrative/commercial) and public use needs (recreational/domestic) for BLM-managed lands while mitigating impacts to resources.

Management Actions and Allowable Uses

01. Construct new permanent/temporary roads where needed to meet resource management objectives, including major culverts and bridges as necessary, to established BLM engineering design standards.
02. Apply BMPs as needed to road location, design, and construction (Appendix P).
03. Maintain existing roads to provide access for both resource management and casual use activities to established BLM maintenance standards while providing user safety, protecting water quality and facility investments, and in consideration of other resource issues.
04. Fully decommission and obliterate (permanent closure) roads with no future resource management need. Decommission (long-term closure) roads not currently needed for resource management but that will be operated and maintained again in the future. Apply as needed road closure BMPs. Close roads only with the approval of affected reciprocal right-of-way permittees.
05. Close and rehabilitate nonessential roads if expenditure of funds is justified.
06. Roads and trails on BLM-managed land under the jurisdiction of other entities will be maintained by the appropriate holder of rights within the provisions of the granting authority or right.
07. Manage to eliminate, reduce, or minimize adverse effects from roads on aquatic resources, and address closure and rehabilitation of unneeded roads
08. Provide and maintain fish passage at new, replacement, and reconstructed road crossings of existing and potential fish-bearing streams, unless barriers are determined beneficial for native fish and/or sensitive aquatic species conservation.
09. Maintain or improve roads within the RHCAs in a condition that will not contribute sediment to streams that will hinder spawning habitat for fish.
10. Avoid locating new roads or road-related facilities in RHCAs. Exceptions may be granted upon watershed or site specific analysis focused on how road design features would minimize or avoid adverse effects to aquatic and riparian resources at site-specific, reach, and watershed scales.
11. Avoid or minimize sediment delivery to streams from the road surfaces to attain and maintain desired aquatic habitat conditions in riparian areas and wetlands.
12. Design new, replacement, and reconstructed stream crossings (culverts, bridges, and other crossings).

Areas of Critical Environmental Concern

Goals

01. Protect relevant and important values and apply special management where standard or routine management is not adequate to protect the values from risks or threats of damage/degradation or to provide for public safety from natural hazards.

Objectives

01. Maintain or restore important relevant and important values in ACECs.

Management Actions and Allowable Uses

01. Implement activities necessary to maintain or restore important and relevant values found in the Preliminary ACEC Report (USDI-BLM 2018)
02. Manage ACECs for the identified relevant and important values. Livestock grazing and other activities not prohibited would be allowed so long as the activity did not degrade the relevant and important values and is compatible with preserving and enhancing the key values of the tract
03. Manage ACECs as land tenure Category 1 for retention.
04. Review and update existing activity plans as needed; create new activity plans to manage relevant and important values as needed.

National Trails**Goals**

01. Safeguard the nature and purposes; and protect and restore the Garnet Winter National Recreation Trail and the Lewis and Clark National Historic Trail resources, qualities, values, and associated settings and the primary use or uses.
02. For the Lewis and Clark National Historic Trail, protect the values set forth in the enabling legislation/designation and cooperatively work with the Trail Administrator for current and future national trails.

Objectives

01. Provide premier visitor experiences for public benefit for both National Trails.
02. Maximize opportunities for shared National Trail stewardship for both National Trails.
03. Avoid activities that are incompatible with the purposes for which the national trail was established for both National Trails.
04. Do not permit uses that would substantially interfere with the nature and purposes of the Lewis and Clark National Historic Trail
05. Identify and manage the historical route and historical remnants and artifacts for public use, enjoyment and vicarious trail experiences for the Lewis and Clark National Historic Trail.
06. Identify and manage high potential historical sites or high potential route segments, including the recommendation of additional Federal Protection Components for the Lewis and Clark National Historic Trail.

Management Actions and Allowable Uses

01. Management actions and allowable uses for the Lewis and Clark National Historic Trail varies by Alternative. Please see sections 2.4 and 2.5 of this DEIS.

Wild and Scenic Rivers

Goal

01. Identify river segments suitable for inclusion in the National Wild and Scenic River System.

Management Actions and Allowable Uses

01. Manage the Rock Creek segment (2.1 miles) on BLM-managed lands as eligible for its outstanding remarkable values of Fish, Geological, Recreation, Scenic outstanding remarkable values until the U.S. Forest Service evaluates suitability on the other 9 miles of Rock Creek.
02. Five eligible river segments—Belmont Creek, Blackfoot Segment 1, Blackfoot segment 2, Blackfoot segment 3, and Gallagher Creek—would be identified as non-suitable for inclusion in the National Wild and Scenic River System.

Wilderness Study Areas

Goal

01. Manage Hoodoo Mountain, Quigg West and Wales Creek WSAs so as not to impair their suitability for preservation as wilderness until such a time as Congress either designates them as wilderness or releases them from further study.

Objective

01. Manage the WSAs according to BLM Manual 6330 - Management of BLM Wilderness Study Areas until Congress acts upon the recommendations.

Management Actions and Allowable Uses

01. Manage the WSAs according to BLM Manual 6330 – Management of BLM Wilderness Study Areas until Congress acts upon the recommendations. Only Congress can designate or release lands.
02. The BLM will prepare a wilderness management plan for any areas designated as wilderness by Congress.

Public Safety: Abandoned Mines

Goals

01. Provide an appropriate management response to natural and human disturbances, emphasizing public and firefighter safety.

Management Actions and Allowable Uses

01. Prioritize abandoned mine land reclamation to address immediate problem sites that pose a threat to public health and safety. Abandoned mine land features impacting water quality, or that are in the vicinity of recreational use by the public are also assigned a high priority for closure and mitigation.
02. Reclamation activities would be conducted in accordance with land health standards and BMPs.
03. Survey and assess abandoned mines for bat use. Determine the need for closures or seasonal closures for activities affecting bat populations in abandoned mines, if present.

04. Use bat gates or other suitable measures when bat use of caves or abandoned mines is determined. Public health and safety would take precedence over protection of bat habitat if hazardous mine openings cannot be remediated with installation of bat gates.
05. Monitor abandoned mine land sites after reclamation.

Tribal Interests

Goal

01. Accommodate treaty and legal rights, including the Hellgate Treaty of 1895, of federally recognized Native American groups in management of public lands including the Confederated Salish and Kootenai Tribes.

Objective

01. BLM would notify and consult with tribes on BLM actions. Consultation and coordination would be conducted on a government-to-government basis with federally recognized tribes.

2.4 Alternative B (Preferred Alternative)

Alternative B is the BLM Preferred Alternative. Alternative B meets the purpose and need with an emphasis on healthy forests through active vegetation management while sustaining and enhancing ecological integrity for plant, wildlife, and fish habitat across the landscape.

This alternative provides for the most vegetation treatments and noxious weed treatments annually. Treatments would restore forested vegetative communities to achieve the mid-range of the natural range of variability sooner, and provide for the multiple terrestrial and aquatic species dependent upon these habitats. Treatments also restore and improve grassland and shrubland vegetative communities. Quantities of forest-based commodity resources from vegetation restoration activities would be the greatest.

This alternative emphasizes dispersed recreation opportunities, especially for hunting and fishing. Recreation would be a priority in five areas—the Lower Blackfoot Corridor, the Garnets (Garnet Ghost Town and winter trails), Chamberlain, Limestone Cliffs, and Ram Mountain—with updated management direction. Dispersed recreation would continue throughout the planning area. Alternative B also sets the stage for step-down travel management focused on snowmobiles, mountain biking, and hiking opportunities in the Lower Blackfoot and Garnet areas with the “Limited motorized travel” allocation.

Existing allotments of livestock grazing would remain available subject to the Rangeland Health Standards with flexibility at the site-specific level to adjust the terms and conditions such as season of use, rest rotations, AUMs, and more. More acres are available for prescriptive grazing under this alternative.

The ESA threatened or endangered species would continue to receive priority emphasis in accordance with USFWS recovery plans. Other priority species and habitats for management include Bureau sensitive species, big game, and migratory birds. Restoration of key species habitats would be important in this alternative. The Lewis and Clark National Historic Trail corridor would be 1/2 mile on public lands on either side of the centerline of the trail.

The following management objectives, management actions, and allowable uses would apply to alternative B in addition to the objectives and management actions outlined in the features common to all alternatives above.

Vegetation and Habitat Management

Forest Management

Forest management emphasizes ecological integrity, terrestrial and aquatic wildlife species habitat needs, and properly functioning watersheds while simultaneously providing forest products and creating forests resilient to disturbances such as wildland fire and epidemic insect outbreaks.

Objective: Treat approximately 15,000 acres per decade, with a goal of moving 10 percent per decade of forest vegetation that is currently near the lower or upper bounds of the natural range of variability (NRV) toward the midrange of NRV by using mechanical means or prescribed fire, or both.

Management actions: For forest management, the BLM would:

01. Design treatments to emulate disturbance and move conditions toward stand density, species composition and structure, which are within NRV for all habitat type groups.
02. Consider vegetation management treatments in warm dry habitat type groups a moderate to high priority based upon departure from NRV, and treatments in cool moist and cold habitat type groups a moderate to low priority based upon departure from NRV.
03. In cool moist and cold habitat type groups, forest management treatments would include the creation of openings to allow for regeneration; allow for precommercial or commercial thinning; and allow for production of commercial products such as timber and biomass.
04. Maintain and create mature forest conditions through active treatment and restoration activities. Design actions to develop stand structures that are relatively complex with variable tree densities, diverse understory composition, and abundant snags and downed logs. Where deficient on the landscape, create snags and down woody material for wildlife habitat.
05. Maintain adequate access for management activities and treatments including permanent or temporary roads as necessary. Determine road locations based on topography, drainage, soil type, and other natural features to minimize erosion. Rehabilitate skid trails and temporary roads by appropriate methods that disperse runoff, reduce erosion, and promote revegetation as needed.

Wildland Fire

Objective 1: Manage approximately 43,602 acres as Fire Management Zone 1, 88,365 acres as Fire Management Zone 2, and 30,643 acres as Fire Management Zone 3.

Objective 2: Within the 1-mile wildland-urban interface (WUI) buffer (approximately 7,648 acres) and Fire Management Zone 1, design and implement fuels treatments to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure. These treatments will be the highest priority on BLM administered lands and take precedence over other resources.

Management Action 1: Minimum impact suppression tactics would be used for wildland fire management in WSAs and, if released, in the Wales Creek ACEC. Wildland fire management in WSAs will follow BLM Manual 6330-Management of BLM Wilderness Study Areas.

Management Action 2: The use of heavy equipment for wildland fire management would not be allowed in WSAs, Wales Creek ACEC, and historic or cultural sites eligible for the National Register of Historic Places unless approved by line officer due to extraordinary circumstances (e.g., wildfire imminent in Garnet Ghost Town or Coloma).

Noxious and Invasive Species

Objective 1: Treat 21,000 to 50,000 infested acres of noxious and invasive species over the life of the plan.

Objective 2: Prioritize prevention and control on roads, trails, waterways, recreation sites, and disturbed sites due to other resource management projects; and prioritize prevention and control in special designation areas and cooperative weed management areas.

Soil, Water, and Riparian Resources

Regulations and policy drive the general programmatic management of these resources, and is thus, common to all alternatives. See appendix G for the objectives and management actions relevant to soil, water, and riparian-wetland resources. The BLM will manage riparian-wetlands with the minimum objective of proper functioning condition (PFC), or progress toward PFC, for riparian-wetlands with PFC potential.

Management Action: Through assessment of PFC, identify those elements that are limiting PFC attainment and develop actions that move toward PFC. These actions could be restoration (planting, invasive species removal, streambank stabilization) and/or changes in use (protective fencing, reduction in numbers or utilization).

Aquatic Habitat and Riparian Habitat Conservation Areas

The BLM would provide for riparian-wetlands and those areas influencing aquatic habitat. The BLM would delineate RHCAs at the site-specific level including criteria related to water and land features, and protect those values. This management approach is based upon INFISH and would be common to action alternatives.

Objective: Modify or relocate grazing practices that prevent attainment of desired aquatic habitat conditions or are likely to adversely affect special status aquatic species.

Terrestrial Wildlife Habitat, including ESA and Bureau Sensitive Species

The majority of terrestrial wildlife habitat management of ESA-listed species and Bureau-sensitive species is driven by law, regulation, and policy and common to action alternatives. Bureau manuals 6500, 6800, 1745, and secretarial orders pertaining to terrestrial wildlife habitat, and other direction would be followed.

Canada lynx. The BLM would follow the Canada Lynx Conservation Assessment and Strategy provisions applicable to key issues on BLM-managed lands common to all alternatives.

Objective 1: Develop vegetation management projects in Canada lynx habitat within lynx analysis units, and lynx critical habitat, to enhance and restore dense early stand initiation forage habitat and dense mature multistory forage and den habitat, in a mosaic pattern across the landscape over space and time.

Objective 2: Maximize lynx and snowshoe hare habitat to provide for Canada lynx recovery in the long term.

Objective 3: Create a mosaic of early stand initiation and mature multistory habitat within each lynx analysis unit and lynx critical habitat. The BLM would consider thinning methods, within lynx habitat and lynx critical habitat, in early stand initiation structure if treatments would result in short-term effects with long-term benefits to snowshoe hare, red squirrel, and lynx.

Objective 4: Fuels treatment projects within the WUI not meeting lynx conservation measures (due to protecting life, increasing the safety of firefighters, and protecting property, improvements, and infrastructure) may occur.

NCDE grizzly bear. The BLM would incorporate the final interagency NCDE Grizzly Bear Conservation Strategy and Bureau manuals 6500, 6840, and 1745. Specific management is common to all action alternatives described above.

Other terrestrial wildlife. The BLM would:

Objective 1: Improve, maintain, and restore habitat for terrestrial wildlife including special status species (ESA-listed and Bureau-sensitive species), rare or limited seasonal habitats, corridors, blocks of intact functional habitat across the landscape, areas of low open motorized road density, foraging areas, and riparian-wetlands. Prioritize terrestrial sensitive species and their habitats; and other priority species including big game, migratory birds, and species from Montana's Comprehensive Fish and Wildlife Conservation Strategy (MFWP 2005a).

Objective 2: Improve, maintain, and restore wildlife corridors and linkages utilizing vegetation management and safe passages.

Objective 3: Retain dead and down woody material in amounts consistent with the NRV and habitat type groups, to the extent compatible with reforestation objectives, fire hazard reduction standards, and public health and safety.

Objective 4: Open road densities would be maintained in zone 1 NCDE at 2011 baseline levels. Manage BLM lands within zone 1 so there shall be no net increase above the 2011 baseline (1.70 mi/mi²) in open motorized road density open to public during the non-denning season (April 1 to November 30). The exceptions outlined in the features common to Alternatives B and C would apply.

Key Resource Uses

Forest Products

Objective 1: Offer approximately 79 MMBF of timber for sale per decade (annual quantities will vary from less than the long-term average of 3.6 MMbf to around 15 MMbf) through forest product sales on an available land base of approximately 101,669 acres. Pursue additional contributions to the Probable Sale Quantity (PSQ) from approximately 13,264 acres available for harvest with limitations within Canada lynx habitat and RHCAs. Approximately 33,377 acres would be unavailable for harvest operations.

Objective 2: Build new permanent roads if necessary to facilitate long-term management of areas to meet forest resource objectives, and close temporary roads upon completion of project implementation. Replacement, maintenance, and decommissioning of existing roads to meet transportation planning and management objectives could also occur during forest product management projects if deemed appropriate at the project level.

Objective 3: Consider salvage forest products when resulting from wildland fire, forest insects and diseases, weather-induced or other forest mortality events, and salvage dead or dying merchantable timber in designated WUI or Fire Management Zone 1 areas within 2 years of when the tree mortality causing event started.

Objective 4: The special forest products (SFP) sale program would maintain current types of activities as well as the development of treatment areas to help meet public demand for SFP sale forest products. SFP

sales would only occur where sufficient physical access currently exists. No new permanent roads would be constructed to meet the demands of the SFP sale program.

Objective 5: Cooperate with the Forest Service to continue offering personal use firewood permits valid for product collection from both the BLM and USFS lands in western Montana, by following agency procedures such as a valid MOU.

Livestock Grazing

Allocation: Manage approximately 145,558 acres as available for livestock grazing, and 17,027 acres as unavailable for livestock grazing; and would administer 6,660 animal use months (AUMs) across the BLM-managed lands. Forage levels for livestock may vary at the project level, based on the implementation of comprehensive grazing strategies necessary to maintain or achieve vegetation objectives.

Management actions: For livestock grazing, the BLM would:

01. Manage allotments in compliance with Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana/Dakotas (USDI-BLM 1997). The BLM would adjust grazing levels and management practices when needed to meet or make progress toward meeting the standards for rangeland health.
02. Issue grazing leases for domestic livestock upon request. Prior to authorizing leases for domestic sheep in bighorn sheep habitat, coordinate with MTFWP.
03. Rest, limited forage utilization, or deferring areas from livestock grazing following major disturbance as appropriate, depending on a variety of factors including, but not limited to, resource objectives, the type of fuel, burn severity, accessibility of the burned area to livestock and post-burning climatic factors.
04. As allotments located within or adjacent to subdivisions on private lands become vacant, the BLM will evaluate the availability of livestock grazing on a case-by-case basis.

Land Tenure

Allocation: Manage approximately 59,462 acres in Category 1, and approximately 103,149 acres in Category 2.

Land Use Authorizations

Allocation: Manage approximately 46,988 acres as ROW avoidance areas for recreation management areas, ACECs, and the Lewis and Clark National Historic Trail corridor. Manage approximately 23,480 acres as ROW exclusion areas, and 236 acres as an ROW corridor.

Minerals

Allocation 1: Recommend approximately 283 acres for withdrawal from mineral entry (Garnet Ghost Town, 263 acres; Limestone Cliffs, 20 acres), and recommend approximately 20,211 acres of interminable temporary segregation as open to mineral entry.

Allocation 2: Close approximately 716 acres to leasable and salable minerals (Garnet Ghost Town RMZ, 424 acres; Conservation easements, 242 acres; Limestone Cliffs SRMA, 50 acres).

Recreation and Visitor Services

Management direction for recreation areas summarized below are included in detail in Appendix L.

Allocation 1: Designate five areas as SRMAs including the:

- **Lower Blackfoot Corridor SRMA**, approximately 19,543 acres will provide a wide array of outcome focused recreation opportunities for multiple skill levels and users while maintaining the scenic values. May include rafting, fishing, hiking, biking, hunting, scenic driving, motorized and non-motorized recreation. Continue working with partners to manage recreation and to develop recreation opportunities
- **Garnet SRMA**, approximately 28,183 acres in 2 recreation management zones: Garnet Ghost Town (424 acres); Garnet Trails (27,759 acres). Manage Garnet Ghost Town to provide day use activities to include guided and self-guided tours, interpretation and education, hiking, picnicking, and viewing the preservation of cultural resources. Also, manage winter cabin rental. Manage, maintain and expand the existing network of snowmobile trails in the Garnet Range, including the Garnet National Winter Recreation Trail and Garnet Winter Backcountry Byway.
- **Chamberlain SRMA**, approximately 19,307 acres would continue to offer a quality, walk-in hunting experience for the public including the local community, continue working with MFWP and the landowners in support of this experience and allow snowmobile riding.
- **Ram Mountain SRMA** (approximately 4,549 acres) would provide walk-in recreational opportunities for hunting, fishing, camping, and hiking adjacent to the Forest Service roadless area.
- **Limestone Cliffs SRMA** (approximately 50 acres) would provide rock-climbing opportunities while maintaining the educational and interpretive value of the limestone outcrops.

Travel and Transportation Management

Allocation 1: Manage approximately 133,770 acres as Limited motorized travel (OHVs limited to designated routes and trails, and snowmobiles limited seasonally and designated areas), and manage approximately 28,844 acres as Closed to motorized travel (OHV and snowmobiles) within the WSAs and Ram Mountain.

Special Designations and Lands with Wilderness Characteristics

Lewis and Clark National Historic Trail

Objective: Designate a corridor on public lands that is one-half mile on either side of the centerline of the Lewis and Clark National Historic Trail. The BLM would manage the corridor as an ROW avoidance area, VRM Class II, and limited off-highway vehicle allocation. Recreation use and opportunities would be oriented toward preserving and enjoying the trail experience—wildlife viewing, floating, fishing, hunting, hiking, biking and sight-seeing are compatible with those values and would be emphasized. For public safety, no grazing use would be allowed in the Lower Blackfoot Corridor portion of the trail corridor. Forest management, road building, and other activities may occur if compatible with preserving, restoring, and enhancing the key values of the Trail.

Areas of Critical Environmental Concern

Allocation: Under alternative B, the BLM would manage the Phil Wright Rock ACEC (640 acres) for its relevant and important values. If Congress were to release the Wales Creek WSA then approximately 5,602 acres would be managed as the Wales Creek ACEC for the pearlshell mussel population and unique geologic features in the area.

Table 5. Alternative B ACEC management direction

ACEC name	ROW	Motorized vehicles	Recreation	Livestock Grazing	Commercial Harvest	Mineral Materials	Locatable Minerals
Phil Wright Rock	Avoidance	Closed	Wildlife viewing, hunting, fishing, sight-seeing, and scenic values	Must be compatible with ACEC values	Must be compatible with ACEC values	Must be compatible with ACEC values	Plan of Operations

- **Phil Wright Rock** ACEC (640 acres): would continue to emphasize the wildlife, watershed, recreation, and scenic values of the area. Management actions would protect, maintain, and enhance (where feasible): bighorn sheep lambing habitat; bighorn sheep, elk, and deer yearlong and winter habitat values; the scenic qualities of the cliffs; recreation uses compatible with the primary values of the tract; fisheries habitat of Rock Creek; riparian vegetation of Rock Creek; and raptor nesting habitat of the cliffs. Recreation use and opportunities would be oriented toward preserving and enjoying the wildlife, watershed, and scenic values of the tract – wildlife viewing, fishing, hunting, hiking and sightseeing are compatible with those values and would be emphasized, no developed recreation sites or opportunities are being considered. Roads will not be constructed unless needed to meet specific management goals.

Wilderness Study Areas

Allocation: The Wales Creek, Hoodoos Mountain, and Quigg West WSAs will be managed under Manual 6330 so as not to impair their suitability for preservation as wilderness until Congress acts on the recommendation to designate them wilderness or to release them for multiple uses. The BLM will prepare a wilderness management plan for any areas designated as wilderness by Congress.

If Congress releases the Wales Creek WSA, then approximately 4,987 acres would be part of the Garnet Area SRMA (Trails RMZ), 995 acres would be part of the Chamberlain SRMA, and 5,602 acres would become the Wales Creek area of critical environmental concern. If Congress releases the Hoodoo Mountain WSA, the upper reaches of Wet Cottonwood Creek and surrounding area will be managed to emphasize riparian habitat, important forage areas, and security habitat for elk.

Lands with Wilderness Characteristics

Allocation: Multiple uses are the priority over protecting wilderness characteristics.

Cultural Resources

Allocation: Conduct Section 110 inventories as appropriate..

2.5 Alternative C

Alternative C emphasizes the greatest degree of conservation of fish and wildlife habitat, and conservation of cultural and historic resources. It also places an emphasis on allowing natural processes to occur in moving toward attainment of natural range of variability in forests.

Alternative C emphasizes wildlife-dependent recreation and moderate levels of resource use balanced with various human demands and land uses, while sustaining and enhancing ecological integrity for plant, wildlife, and fish habitat across the landscape.

This alternative provides for active restoration of vegetative communities to achieve the natural range of variability, but to a lesser extent than alternatives A and B. Treatments within forested and grassland

vegetative communities would emphasize terrestrial and aquatic habitat restoration. Quantities of forest-based commodity resources from vegetation restoration activities would be the lowest.

Alternative C also emphasizes dispersed recreation opportunities, especially hunting and fishing. Wildlife-dependent recreation (hunting, fishing, wildlife viewing) would be a priority in four areas through Backcountry Conservation Area designations— the northern Garnets (Chamberlain), the Hoodoos, Marcum Mountain, and Ram Mountain. Recreation would also be a priority in the Lower Blackfoot Corridor, but for a diversity of recreation experiences. Dispersed recreation would continue throughout the planning area. This alternative also sets the stage for step-down travel management focused on snowmobiles, mountain biking, and hiking opportunities in the Lower Blackfoot and Garnet areas with the “Limited motorized travel” allocation.

Existing allotments of livestock grazing would remain available subject to the Rangeland Health Standards with flexibility at the site-specific level to make adjustments to the terms and conditions such as season of use, rest rotations, AUMs, and more. Stricter requirements are triggered when rangeland health standards are not met, causal factor livestock grazing. Very few acres are available for prescriptive grazing under this alternative.

The ESA threatened or endangered species would continue to receive priority emphasis in accordance with USFWS recovery plans. Other priority species and habitats for management include Bureau sensitive species, big game, and migratory birds. Restoration of key species habitats would be a high priority in this alternative. The Lewis and Clark National Historic Trail corridor would be 1 mile on public lands on either side of the centerline of the trail. Wildlife habitat objectives would be similar to alternative B, but with a greater emphasis on conservation and restoration of terrestrial wildlife habitat. Riparian conservation criteria for project-level implementation would be similar to alternative B.

The following management objectives, management actions, and allowable uses would apply to Alternative C.

Vegetation and Habitat Management

Forest Management

Objective: Within all habitat type groups, the BLM would treat approximately 10,000 acres per decade with a goal of moving 8 percent per decade forest vegetation that is currently near the lower or upper bounds of the natural range of variability (NRV) toward the midrange of NRV by using mechanical means or prescribed fire, or both. The BLM would also:

- Design treatments to emulate disturbance and move conditions toward stand density, species composition, and structure, which are within NRV for all habitat type groups with an emphasis on creating conditions that are beneficial for wildlife habitat.
- Consider vegetation management treatments in warm dry habitat type groups a moderate to high priority based upon departure from NRV, and in cool moist and cold habitat type groups a moderate to low priority.
- In cool moist and cold habitat type groups, treatments would include the creation of small openings (10 acres or smaller) to allow for regeneration of shade-intolerant tree species, and would allow for precommercial or commercial thinning.
- Maintain and promote mature forest conditions. Design treatments that would protect stands in the late-successional phase of stand development; and maintain stand structures that are relatively complex with highly variable tree densities, healthy and diverse understory composition, and

abundant snags and downed logs. The BLM would proactively recruit few snags and little down woody material.

- Obliterate or decommission some roads if those actions would be beneficial to the quality of terrestrial and aquatic wildlife habitat.

Wildland Fire

Objective 1: Manage approximately 43,365 acres as Fire Management Zone 1, 50,861 acres as Fire Management Zone 2, and 68,385 acres as Fire Management Zone 3.

Objective 2: Within the 1-mile wildland-urban interface (WUI) buffer (approximately 7,648 acres), design and implement fuels treatments to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure. These treatments will be the highest priority on BLM administered lands and take precedence.

Management Action 1: Minimum impact suppression tactics would be used for wildland fire management in WSAs, lands where wilderness characteristics are protected, Phil Wright Rock ACEC, and, if released, Wales Creek ACEC. Wildland fire management in WSAs will follow BLM Manual 6330-Management of BLM Wilderness Study Areas.

Management Action 2: The use of heavy equipment for wildland fire management would not be allowed in WSAs, on lands where wilderness characteristics are protected, Phil Wright Rock ACEC, Wales Creek ACEC, and historic or cultural sites eligible for the National Register of Historic Places unless approved by line officer due to extraordinary circumstances (e.g., wildfire imminent in Garnet Ghost Town or Coloma).

Soil, Water, and Riparian Resources

Regulations and policy drive the general programmatic management of these resources, and is therefore described above under features common to alternatives B and C.

Objective: Move toward potential natural community (PNC). The BLM will manage riparian-wetlands with the minimum objective of PFC, and for progress toward PNC.

Management Action 1: Through assessment of PFC, identify those elements that are limiting PFC attainment and develop actions that move toward PFC. These actions could be restoration (planting, revegetation, invasive species removal, streambank stabilization, beaver reintroduction, structures) and/or changes in use (protective fencing, reduction in numbers or utilization).

Management Action 2: For riparian-wetlands meeting PFC, assess the potential for meeting or progressing toward PNC. Where PNC may be attainable, implement restoration projects or management practices to aid in PNC attainment.

Noxious and Invasive Species

Objective: Treat 16,000 to 38,000 infested acres of noxious and invasive species over the life of the plan.

Management action 1: Use bio-control to the extent possible, rather than herbicide, to manage invasive weeds.

Management action 2: Prioritize prevention and control on roads, trails, waterways, recreation sites, and disturbed sites due to other resource management projects; and prevention and control weed management areas would be a secondary priority.

Terrestrial Wildlife

Canada lynx. The BLM would follow the Canada Lynx Conservation Assessment and Strategy provisions applicable to key issues on BLM-managed lands common to all alternatives.

Objective 1: Maximize lynx and snowshoe hare habitat and provide for recovery of Canada lynx in the long term with emphasis on managing vegetation in lynx habitat and critical habitat for the benefit of lynx, snowshoe hare, red squirrels, and other prey species.

Objective 2: Create a mosaic of early stand initiation and mature multistory habitat within each lynx analysis unit and lynx critical habitat. Develop a lynx analysis unit-wide plan to enhance early stand initiation and mature multistory habitat.

Objective 3: Fuels treatment projects within the WUI not meeting lynx conservation measures (due to protecting life, increasing the safety of firefighters, and protecting property, improvements, and infrastructure) may occur.

NCDE grizzly bear. The BLM would incorporate the final interagency NCDE Grizzly Bear Conservation Strategy and Bureau manuals 6500, 6840, and 1745. Specific management is described in features common to Alternatives B and C above.

Other terrestrial wildlife. The BLM would:

Objective: Designate four backcountry areas (BCAs): Chamberlain BCA (approximately 18,145 acres), the Ram Mountain BCA (approximately 4,549 acres), the Hoodoos BCA (approximately 12,533 acres), and the Marcum BCA (approximately 11,162 acres). BCAs provide for dispersed wildlife-dependent recreation, and emphasize conserving, maintaining, restoring, and enhancing high-quality habitat for wildlife-dependent recreation. Within the BCAs, reduce, minimize, or avoid fragmentation of large intact big game security habitat. Maintain functional blocks of security habitat for big game. Reduce, minimize, or avoid fragmentation of large intact big game security habitat. Manage big game corridors and linkages to provide for movement.

Management actions: for terrestrial wildlife, the BLM would:

01. Prioritize vegetation management to design treatments for the benefit of special status species.
02. Implement design features for resident birds, migratory birds, and Montana Species of Concern.
03. Retain dead and down woody material in amounts consistent with the NRV and habitat type groups.
04. Reserve areas between treatment units will be a minimum of 600 feet wide unless topographic features maintain appropriate sight distances. Defer timber harvest adjacent to past cutting units until regeneration provides hiding cover.
05. Open motorized road density would be maintained in the Zone 1 NCDE, and big game winter ranges at 2011 baseline levels (1.70 mi/mi²).

Aquatics Habitat and Riparian habitat conservation areas

The BLM would provide for riparian-wetlands and those areas influencing aquatic habitat. The BLM would delineate RHCAs at the site-specific level including criteria related to water and land features, and protect those values. This management approach is based upon the concepts of INFISH and would be common to all action alternatives.

Management action: Modify or discontinue grazing practices that prevent attainment of desired aquatic habitat conditions or are likely to adversely affect special status aquatic species.

Key Resource Uses

Forest Products

Objective 1: Offer approximately 66 MMBF of timber for sale per decade (annual quantities will vary from less than the long-term average of 3.6 MMbf to almost 15 MMbf) through forest product sales on an available land base of approximately 100,465 acres, and pursue additional contributions to the PSQ from approximately 13,264 acres available for harvest with limitations. This allocation includes acres within the RHCA and lynx habitat inside the lynx analysis unit. There would be approximately 34,580 acres unavailable for harvest operations, which would include wilderness study areas, roaded acres, protected lands with wilderness characteristics, and RHCAs.

Objective 2: Prohibit new permanent roads for vegetation management activities. Minimize temporary road construction; decommission temporary roads upon completion of project implementation. Conduct forest treatments only in areas already accessible by the current road system, although helicopter logging may be feasible in difficult-to-access areas.

Objective 3: Consider salvage forest products resulting from wildland fire, forest insects and diseases, weather-induced or other forest mortality events if beneficial to wildlife habitat.

Objective 4: The SFP sale program would maintain current types of activities to help meet public demand for small sale forest products. SFP sales would only occur where sufficient physical access currently exists. No new permanent roads would be constructed to meet the demands of the SFP sale program.

Objective 5: Removal of standing dead or down trees or dead woody material for commercial or personal use firewood purposes would be authorized only in designated areas.

Livestock Grazing

Allocation: Manage approximately 107,341 acres as available for livestock grazing, and approximately 55,244 acres as unavailable for livestock grazing; and would administer approximately 6,014 AUMs across the BLM-managed lands. Forage levels for livestock may vary at the project level, based on the implementation of comprehensive grazing strategies necessary to maintain or achieve vegetation objectives and wildlife habitat objectives.

Management actions: For livestock grazing, the BLM would:

01. The BLM would manage allotments in compliance with Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana/Dakotas (USDI-BLM 1997). The BLM would adjust grazing levels and management practices when needed to meet or make progress toward meeting the standards for rangeland health. If an allotment failed to meet standards causal factor livestock grazing after two consecutive rangeland health assessments, then the BLM would remove grazing from an appropriate portion of the allotment until the standard could be achieved.
02. Prohibit leases for domestic sheep or goats within bighorn sheep habitat.
03. Rest livestock grazing for a minimum of two grazing seasons (March 1 to February 28) after a major disturbance.
04. Recommend a stubble height of 6 inches in livestock grazing leases.

05. As allotments located within or adjacent to subdivisions on private lands become vacant, the BLM will evaluate the availability of livestock grazing on a case-by-case basis. The BLM would make unavailable to grazing those allotments that have generally been vacant or inactive for 5 years or more.

Land Tenure

Allocation: Manage approximately 63,027 acres in Category 1, 94,139 acres in Category 2, and 5,445 acres in Category 3.

Land Use Authorizations

Allocation: Manage approximately 55,062 acres as ROW avoidance areas (2 SRMAs, 4BCAs); approximately 39,490 acres as ROW exclusion areas (WSAs, Lewis and Clark National Historic Trail, protected lands with wilderness characteristics, Phil Wright Rock ACEC, Limestone Cliffs ACEC) and 236 acres as an ROW corridor.

Minerals

Allocation 1: Recommend approximately 1,015 acres for withdrawal from mineral entry (Phil Wright Rock ACEC, 640 acres; Garnet Ghost Town, 355 acres; Limestone Cliffs ACEC, 20 acres), and would recommend opening 19,531 acres of interminable temporary segregation as open to mineral entry.

Allocation 2: Close approximately 14,153 acres to leasable and salable minerals (Lewis and Clark NHT, Phil Wright Rock ACEC, conservation easements, Garnet Ghost Town RMZ, Limestone Cliffs ACEC).

Recreation and Visitor Services

Management direction for recreation areas summarized below are included in detail in Appendix L.

Allocation 1: Designate the Lower Blackfoot Corridor SRMA, approximately 19,543 acres, and the Garnet SRMA, approximately 26,980 acres, and manage same as Alternative B.

Allocation 2: Designate four BCAs:

- **Chamberlain BCA** (approximately 18,138 acres) would continue to offer a quality, walk-in hunting experience for the public, including the local community, and continue working with MFWP and the landowners in support of this experience, while also providing for other dispersed wildlife-dependent recreation opportunities including camping, wildlife viewing, and hiking. Provide for and enhance high-quality habitat for recreationally dependent fish and wildlife species.
- **Ram Mountain BCA** (approximately 4,549 acres) would provide dispersed wildlife dependent recreation opportunities including hunting, camping, wildlife viewing, and hiking. Provide for and enhance habitat for recreationally dependent wildlife species.
- **Hoodoos BCA** (approximately 12,533 acres) would provide dispersed wildlife-dependent recreation opportunities including hunting, camping, wildlife viewing, and hiking. Provide for and enhance habitat for recreationally dependent wildlife species.
- **Marcum BCA** (approximately 11,162 acres) would provide dispersed, high-quality wildlife-dependent recreation opportunities including hunting, camping, wildlife viewing, and hiking. Provide for and enhance habitat fish and wildlife species.

Travel and Transportation Management

Allocation 1: Manage approximately 131,696 acres as Limited motorized travel (OHV limited to designated routes and trails, and snowmobiles limited seasonally and designated areas), and manage approximately 30,918 acres as Closed to motorized travel (OHV and snowmobile).

Special Designations and Lands with Wilderness Characteristics

Lewis and Clark National Historic Trail

Objective: Designate a corridor on public lands that is 1 mile on either side of the centerline of the Lewis and Clark National Historic Trail. Within the corridor, the BLM would manage for an ROW exclusion, VRM Class II, Limited motorized travel allocation, and closed to mineral materials and leasable minerals. Recreation use and opportunities would be oriented toward preserving and enjoying the trail experience—wildlife viewing, fishing, hunting, hiking, biking and sightseeing are compatible with those values and would be emphasized. For public safety, no grazing use would be allowed in the Lower Blackfoot Corridor portion of the trail corridor. Activities within the trail corridor such as forest management and road building may occur if compatible with preserving, restoring, and enhancing the key values of the tract.

Areas of Critical Environmental Concern

Allocation: Manage the Phil Wright Rock ACEC (640 acres) and the Limestone Cliffs ACEC (20 acres) for their respective relevant and important values. If Congress releases the Wales Creek WSA, then approximately 5,602 acres would become the Wales Creek ACEC for the pearlshell mussel population and unique geologic features in the area..

Table 6. Summary of ACEC management direction for alternative C

ACEC name	ROW	Motorized vehicles	Recreation	Livestock Grazing	Commercial Harvest	Mineral Materials	Locatable Minerals
Phil Wright Rock	Exclusion	Closed	Wildlife viewing, hunting, fishing, sight-seeing, and scenic values	Must be compatible with ACEC values	Set aside	Closed	Recommend withdrawal (640 acres)
Limestone Cliffs	Exclusion	Limited	use oriented toward preserving and enjoying the geologic and scenic features of the tract - wildlife viewing, hunting, educational/interpretive tours are compatible with the values of the tract, rock climbing must not degrade relevant and important values	Must be compatible with ACEC values	Must be compatible with ACEC values	Closed	Withdrawn

- **Phil Wright Rock ACEC** (640 acres): BLM would continue to emphasize the wildlife, watershed, recreation, and scenic values of the area. Activities not explicitly prohibited must not degrade and must be compatible with the relevant and important values of the tract. No new or temporary roads would be constructed. Wildland Fire management should use “minimum impact suppression tactics”

or “light hand on the land” suppression techniques wherever possible, while providing for the safety of firefighters and the public and meeting fire management objectives.

- **Limestone Cliffs ACEC** (20 acres): the BLM would protect, maintain, and enhance the scientific, educational, and recreational values of the Limestone Cliffs ACEC. Roads would not be constructed unless needed to meet specific management goals.

Wilderness Study Areas

Allocation: The Wales Creek WSA, Hoodoos Mountain WSA, and Quigg West WSA will be managed under Manual 6330 to not impair their suitability for preservation as wilderness until Congress acts on the recommendation to designate wilderness or to release to multiple uses. The BLM will prepare a wilderness management plan for any areas designated as wilderness by Congress.

If Congress releases the Wales Creek WSA, then the BLM would manage approximately 4,987 acres as part of the Garnet Area SRMA, approximately 995 acres as part of the Chamberlain BCA, and approximately 5,602 acres as the Wales Creek Area of Critical Environmental Concern. If Congress releases the Hoodoo Mountain WSA, then the BLM would manage approximately 11,380 acres as a Hoodoos BCA.

Lands with Wilderness Characteristics

Allocation: Under alternative C, the BLM would protect the wilderness characteristics in the five identified areas covering approximately 2,523 acres. The acres would be a VRM Class II, ROW exclusion area, closed to mineral material sales, closed to motorized travel, and closed to construction of new roads. Vegetation treatments and prescribed fire would be allowed to maintain and improve naturalness in the long term - emphasize prescribed fire and hand tools over mechanized equipment. For wildfire suppression MIST or light hand on the land suppression tactics should be used, while providing for the safety of firefighters and the public and meeting fire management objectives

Cultural Resources

Allocation: Conduct 200 acres of Section 110 inventory annually.

2.6 Alternatives Considered but Not Analyzed in Detail

The BLM considered the following alternatives but eliminated each one from detailed analysis because they did not meet the purpose of and need for the RMP or because they were outside of the technical, legal, or policy constraints of developing an RMP for BLM-managed resources and resource uses in the planning area.

Theodore Roosevelt Conservation Partnership proposal

The Theodore Roosevelt Conservation Partnership submitted a proposal for allocating 54,331 acres of BLM-managed lands as backcountry conservation areas.

The BLM considered the Theodore Roosevelt Conservation Partnership proposal and analyzed a similar alternative in detail. Although not the exact proposal in detail, the BLM reduced acres that would not be feasible for management due to road infrastructure, distance from the primary BCA polygon, and the potential for user conflicts.

Close Entire Decision Area to Livestock Grazing

The BLM considered an alternative that would close all of the BLM-managed surface lands to livestock grazing but eliminated it from detailed analysis for several reasons: First, the overarching purpose and need of the RMP is to ensure public lands are managed in accordance with FLPMA under the principles of multiple use and sustained yield. Providing for multiple use and sustained yield does not mean that every resource use is available on every acre of public lands, or that every resource will be managed for on every acre of public lands. The complete exclusion of any resource use from the planning area—recreation, livestock grazing, etc.—does not meet the RMP’s stated purpose and need. Rather, the RMP alternatives will analyze varying levels of resource uses and conservation, the intensity levels of both will vary by alternative. Where there are identified conflicts among resources and/or resource uses, the alternatives will provide a range of options for addressing identified conflicts across a planning scale.

Next, the BLM did not identify any issues or conflicts during this land use planning process that would require the complete elimination of livestock grazing within the decision area. Further, the BLM has considerable discretion through livestock grazing regulations to determine and adjust stocking levels, seasons of use, and livestock grazing management activities, as well as forage allocation.

Closure to grazing is not the only available mechanism to reduce grazing-related impacts. If livestock grazing is identified as a significant factor for not achieving or moving toward achieving land health standards, or if monitoring shows an adjustment is needed, then implementation-level management changes can be made in coordination with the permittees and interested members of the public. Such actions can include adjusting AUMs, changing the season or length of grazing use, implementing vegetation treatments, and adjusting grazing management practices.

For these reasons, an alternative proposing no livestock grazing for the entire planning area is not carried forward for further analysis.

2.7 Comparison of Alternatives and Environmental Consequences

A summary comparison of all the alternatives discussed in chapter 2 follows in section 2.7. These tables summarize the major land use plan decisions including the allowable uses and actions described in chapter 2, but does not include all the management actions included under each alternative. The summary tables provide a comparative form for defining the differences among the alternatives.

- The GIS application used in developing these allocations is a powerful and precise tool; however, there are discrepancies when comparing acreages in this system to the legal acreages used to describe land ownership. The following data use GIS acres for analysis, and every effort is made to match the legal acreages. These acreages are constantly reviewed, and minor revisions are frequently made to ensure an accurate product.
- Alternative A is the no-action alternative that represents the current 1986 Garnet RMP, as amended. Every effort is made to provide a direct comparison between the no-action and action alternatives; however, alternative A is representative of a different land base and planning method. Therefore, a direct comparison cannot always be made. Where possible, annotations explain these differences.
- Some acreages are also represented as a percentage. These values are located in parenthesis directly adjacent to the acreage, and are in relation to the total BLM-administered GIS acres the Missoula Field Office manages (162,611 acres).
- Values represent GIS acres, unless otherwise noted.

Table 7. Total acres managed by the Missoula Field Office

	All alternatives (acres)
Total BLM-managed acres: legal	162,376
Total BLM-managed acres: GIS	162,611

Resources - comparison of alternatives

Table 8. Wildlife Habitat

Habitat allocation	All alternatives acres (percent)
Canada lynx	
<i>Critical habitat</i>	108,426 (66%)
<i>Lynx habitat</i>	63,957 (39%)
<i>Lynx analysis units</i>	100,123 (62%)
Draft Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy	
<i>Zone 1</i>	112,461 (69%)
<i>Zone 2</i>	27,654 (17%)
Elk summer and fall habitat Components	106,594 (66%)
Big game summer and fall range	152,204 (94%)
Big game winter range	105,911 (65%)

Table 9. Fish Habitat

Habitat allocation	Alternative A acres	Alternative B acres	Alternative C acres
Bull trout critical habitat (miles)	27	27	27
Fish key watersheds	n/a	37,614	37,614

Table 10. Lands with wilderness characteristics

Lands with wilderness characteristics proposed management	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Protection of wilderness characteristics	n/a	0	2,523 (2%)
Emphasize other multiple uses while applying management restrictions to reduce impacts to wilderness characteristics	n/a	0	0
Emphasize other multiple uses as a priority over protecting wilderness characteristics	n/a	2,523 (2%)	0

Table 11. Visual resources

	Visual Resource Inventory Acres (percent)	Visual Resource Management Alternative A acres (percent)	Visual Resource Management Alternative B acres (percent)	Visual Resource Management Alternative C acres (percent)
Class I	23,480 (14%)	23,480 (17%)	23,480 (14%)	23,480 (14%)
Class II	36,338 (22%)	3,702 (2%)	21,928 (13%)	26,586 (16%)
Class III	31,953 (20%)	28,785 (22%)	38,227 (24%)	63,782 (39%)
Class IV	70,840 (44%)	77,836 (58%)	78,976 (49%)	48,763 (30%)
Class V	0	325 (<1%)	0	0

Resource Uses – comparison of alternatives

Table 12. Forestry and Woodland Products

Forestry and woodland product allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Allowable sale quantity ¹ (MMBF ²) – per decade	72 (actual annual average 3.6/year)	n/a	n/a
Probable sale quantity ³ (MMBF ²)- per decade ⁴	n/a	79 (annual quantity varies, averaging 7.9/year)	66 (annual quantity varies, averaging 6.6/year)
Lands available for forest management	105,020	101,669 (63%)	100,465 (62%)
Lands with management restrictions that may reduce harvest volumes	64,720	13,264 (8%)	13,264 (8%)
Lands unavailable for management of commercial products	7,440	33,377 (21%)	34,580 (22%)

¹ Allowable sale quantity is the total level of timber that can be sold and harvested during a decade while assuring a continuous supply of timber in perpetuity (sustained yield). Management practices, assumptions, land use plans, and biological capacity are considered in its calculation. The allowable sale quantity usually represents an average annual quantity.

² MMBF= One million board feet.

³ Probable sale quantity is the calculated sustained-yield harvest level that can be maintained without a decline over the long term if scheduled harvests and regeneration are accomplished. It is not a commitment to offer a specific level of timber volume for sale every year.

⁴ The 1986 Garnet RMP designated an allowable sale quantity of 7.2 million board feet on an annual basis, which equates to 72 million board feet per decade. The proposed timber outputs under alternatives B and C reflect current BLM policy of developing a probable sale quantity, and represent the probable harvest over a decade. This approach provides harvest estimates to the timber industry for business management purposes, while allowing for fluctuations in staffing, budgets, and field office priorities.

Table 13. Wildland Fire Management Zones

Wildland fire management zone	Alternative A Acres ¹ (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Zone 1	37,400 (23%)	43,602 (27%)	43,365 (27%)
Zone 2	102,700 (63%)	88,365 (54%)	50,861 (31%)
Zone 3	0	30,643 (19%)	68,385 (42%)

¹ In 2003, the BLM amended the 1986 Garnet RMP and designated fire management zones B and C, which closely correspond to fire management zones 1 and 2. The difference in overall acres is due to recent acquisitions.

Table 14. Livestock Grazing

Livestock grazing allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Acres available for livestock grazing	117,774 (72%)	145,558 (90%)	107,341 (66%)
<i>Available</i>	<i>111,721</i>	<i>103,192</i>	<i>101,509</i>
<i>Available for prescriptive grazing only</i>	<i>6,053</i>	<i>42,366</i>	<i>5,832</i>
Acres unavailable for livestock grazing	44,810 (28%)	17,027 (10%)	55,244 (34%)
Animal unit months	6,292-8,013 ¹	6,660	6,014
<i>Available</i>	<i>6,179</i>	<i>5,954</i>	<i>5,892</i>
<i>Available for prescriptive grazing only</i>	<i>113</i>	<i>706</i>	<i>122</i>
<i>Unavailable</i>	<i>891</i>	<i>523</i>	<i>1,169</i>
Available allotments	73	73	73

¹ The 1986 Garnet RMP set a short-term livestock forage target of 6,245 animal unit months, and a long-term target of 8,013 animal unit months.

Table 15. Lands and Realty (Land Tenure)

Land tenure category	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Retention ¹	157,177 (97%)	<i>n/a</i>	<i>n/a</i>
Other ¹	5,445	<i>n/a</i>	<i>n/a</i>
Category 1	<i>n/a</i>	59,462(36%)	63,027(38%)
Category 2	<i>n/a</i>	103,149 (63%)	94,139 (57%)
Category 3	<i>n/a</i>	0	5,445 (3%)

¹ Alternative A allocations for Land Tenure have different criteria than Alternatives B & C (see pages Appendix Q for differences)

Table 16. Lands and Realty (Rights-of-Way)

Rights-of-way allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Exclusion area ¹	533(<1%)	<i>n/a</i>	<i>n/a</i>
Avoidance area (Utility Corridors) ¹	21,317(13%)	<i>n/a</i>	<i>n/a</i>
Exclusion area	<i>n/a</i>	23,480(14%)	39,490(24%)
Avoidance area	<i>n/a</i>	46,988 (28%)	55,062(33%)
Utility corridor	236 (<1%)	236 (<1%)	236 (<1%)

¹ Alternative A allocations for Rights-of-Ways have different criteria than Alternatives B & C (see Appendix Q for differences)

Table 17. Locatable Minerals

Locatable mineral allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Recommended for withdrawal	820	283	1,015
<i>Phil Wright Rock ACEC</i>	<i>640</i>	<i>0</i>	<i>640</i>
<i>Historic and Cultural Sites</i>	<i>160</i>	<i>n/a</i>	<i>n/a</i>

Locatable mineral allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
<i>Garnet Ghost Town</i>	0	263	355
<i>Limestone Cliffs (existing withdrawal)</i>	20	20	20
Interminable "temporary" segregation	20,315	20,315	20,315
<i>Recommend open</i>	19,675	20,211	19,531
<i>Recommend withdrawal</i>	640	88	733

Table 18. Mineral Materials

Mineral material allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Closed to mineral materials disposal	1,062	716	14,153 [14,004] ¹
<i>Phil Wright Rock ACEC</i>	640	0	640
<i>Lewis and Clark NHT Corridor</i>	0	0	12,827
<i>Garnet Ghost Historic and Cultural Sites</i>	160	0	0
<i>Conservation easements</i>	242	242	242
<i>DuPont</i>	197	197	197
<i>Bear Creek Flats</i>	36	36	36
<i>Coloma-East Mammoth Lode</i>	9	9	9
<i>Garnet Ghost Town RMZ</i>	0	424	424
<i>Limestone Cliffs (SRMA in B, ACEC in A&C)</i>	20	50	20

¹ In Alternative C, the DuPont Conservation Easement overlaps with the Lewis and Clark National Historic Trail Corridor. The bracketed acreages account for this overlap and represents the total cumulative acreage closed to mineral materials disposal, while the nonbracketed acreage double counts the overlap and represents the actual conservation easement boundary.

Table 19. Nonenergy solid leasable

Nonenergy solid leasable allocations	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Closed to nonenergy solid leasable mineral exploration and development	23,742	24,127	36,993 [36,871] ¹
<i>Wilderness study areas</i>	23,480	23,480	23,480
<i>Phil Wright Rock ACEC</i>	0	0	640
<i>Lewis and Clark NHT Corridor</i>	0	0	12,827
<i>Conservation easements</i>	242	242	242
<i>DuPont</i>	197	197	197
<i>Bear Creek Flats</i>	36	36	36
<i>Coloma-East Mammoth Lode</i>	9	9	9
<i>Garnet Ghost Town RMZ</i>	0	424	424
<i>Limestone Cliffs (SRMA in B, ACEC in A&C)</i>	20	50	20

¹ In Alternative C, the DuPont Conservation Easement overlaps with the Lewis and Clark National Historic Trail Corridor. The bracketed acreages account for this overlap and represents the total cumulative acreage closed to mineral materials disposal, while the nonbracketed acreage double counts the overlap and represents the actual conservation easement boundary.

Table 20. Recreation Management Areas

Recreation management area designations	Alternative A Acres ¹ (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Special recreation management areas	71,376 (44%) [52,393 (32%)]	71,632 (44%)	46,523 (29%)
<i>Blackfoot River and Trail</i>	9,845 [8,996]	0	0
<i>Lower Blackfoot River Corridor</i>	n/a	19,543	19,543
<i>Garnet Winter Trails</i>	40,282 [31,639]	0	0
<i>Garnet Ghost Town</i>	424	0	0
<i>Garnet</i>	n/a	28,183	26,980
<i>Garnet Ghost Town Recreation Management Zone</i>	n/a	424	424
<i>Garnet Trail Recreation Management Zone</i>	n/a	27,759	26,556
<i>Blackfoot Block Management Area</i>	19,052 [9,561]	n/a	n/a
<i>Chamberlain</i>	n/a	19,307	0
<i>Ram Mountain</i>	n/a	4,549	0
<i>Limestone Cliffs</i>	n/a	50	0
<i>Clark Fork River</i>	1,773	0	0
Backcountry conservation areas	n/a	0	46,389 (29%)
<i>Hoodoos</i>	n/a	0	12,533
<i>Marcum</i>	n/a	0	11,162
<i>Chamberlain</i>	n/a	0	18,145
<i>Ram Mountain</i>	n/a	0	4,549

¹ In Alternative A, some SRMAs overlap. The acreage in brackets accounts for this overlap and represents the total cumulative acreage, while the non-bracketed acreages represent the actual SRMA boundaries, but double-counts the overlapping areas.

Table 21. Off-highway vehicle and snowmobile allocations

Off-highway vehicle and snowmobile allocation	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Open	0	0	0
Limited	137,052 (84%)	133,770	131,696
Closed	25,562 (16%)	28,844	30,918

Special Designations – comparison of alternatives

Table 22. Special Designations (ACECs, WSAs, WSRs, National Trails)

Special designation	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Areas of critical environmental concern (ACEC)	1,225 (<1%)	640 (<1%)	660 (<1%)
<i>Limestone Cliff</i>	20	0	20
<i>Phil Wright Rock</i>	640	640	640

<i>Bear Creek Flats</i>	565	0	0
Garnet Backcountry Byway (miles)	13	13	13
Garnet National Winter Recreation Trail (miles)	n/a	31.4	31.4
Wild and scenic river segments: eligible (miles)	0	27.6	27.6
<i>Belmont Creek</i>	n/a	4.5	4.5
<i>Blackfoot River segment 1</i>	n/a	3.8	3.8
<i>Blackfoot River segment 2</i>	n/a	6.8	6.8
<i>Blackfoot River segment 3</i>	n/a	6.3	6.3
<i>Gallagher Creek</i>	n/a	4.1	4.1
<i>Rock Creek</i>	n/a	2.1	2.1
Wild and scenic river segments: proposed suitable (miles)	0	0	0
Wild and scenic river segments: deferred suitability decision: Rock Creek (miles)	n/a	2.1	2.1
National historic trails			
<i>Lewis and Clark National Historic Trail (miles)</i>	n/a	12	12
<i>Lewis and Clark National Historic Trail Corridor (acres)</i>	n/a	6,830 (4%)	12,827 (8%)
Wilderness study areas (WSAs)	23,480 (14%)	23,480 (14%)	23,480 (14%)
<i>Hoodoo Mountain</i>	11,380	11,380	11,380
<i>Wales Creek</i>	11,580	11,580	11,580
<i>Quigg West</i>	520	520	520

Table 23. Wilderness Study Area Management, if released from designation for other uses

Wilderness study area management designation	Alternative A acres (percent)	Alternative B acres (percent)	Alternative C acres (percent)
Hoodoo Mountain Wilderness Study Area			
<i>Big game summer and fall range</i>	6,385	n/a	n/a
<i>Big game winter range</i>	430	n/a	n/a
<i>Elk summer and fall habitat Components</i>	1,898	n/a	n/a
<i>Special management areas</i>	2,171	n/a	n/a
<i>Backcountry conservation area</i>	n/a	0	11,380
Wales Creek Wilderness Study Area			
<i>Big game summer and fall range</i>	4,449	n/a	n/a
<i>Elk summer and fall habitat Components</i>	1,931	n/a	n/a
<i>Special management areas</i>	5,205	n/a	n/a
<i>Wales Creek Area of critical environmental concern</i>	0	5,602	5,602
<i>Locatable withdrawal</i>	0	0	4,850
<i>Closed to leasable and saleable mineral development</i>	0	5,602	5,602
<i>Backcountry conservation area</i>	n/a	0	995
<i>Chamberlain Special Recreation Management Area</i>	n/a	995	0
<i>Garnet Special Recreation Management Area</i>	n/a	4,987	4,987

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the environment that the RMP is likely to affect and the environmental consequences of the alternatives. Many EISs present the affected environment and environmental consequences in separate chapters. The BLM has combined these two topics into this single chapter to provide all of the relevant information on a resource in a single discussion. This chapter includes sections on each resource that the RMP is likely to affect. Each resource section begins with the key points, and a summary of the methods used to analyze the effects of the alternatives on this resource. Each section includes one or more subsections that address how the alternatives would affect the resource (the BLM refers to these questions as “issues”). The BLM describes the status and trends of the pertinent resource and then answers the question by describing the environmental consequences to the resource of the alternatives analyzed in detail, including the No Action alternative.

Scope of the Analysis

With few exceptions as described above, the effects of an RMP represent indirect effects. That is, an RMP is designed to guide and control future management actions, but those actions and their effects are later in time than the RMP Record of Decision. Although the specific timing, size, location, and design of future actions that would occur under each alternative are not certain, the BLM can project a reasonable forecast of future actions consistent with the management direction of the alternatives for the analysis in this Draft RMP/EIS.

Cumulative effects result from the incremental impact of an action when added to past actions, other present actions, and reasonably foreseeable actions. Due to the nature of the analysis in this large-scale and long-term planning effort, environmental effects described in this Draft RMP/EIS would have Incremental impacts that would have a cumulative effect together with past actions, other present actions, and reasonably foreseeable actions. The discussion of effects on each resource incorporates the effects of past actions, and describes other present actions and reasonably foreseeable actions to provide context in which the incremental effects are examined, thus revealing the cumulative effects of the alternatives.

For BLM-managed lands, reasonably foreseeable future actions are those actions that would occur as described under the various alternatives. For other ownerships within the planning area, reasonably foreseeable actions are those actions that would occur with the continuation of present management, also from a broad-scale perspective. It would be speculative for the BLM to presume knowledge of site-specific actions that would occur in the future on lands managed by others over the period analyzed. The BLM based these assumptions about future management on other ownerships on existing plans or current trends, and these assumptions are broad and general in nature. However, the broad assumptions are sufficient to provide context for evaluating the incremental effect of the alternatives.

Geographic and Temporal scales

The three-county analysis area serves as the geographic scale for analysis unless otherwise specified in the resource or resource use described below. The temporal scale for this analysis is the life of the plan; expected to last 20 to 30 years, unless otherwise specified in the resource or resource use described below.

Incomplete or unavailable information

The Council on Environmental Quality's regulations for implementing NEPA require that an EIS discussion of environmental consequences include "any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented" (40 CFR 1502.16). Irreversible or irretrievable commitments of resources are those that cannot be reversed or that are lost for a long period. Examples include the extraction of minerals or the commitment of land to permanent roads. Although not specifically labeled, adverse environmental effects, the relationship between short-term uses and long-term productivity, and the irreversible and irretrievable commitment of resources are described, by resource, throughout the discussion of environmental consequences in this chapter.

3.2 Vegetation Communities

This section addresses the vegetation communities in the decision area. The August 2016 Missoula Resource Management Plan Analysis of the Management Situation describes the current conditions and trends of vegetation communities in the decision area, and is incorporated here by reference.

While the analysis of the management situation categorizes vegetation communities into separate sections, the wildland fire management, noxious and invasive species, forest vegetation, and shrubland and grassland vegetation sections are combined into one affected environment section in this document. These resources are codependent to each other, and respond to disturbances and management practices in similar ways. Discussing the current conditions, issues, and past and ongoing actions presents a common baseline to compare the effects of the alternatives. The environmental consequences for these resources are independently addressed in subsequent sections.

3.2.1 Affected Environment

Indicators

- Acres of vegetation treatments.
- Percentage of forest vegetation within the average natural range of variability (using the maximum and minimum NRV for comparison) as measured by species composition (as measured by tree size class and density), landscape pattern (patch size), and the risk of uncharacteristic disturbances (wildfire and insect/disease outbreaks).
- Acres of WUI.
- Acres of treatments for infested acres of noxious and invasive species.
- Acres available to livestock grazing (rangeland health standards 1 and 5).
- Open motorized road density.
- Whether the BLM is achieving or making progress to achieve the rangeland health standards and guidelines as defined in the "Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota, and South Dakota" (USDI-BLM 1997). BLM-managed lands within the decision area use the 5 standards and 11 guidelines in the "Butte District" section of this record of decision, all are considered indicators of grassland and shrubland vegetation, but standards 1 and 5 primarily apply to these communities.

Geographic and Temporal scales

The decision area serves as the geographic scale for analysis. The temporal scale is the 30-year expected life of the management plan.

The analysis area is primarily based upon sixth level hydrologic units, which are sub watershed boundaries, encompasses 1.3 million acres and includes the entire Missoula Field Office surface ownership area, lands managed by the Forest Service, as well as state and private lands. The analysis was completed using a 50-year timeframe.

Vegetation Modeling

SIMPLLE (Simulating Patterns and Processes at Landscape scales) is a model that simulates changes in vegetation on landscapes in response to both natural disturbances and management activities as they interact with climatic conditions. BLM used this model to calculate the natural range of variability for vegetation conditions, and to project the vegetation conditions of the alternatives across the forest vegetation analysis area into the future for the effects analysis. The Forest Service's Region 1 VMap GIS layer was the primary data used to run SIMPLLE for vegetation modeling along with on-site inventory data collected on a portion of BLM lands.

SIMPLLE takes a landscape condition at the beginning of a simulation and uses logic to grow the landscape through time, while simulating processes (growth, fire, insects, etc.) that might occur on that landscape during the simulation, accounting for the effects of those processes. It is a state and transition model, incorporating multiple pathways of change in vegetation in response to climate, disturbances, growth, and other processes. Simulation time steps are 10 years, and simulations are made for multiple time steps. The logic assumptions in the model come from a variety of sources, including expert opinion, empirical data, and modeled data from other forestry computer applications such as Forest Vegetation Simulator.

One of the main utilities of the SIMPLLE model is its stochastic nature. The model is typically run for multiple iterations to allow the manager to see a variety of possible projections, look for patterns, and adjust management response accordingly. Managers cannot know with precision the specific types, locations, and extents of natural disturbances that will occur on the landscape. Therefore, the SIMPLLE model will randomly assign fire, insect, and disease processes on the landscape in a manner consistent with what is known about the nature of these disturbances (e.g., insect-prone stands have a higher hazard and probability of getting an infestation, especially in a dry climate cycle). SIMPLLE was run for this plan revision effort using the warmer and drier climate setting.

The other main utility of the SIMPLLE model is its spatially interactive nature. A process occurring on one site is dependent, to an extent, on the processes that are occurring on adjacent sites. Consider a fire event. SIMPLLE simulates fire by assigning fire starts with a probability consistent with what historic records indicate for the area and climate. Each start is then given the opportunity to grow. The size the fire grows to is dependent on the surrounding vegetation as well as the historic probability that it will end with a weather event or successful fire suppression. The type of fire that spreads (lethal, semi-lethal, or non-lethal) is dependent on the vegetation conditions of the site (including past disturbance or treatment), the climate assumption for the timestep, its elevation position relative to the burning fire (uphill, downhill, etc.), and whether it is downwind or not. Again, the fire process will stop according to the probability of a weather-ending event, successful fire suppression, or perhaps running up against a natural barrier such as a change in vegetation that would support fire spread. SIMPLLE will then determine the effect of the fire by considering whether there are trees present capable of reseeding/resprouting the site (in the case of a lethal fire), whether the stand's fuel conditions have been reduced (for semi- or non-lethal fires), and whether there has been a change in size and/or species on the site.

Analytical Methods and Assumptions

- The concept of natural range of variability (NRV) is utilized by land managers to understand the dynamic nature of natural systems, the processes that sustain and change these systems, the current state in relationship to the past, and the possible ranges of conditions that are feasible to create or maintain. Historic conditions provide insight for understanding the set of conditions and processes that historically sustained ecosystems and biodiversity, and provides a reference against which to evaluate current change (Sampson and Adams 1994). It is a useful tool for determining a range of future variability and for establishing the limits of acceptable change. The averages within NRV (including the maximum and minimum points of NRV) is compared to existing vegetation conditions to determine departures or shifts toward the maximum or minimum of NRV. These departures from NRV or shifts away from the averages toward the maximum or minimum point of NRV can be used to aid resource managers in planning and prioritizing treatments. NRV analysis and SIMPPLLE modeling has been and is being used extensively by adjacent land managers for landscape scale planning efforts
- Warmer and dryer climate settings were used during vegetation modeling to account for potential future changes in climate conditions.
- Use active forest management to emulate natural disturbance.
- Past management, most notably fire suppression has altered forest structure to the point where current conditions have departed from NRV.
- Vegetation treatments are sometimes implemented to emulate natural disturbances (for example, thinning to reduce stem densities to what is within the NRV would have historically been done with fire).
- While in most cases vegetation treatments will be geared toward meeting vegetation conditions that fall within the NRV, it is recognized that this might not necessarily be the case in WUI areas where more substantial fuels reductions may be needed to address site-specific conditions and objectives for public safety. This may also be the case where single species management is emphasized as a priority. Precluding thinning to manage for Canada lynx and its primary prey species the snowshoe hare, would affect attainment of conditions that are within NRV. Areas outside of their NRV would have less resilience to disturbance and climate variability.
- Due to a lack of periodic fires across the planning area, forest fuels have increased. Suppression has altered the structure and density of the forests. More trees per acre are present in smaller size classes than were historically present. The younger trees are creating ladder fuels, and many of the early seral forest species are being lost from the landscape.
- Starting in 2000, the Northern Rockies have experienced longer fire seasons, larger fires, and more high-severity fires. This is due to a number of factors including a buildup of forest fuels, climate variability, drought, and widespread mortality of several pine species from mountain pine beetle (ponderosa, lodgepole, and whitebark). This trend is likely to continue, with longer fire seasons and larger more intense wildfires.
- The WUI will increase as homes and infrastructure are built near or among lands prone to wildfire.
- In the past five years, more emphasis has been placed on landscape level restoration that creates resilient landscapes. These types of projects have included working with partners to treat large areas with different ownerships. This trend is likely to continue.
- Through policy and in practice, more emphasis is placed on using wildfire as a tool to restore and maintain fire-adapted vegetative communities. Under the right conditions and appropriate locations,

the BLM and its partners allow natural ignitions to burn and achieve resource management objectives. This trend is likely to continue and expand.

- Regardless of FMZ, full suppression will continue to be the primary wildland fire management strategy. It will likely take 10 to 20 years to treat enough vegetation, develop plans with our protection agencies and cooperators, and to culturally change the way we think about wildland fire management to actually manage a wildfire to achieve resource management objectives. Thus, wildland fires affecting vegetation will be prescribed fires, and wildfires that escape initial attack on the most extreme days in the most extreme years.
- Insects will continue to play a role in increasing the buildup of forest fuels. Currently tree mortality due to insects is at endemic levels. At some point during the life of the plan, there will likely be a large insect outbreak similar to the 2008 to 2010 outbreak in the lodgepole pine.
- Types of fuels treatments include wildland fire, mechanical, manual, biological, and chemical applications. Wildland fire includes both prescribed fire and wildfires. Mechanical treatments involve the use of vehicles such as wheeled tractors, crawler-type tractors, or specially designed vehicles with attached implements and include timber harvest, chipping, piling, and mastication. Manual treatments include the use of hand tools and hand-operated power tools and include pre-commercial thinning, cutting and piling, and fuel augmentation. Biological control involves the intentional use of domestic animals, insects, nematods, mites, or pathogens that weaken or destroy vegetation. Herbicides are chemicals that kill or injure plants
- Rangeland Health Standards and Guidelines will be the evaluation method for assessing livestock grazing impacts to grasslands and shrublands. The BLM will take appropriate action to achieve or make progress toward achieving unmet rangeland health standards when current livestock grazing is a significant causal factor for non-achievement. Monitoring rangelands using key areas will be conducted through acceptable methods to determine trend or seral stage of plant communities.
- Forage use will be measured by the percent of current year's forage production that is consumed or destroyed by insects and grazing animals. Forage utilization may also be collected using key grass species (rough fescue, bluebunch wheatgrass, etc.)
- Emphasis on vegetation management and habitat restoration would likely increase the number of acres treated for noxious weeds. For successful habitat restoration projects, noxious weeds need to be managed.
- Ground disturbing activities resulting from resource management or use will increase the chance for the introduction and spread of noxious weeds.
 - ◆ *Recreation* – people inadvertently introduce and spread noxious weeds more readily in areas with more human activity. More visitors and activities are expected in areas identified as Special Recreation Management Area (SRMA).
 - ◆ *Roads* –road construction and associated activities (e.g., increased use) would increase the probability of introduction and/or spread of noxious weeds. Increased road development is often associated with vegetation treatments, mineral development, and rights-of-way (Mortensen 2009).
 - ◆ *Livestock Grazing* –livestock grazing contributes to the introduction and/or spread of noxious weeds. Many weed species have the ability to adhere to fur and skin as well as pass through the digestive track this allows weeds to spread very quickly. Wildlife also adds to this type of spread but to a much lesser degree (R. De Clerck-Floate 1997).
 - ◆ *Mining* – Mining by its very nature creates considerable ground disturbance. Current mining and environmental law require reclamation and restoration of mining sites. Past mining activities have

contributed to spread of noxious weeds and did not have regulation at the time to mitigate the spread of noxious weeds.

- ◆ *Logging/Forest Management* – Logging and other forest management activities cause ground disturbance. These activities are closely associated with introduction and spread of noxious weeds by spread of existing infestations, spread into uninfested areas or introduction of new invasive species into the area.

Composition

The highly varied environment of the Northern Rocky Mountains creates a mosaic of forest, shrubland, and grassland vegetation. Species composition and productivity, and the consequent potential values, differ greatly between and within these major vegetation types. The ability to identify land units and relate them to both their inherent capability to produce various resources and their response to management activities is essential for multiple use planning and intensive resource management on our western wildlands (Mueggler and Stewart 1980).

Approximately 3 percent of BLM-managed lands in the decision area are nonforested, which means less than 10 percent tree canopy cover. The approximately 97 percent of BLM-managed lands dominated by less than 10 percent tree canopy cover have limited mountain meadows, shrublands, and grasslands. This section discusses the composition of forested and nonforested lands.

Forest Vegetation Communities

Forested lands within the analysis area have been stratified into habitat type groups (HTG). This ecologically based stratification system defines site potential and historic fire regimes, and enables land managers to predict responses to vegetation management activities (Pfister et al. 1977). Habitat types groups, their current species compositions, fire groups, and relative abundance within the analysis area are shown in Table 24.

Table 24. Forest species compositions, habitat type groups, and fire groups

Dominant current species composition in decreasing order of abundance	Habitat type group name (number)	Fire Group(s)	Acres of habitat type group on BLM-managed lands (percentage of forested lands)	Total forested acres in analysis area ¹
Ponderosa pine and ecotonal grassland/shrubland	Warm Douglas-fir (HTG-1)	4	31,840 (20%)	197,920 (19%)
Douglas-fir and ponderosa pine	Cool Douglas-fir (HTG-2)	4 and 6	77,440 (50%)	491,680 (48%)
Douglas-fir, western larch, and lodgepole pine	Moist Douglas-fir (HTG-3)	6	3,770 (3%)	21,760 (2%)
Douglas-fir, lodgepole pine, and western larch	Moist Subalpine Fir (HTG-4) ¹	9	25,630 (16%)	141,390 (14%)
Lodgepole pine, Douglas-fir, and subalpine fir/spruce	Cold Subalpine Fir (HTG-5)	9	6,650 (4%)	20,560 (2%)
Subalpine fir/spruce	Very Cold Subalpine Fir (HTG-6)	10	10,560 (7%)	143,620 (14%)
		Total	155,890	1,016,930

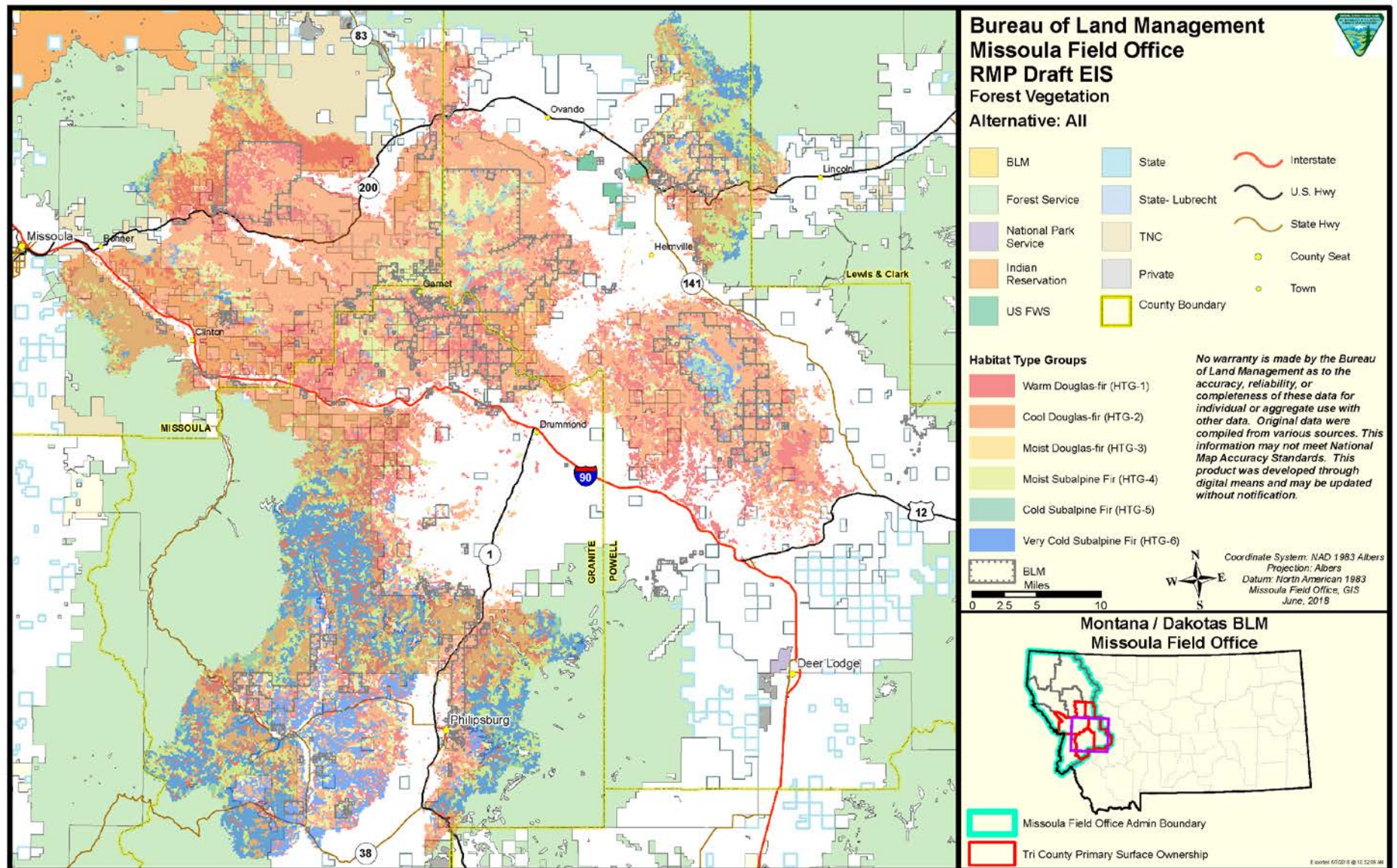
Source: National Vegetation Classification System and SIMPPLLE Data.

¹ The forest vegetation analysis area is the boundary used in the SIMPPLLE analysis area.

Figure 3 displays where the habitat type groups lie geographically on Field Office surface ownership lands. Approximately 6,724 acres of grass/forb/shrub vegetation types (HTG-9), coniferous riparian (HTG-7) and non-coniferous riparian (HTG-8) occur in the analysis area, but at small enough occurrences to not be reflected in the modeling results. These acres may be slightly different as SIMPPLLE uses a 10-acre cell size, which is slightly different from our GIS mapping analysis. The aforementioned vegetation types are discussed below.

These Habitat Type Groups also correspond to terrestrial wildlife habitat. The Wildlife section (section 3.3.8) describes the relationship between HTGs and wildlife habitat associations in more detail.

Figure 3. Habitat type groups in the forest vegetation analysis area



Management goals and objectives for forest vegetation are based upon moving existing conditions toward the average natural range of variability or moving toward the natural range of variability where deviations exist.

Natural range of variability refers to the spectrum of ecosystem states and processes one would expect to encounter over a long time period without human intervention to disturbance cycles (such as fire suppression). This concept is often used to describe disturbance processes, and the variability that disturbance creates. Managing for a natural range of variability will sustain native species and their habitats, improve and maintain biodiversity, maintain productivity, and provide for the long-term sustainability of values and desired services (Reeves et al. 2009, Landres et al. 1999, Swanson et al. 1994, Haufler 1999, Morgan et al. 1994). In addition, forest vegetation is more resilient to changing climactic conditions if managed within a natural range of variability.

The analysis of the management situation referred to historic range of variability or HRV to determine an acceptable range of processes and conditions of an ecosystem. The planning team decided to use natural range of variability or NRV for this analysis. Historic conditions provide insight for understanding the set of conditions and processes that historically sustained systems and biodiversity, and provides a reference against which to evaluate current change (Sampson and Adams 1994). While it is a useful tool for determining a range of future variability and for establishing the limits of acceptable change, it is a discrete period of time that may not capture variability into the future given the potential for changing climactic conditions. The NRV for many ecosystem components related to forest vegetation including wildlife habitat and disturbance regimes was determined using the SIMPPLLE model that considers historic conditions during the modeling process.

The concept of managing forests to move toward or remain within their natural range of variability aligns with many comments received during public scoping and with the management approach applied by Region 1 of the U.S. Forest Service. The alternatives propose active vegetation management (thinning, timber harvest, and prescribed burning) to move vegetation toward a natural range of variability at differing rates (in terms of treatment acres). Varied timber harvest levels and wildlife habitat conditions are an associated result of forest vegetation management across the alternatives. As an example, overstocked warm-dry vegetation types with multiple tree species would benefit from thinning and timber harvest and provide native ungulate populations with increased forage.

As the dominant external disturbance agent, fire has been important in shaping vegetation structure and composition in the Interior Colombia Basin for thousands of years (Johnson et al. 1994). Fires continued to have these important roles until 1940, when fire suppression was effective enough to limit the role of natural fire throughout the region (Pyne 1982). Characterization of each habitat type group into various fire groups (Fischer and Bradley 1987) was completed to enable an understanding of how the role of fire affects forest succession. In other words, identification of fire groups helps to describe how our current cover types have developed into their current conditions, given the habitat type groups in which they belong. The fire groups associated with these habitat types are characterized as follows:

- *Fire Group 4:* Nonlethal fire regime with natural surface mean fire interval between 5 to 25 years and stand replacement fires rare at mean intervals greater than 300 years.
- *Fire Groups 4 and 6:* Nonlethal and Mixed Severity fire regimes with natural mean fire intervals between 10 to 50 years and stand replacement mean fire intervals exceeding 300 years on the drier types (i.e., fire group 4) and less than 300 years on the moister types (i.e., fire group 6).
- *Fire Group 6:* Mixed Severity fire regime with natural mean fire intervals between 25 to 125 years. Higher severity, stand replacement fires can occur within this group on the sites having heavy fuel loadings and denser stocking (Fischer and Bradley 1987).

- *Fire Group 9*: Lethal and mixed fire regimes with mean fire intervals between 50 and 200+ years.
- *Fire Group 9 (riparian)*: Lethal to mixed fire regime with mean fire intervals between 50 and 200 years as a function of stream influence zone, physiography, and adjacent upland fuel conditions.
- *Fire Group 10*: Fire disturbance is generally secondary to site factors (climate and soil) relative to forest development on these sites. Vegetation recovery and succession is slow following disturbance events.

Current conditions and NRV were compared in terms of species composition, size class, and structural diversity for each of the HTGs to determine departure. This analysis has indicated vegetation management needs to move current conditions toward the NRV. For the purpose of this document, summary information for each HTG is provided. As part of the RMP revision process, a more detailed analysis will be completed to quantify the amount of departure within each HTG.

Warm Douglas-fir (HTG-1). Many of these stands within the planning area have a dominant ponderosa pine overstory with mainly Douglas-fir regeneration in the understory due to the lack of disturbance and its shade tolerance. Without disturbance, these sites will continue to convert to Douglas-fir until it dominates. These sites are typically too dry for lodgepole pine or western larch. The higher conifer density is increasing competition for moisture, sunlight, and nutrients, particularly for the overstory ponderosa pine. This additional stress is predisposing the ponderosa pine to higher rates of successful pine beetle infestation. Aspen glades and cottonwoods, historically common along the drainages and riparian ecotones, are being replaced by more shade-tolerant coniferous types.

Bunchgrasses and low shrubs generally dominate the undergrowth, with bunchgrass being the dominant understory vegetation. Many of these sites, particularly if the site was historically dominated by bunchgrasses, are prone to invasive plant infestation. Noxious weeds such as spotted knapweed (*Centaurea maculosa*) and leafy spurge (*Euphorbia esula*) out-compete native vegetation for soil moisture. This HTG is commonly ecotonal to grassland/shrubland types, and located on drier sites forming the majority of wildlife winter range habitat.

This habitat type group is considered high risk to noxious and invasive plant species invasion. Plant communities in this zone are susceptible to invasion by noxious weeds because forest over story cover is not sufficiently dense to shade out invasive weeds and the bunchgrass component does not compete well with weeds because of the prevalence of un-vegetated areas among the relatively evenly dispersed bunchgrass clumps. This area has a high road density and considerable past/present public and commercial use. Approximately 30,770 acres of HTG-1 on BLM lands. Spotted knapweed, leafy spurge and Sulfur cinquefoil are the three species that pose the greatest risk to this habitat type group. Currently spotted knapweed has the greatest distribution, low management difficulty and high environmental impact. Leafy spurge is the greatest threat but has a limited distribution but has a high environmental impact and high management difficulty. St Johnswort currently has very limited distribution in the BLM-managed lands district, but has the ability to spread rapidly if not managed aggressively. This habitat type group is commonly ecotonal to grassland/shrubland types on drier sites forming the majority of wildlife winter range habitat. Other noxious weed species such as hounds tongue and musk thistle pose a localized threat by forming small dense patches that become point source for further spread.

Cool Douglas-fir (HTG-2). Douglas-fir and ponderosa pine constitute the dominant coniferous species within this HTG. The potential to support western larch or lodgepole pine as a minor seral component depends on disturbance regimes and site productivity. Historical logging that targeted removal of the dominant species has created an accelerated shift in species composition to a higher percentage of Douglas-fir while altering structure to more multi-layered, dense, and younger age-class stands. These conditions create stagnation in the stands (Losensky 1997).

Areas within this HTG in fire group 6 (having historically mixed and high severity fire regimes) are close to or within the historical fire return interval for portions of the HTG. However, the lower severity surface fires that historically occurred for portions of this HTG in fire group 4 have been affected by fire suppression.

Due to fire suppression, development of coniferous understories is increasing thereby shifting stand structure to multi-storied stands with a high composition of Douglas-fir, both of which create ladder fuels. Stand density is continuing to increase predisposing portions of this type to a higher percentage of high severity fire, whereas low- or mixed-severity fires were more common historically.

Cool Douglas-fir habitat types are at moderate risk for noxious weed invasion. Because of the higher percentage of the Douglas-fir in this habitat type a more multi-layered, denser and younger age-class stand is created in which noxious weeds do not compete well with native vegetation. South aspects are higher risk because of lower canopy cover and sparser native vegetation, noxious weeds on these type of sites can out compete native vegetation. This HTG becomes susceptible to noxious weed invasion through ground disturbing activities (mining, logging, wildfire and grazing). Approximately 17,050 acres of HTG-2 on BLM lands. When this habitat type group occupies northwest, north and northeast aspects they are at low risk for invasion, but weeds may be found along roads and other disturbed sites that receive additional sun light but are unable to spread from these sites.

Moist Douglas-fir (HTG-3). Douglas-fir and western larch constitute the dominant coniferous species within this HTG. Lodgepole pine and ponderosa pine can also occur as either major or minor components of the HTG.

As in HTG-2, historical mechanical treatments that targeted removal of the dominant species has allowed for an accelerated shift in species composition to a higher percentage of Douglas-fir. This shift alters forest structure to more multi-layered, dense, and younger age-class stand. Western larch and ponderosa pine are shade-intolerant, and therefore, do not regenerate under the dense Douglas-fir canopies that currently occur in this HTG.

Forested areas within this HTG are within fire group 6, so they are almost outside of HRV in terms of fire return interval, and many are in need of natural or human disturbance (fire or logging) in order to facilitate successional pathways that more closely resemble the HRV. As an example, historical mechanical treatments have facilitated high canopy closure and species dominance by Douglas-fir. In order to facilitate successful regeneration and growth of more shade-intolerant species, either thinning, logging, prescribed burning, or some combination of the three needs to be implemented.

Moist Douglas-fir habitat types are at moderate to low risk for noxious and invasive weed invasion. This group is found primarily on north aspect slopes and areas with higher soil moisture. These factors favor native vegetation few noxious weeds can compete successfully on these sites. As with HTG-2 ground disturbing activities such as mining, logging and grazing can increase the risk for invasion but to a lesser degree than HTG-2. Noxious weed species such as Canada thistle and Orange/Meadow Hawkweed can invade HTG-3 sites, spotted knapweed can invade these sites but not aggressively. Approximately 40,280 acres of HTG-3 on BLM lands.

Moist subalpine fir (HTG-4). Douglas-fir and lodgepole pine are the dominate species within HTG-4. As this HTG is found at slightly higher elevations or on moister east or north aspects, there is typically less western larch and ponderosa pine. Subalpine fir and Engelmann spruce occur within the HTG with relative species composition depending on site productivity and succession. Without a disturbance agent, succession dictates that subalpine fir and spruce dominate (Davis et al. 1980).

Lack of fire on the landscape as a disturbance, both temporally and spatially, have increased both ladder fuels and down woody debris. This has allowed the fire regime to shift from a small- to large-scale high severity/stand replacement fire regime (fire group 9). Greater spatial continuity and to a lesser extent high stand density in these types is a result of the lack of fire as a disturbance. The combination of both conditions allows insect and disease epidemics and stand replacement events outside of their historic range of variability. A large-scale mountain pine beetle epidemic affected 600,000 acres of lodgepole pine within the analysis area from 2008, to 2013. This will result in a shift of large forested areas to an early successional state and young age classes if there is successful natural regeneration. Natural regeneration requires site preparation, a seed source, and heat from a wildfire for serotinous lodgepole pine cones. If natural regeneration is not successful, then some areas may convert to non-forested cover types. Overall, vegetation biodiversity decreases as the fire regime changes (Brown and Smith 2000). This HTG is an important component of snowshoe hare and lynx habitat in the analysis area.

Moist Subalpine fir types are low risk type for noxious weed invasion. This group is characterized by cool temperatures (July mean 60 to 64 degrees) and light to moderate impact from summer frost. Surface soils are usually acidic to very acidic on these sites, these factors contribute to low risk of invasion by noxious weeds. Groups 5 and group 6 have similar characteristics but as with HTG-3 localized infestations are possible and spread is not aggressive. Approximately 25,630 acres of HTG-4 on BLM lands.

Cold subalpine fir (HTG-5). Lodgepole pine is the dominant seral species throughout this type, and subalpine fir is the climax species, although it rarely achieves dominant status at the landscape scale. This is a function of seed source and slow succession rates which are often interrupted by stand replacement fire. Douglas-fir is a minor seral component on warmer drier sites, and spruce is a minor seral component on the more moist sites.

Overall, individual stands are within the historical range of conditions for this type; however, age class and shade-tolerant species compositions of the stands may have shifted and are now covering a higher than normal proportion of the landscape (Arno and Fiedler 2005). Due to fire suppression within the last 100 years, stands within this HTG that have not experienced fire or forest management harvests have shifted from a mosaic of age-classes into mature or overmature conditions which allows large acreages of this type to exist in a lodgepole pine “old forest” state. Lodgepole pine forests within this late seral state are within the age and size classes to be predisposed to mountain pine beetle epidemics and dwarf mistletoe infestation (Losensky 1997). These mature and overmature lodgepole forests are currently occurring over a larger area than historically, allowing a loss of diversity within this type (Losensky 1997, Arno and Fiedler 2005). Loss of diversity is occurring spatially since the patch sizes are not within historical context. Vegetation diversity is being reduced since fire disturbance in this type allows for development of shrub fields and understory forb and grass components (Arno and Fiedler 2005).

As discussed in *Wildland Fire in Ecosystems: Effects of Fire on Flora* (Brown and Smith 2000), fuel loading/buildup is an important factor for length of fire interval within an area. Recent mortality associated with the MPB outbreak will increase fuel loads exponentially within the next 5 to 10 years. This increase in fuel loading is likely to promote stand-replacing fires, potentially at a larger scale than historically occurred. As in HTG-4, this HTG is an important component of snowshoe hare and lynx habitat in the analysis area.

Cold Subalpine fir are low risk type for noxious weed invasion. Approximately 26,350 acres of HTG-5 on BLM lands.

Very cold subalpine fir (HTG-6). This HTG consists primarily of subalpine fir and Engelmann spruce, and comprises a very small portion (less than 1 percent) of the analysis area. Some Douglas-fir and lodgepole pine occur in this HTG, but are minor components. Whitebark pine found in the analysis area is

usually associated with this HTG. These areas are high elevation forests found near timberline. The loss of the Whitebark pine to white pine blister rust will reduce forest diversity and have detrimental impacts to some wildlife species.

Fire is not a dominant disturbance agent on these sites as they are characterized by a cold, moist, and rocky fire-resistant environment. For this reason, fire frequency and disturbance concepts do not apply well to this HTG. Most of the vegetation within this HTG is within NRV.

Very Cold Subalpine fir types are very low risk of noxious weed invasion. Approximately 20 acres of HTG-6 are on BLM lands.

Coniferous Riparian (HTG-7). This group is generally restricted to narrow stringers along incised mountain valley stream courses and upper basin settings. Engelmann spruce, lodgepole pine, Douglas-fir, and some cottonwood are usually represented in seral communities dependent on disturbance regime. Spruce and subalpine fir dominate later stages of succession. Soils remain saturated much of the year, restricting Douglas-fir and favoring spruce (and seral cottonwood) composition on wetter sites. The undergrowth is dominated by medium to tall mesic and wet site shrubs and a diverse herbaceous component. Riparian corridors generally have high potential for structural and compositional complexity, functioning to increase biodiversity and provide linkages between ecological land units.

The narrow riparian stringers, depending on width, topography, and adjacent stand type are susceptible to the same mixed severity and stand-replacement events as adjacent HTGs, and thus, are difficult to summarize.

Conifer Riparian types are very low risk of noxious weed invasion. Wet soils and dense canopy cover make noxious weed invasion by most species very difficult. In areas with sufficient light and drainage, very localized infestation would be possible and spread from those sites would be very limited.

Nonconiferous Riparian (HTG-9). No BLM parcels met the criteria used in SIMPPLLE, specifically the 10-acre cell size, which is slightly different from our GIS mapping analysis.

Grass/forb/shrub (HTG-9). Grasslands and shrublands, also referred to as rangelands, are a productive and primary source of forage for domestic livestock and wildlife. Rangelands provide water for urban, rural, domestic, industrial, and agricultural use. They provide wildlife habitat, areas for natural recycling, purification of the air, and carbon sequestration (USDA-NRCS 1997). The presence of shrub and grassland communities are a function of topography, aspect, soil type, soil fertility, hydrology, groundwater, floodplains, riparian areas, natural disturbances, and historic use.

Native plant species commonly found on rangelands include sagebrush, bitterbrush, fringe sage, rabbitbrush, bluebunch wheatgrass, prairie June grass, Idaho fescue, rough fescue, green needlegrass, needle-and-thread, mountain brome, Richardson needlegrass, and Sandberg bluegrass. Rangeland vegetation can be grouped into seven broad National Vegetation Classification System macro groups, which is displayed in the following table.

Table 25. National Vegetation Classification System standard macro groups for rangeland

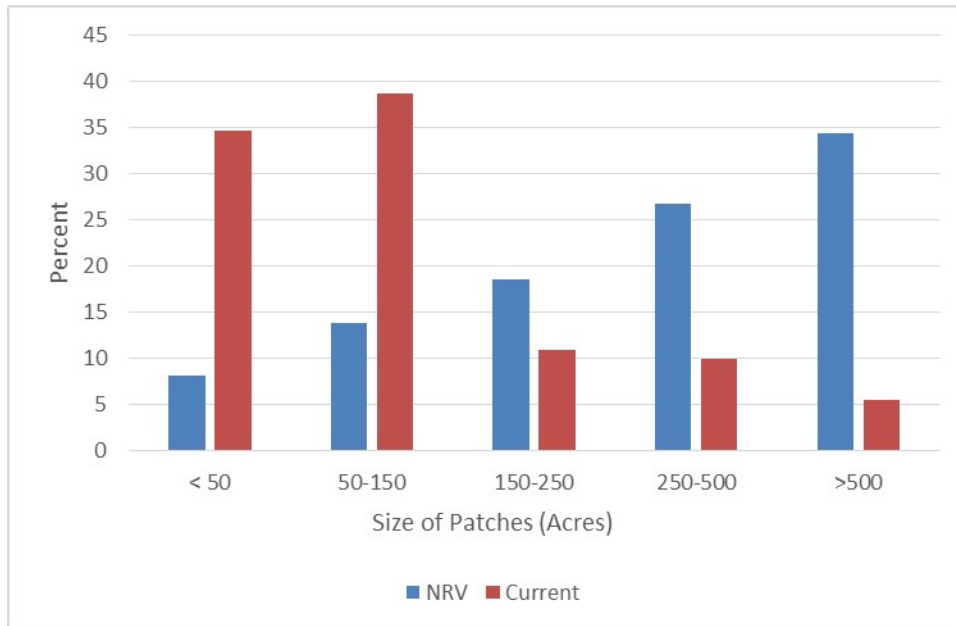
Standard Macro Groups	BLM-managed lands (acres)
Inter-Mountain Basins Big Sagebrush Steppe	45
Inter-Mountain Basins Montane Sagebrush Steppe	1,095
Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	2,922
Northern Rocky Mountain Montane-Foothill, Deciduous Shrubland	169
Northern Rocky Mountain Subalpine-Upper Montane Grassland	600
Northern Rocky Mountain Subalpine Deciduous Shrubland	87
Rocky Mountain Subalpine-Montane Mesic Meadow	169
Total	5,087

Source: National Vegetation Classification System Database

Landscape Pattern and Patch Dynamics

The change in interactive spatial components (or forest structural patches) across a landscape over time can be defined as patch dynamics. Landscape pattern is important for and related to connectivity of wildlife habitat. Disturbances, both natural and human-induced, are important in the patch dynamics concept, because they drive the formation and dynamics of patches across multiple scales. Therefore, manipulating the disturbance regime (the spatial and temporal patterns of disturbance) can be an effective method of managing landscapes to function within NRV. The spatial pattern of forest conditions across a landscape can affect ecological processes, including wildlife and plant habitat and dispersal; disturbance risk, spread and size; and human aesthetic values. Large areas of densely stocked forests and greater landscape homogeneity can create higher potential for large, high severity fire. Research has shown that the spread of wildfires and the potential for large fire growth across a landscape can be limited by reducing fuel continuity (Ager et al. 2010, Collins et al. 2008, Finney and Cohen 2003, Finney 2007, Hessburg et al. 2007, Safford et al. 2009, Stephens et al. 2009). Large expanses of forest with fairly homogenous conditions of host species of susceptible characteristics and can create higher potential for bark beetle outbreaks (Fettig et al. 2007, Samman and Logan 2000). For bark beetles (as well as other insects or diseases), the severity of outbreaks and tree mortality can be reduced in extent by increasing the diversity of stand ages, size classes, and tree species in landscapes that are homogenous (Bentz et al. 2010, Bollenbacher 2010, Fettig et al. 2007). For these reasons, mimicking the dynamics and conditions created by natural disturbances (such as a fire that would have occurred prior to fire suppression in the late 1800s) is necessary for the long-term resilience of ecosystems.

The figure below depicts type groups within the Field Office area. This was derived using aerial photo interpretation, by comparing historic and current aerial photos in nine separate geographic areas. More information and details about the patch size analysis can be found in Appendix C.

Figure 4. Patch size analysis of warm/dry to moderately warm/dry habitat type groups

There is currently an overabundance of small (less than 150 acres) patches on the landscape and not enough medium- and large-sized patches.

Ecosystem Processes and Disturbances

Vegetation conditions in ecosystems are not static; they are constantly changing across space and time. The primary causes of vegetation change that are important to understand for this analysis are climate, vegetation succession, fire, forest insects and diseases, and treatments (i.e., timber harvest). The interactions between these ecosystem processes and disturbances over past centuries have resulted in the vegetation composition and structure that currently exists, and will be responsible for the changes to vegetation into the future evaluated in this EIS. Each is briefly discussed below.

Climate. Climate influences vegetation conditions and ecosystem processes. Temperature and moisture patterns dictate what trees and other plant species are able to establish and grow on a site, as well as such factors as growth rates and plant density. Periodic drought can alter forest conditions through direct mortality of trees, or indirectly, such as by increasing the frequency and/or severity of fire, or rendering trees more susceptible to insect and disease mortality.

Considerable natural variation in climate conditions has occurred historically, both over the long time frame (e.g., many centuries) and shorter time frame (e.g., the past 100 to 200 years). Specific changes in ecosystem components due to expected climate variability are difficult to predict, and are highly uncertain, especially in the mountainous, diverse terrain of the northern Rocky Mountain region. Therefore, the BLM will be taking a relatively broad approach to management of the ecosystems, focusing on strategies that increase the overall resilience of the forests to allow adaption to whatever changes the future may bring. This translates to concepts that include maintaining or increasing biodiversity (species, forest structures, pattern complexity, etc.), featuring species and forest conditions that are more resistant and resilient to fire and insect/disease, and maintaining healthy, vigorous forest conditions as recommended by the authors of the Northern Rockies Adaptation Partnership report (Keane

et al. 2015). The RMP has taken this approach to addressing potential climate variability and associated change in function in development of management direction for vegetation.

Some possible effects to vegetation from increasing temperatures are as follows:

- Longer, warmer growing seasons may increase growth rates
- Greater soil water deficits and increased evapotranspiration in the summer may increase plant stress. This latter result is more likely in forested areas, where water is currently a limiting factor on many sites. Stress can lead to higher mortality rates, either directly caused by water stress or indirectly by insects or disease.

These changes to vegetation are expected to affect disturbance processes within forests of the western United States. On lands within the Field Office, fire, insects and disease would potentially experience the most notable changes. As summarized in the Northern Rockies Adaptation Partnership report (2015, chapter 8, references incorporated), studies of potential effects of climate variability on fire and insect/disease suggest the following may occur across the western United States and Canada (refer to the Wildland Fire Management section):

- Related to wildfire: Longer fire seasons, more days of high fire danger, increased frequency of ignitions, more frequent large fires, more episodes of extreme fire behavior, and increased average annual area burned.
- Related to insect and disease: Given availability and spatial distribution of host species, there may be elevated levels of native insects and disease, with bark beetles (mountain pine beetle, Douglas-fir beetle) and western spruce budworm. These increases are closely tied to increased stress of trees due to changing water balances. Climate variability on forest diseases are difficult to predict, but predicted increases in temperature and drought will probably serve to increase pathogen populations in the future. The roles of pathogens as important disturbance agents will likely increase in the future because they are able to migrate to new environments at a faster rate than trees.

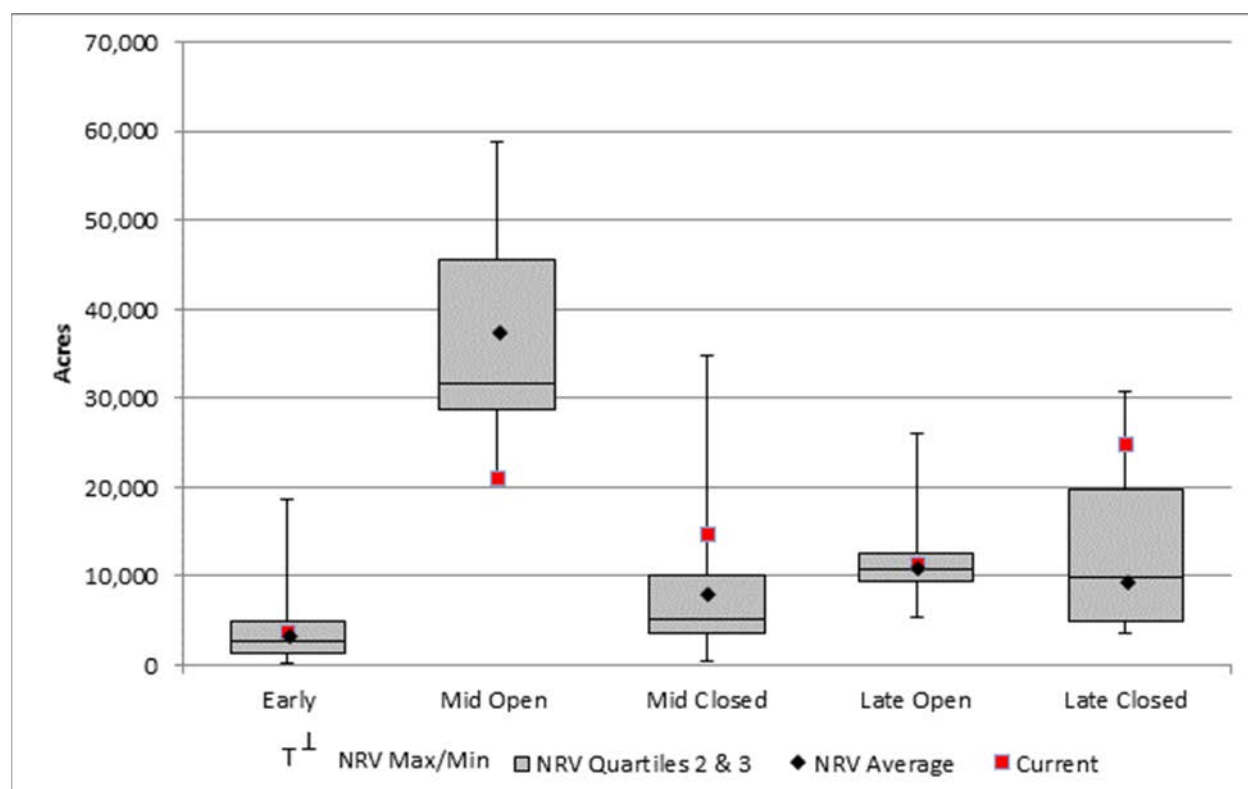
Vegetative Succession. Vegetative succession is the sequential process of long-term plant community change and development. Succession is the change in the composition, structure and function of plant communities over time following a disturbance (such as fire), and is based on the concept that every plant species has a particular set of environmental conditions under which it will reproduce and grow optimally. Successional pathways are complex and varied, reflecting in inter-relationships between site conditions, vegetation and multiple system processes and disturbances, as well as weather and climate. The rate of successional change is also variable.

Successional classes were used to summarize changes in structure over time according to SIMPPLLE modeling outputs. Tree size classes, vertical layering (single story, two story or multistory) and density (canopy cover) outputs from SIMPPLLE were used to create five successional classes. Utilizing successional classes as a metric for structure allows for comparison and correlation between vegetation management and wildlife habitat. The five successional classes are early development; mid open; mid closed; late open, and late closed. The early successional stage is characterized by the seedling/sapling forest size class. This successional stage creates a forest opening, because the much shorter trees and other vegetation create a distinct boundary and noticeably different condition to adjacent stands that are dominated by larger trees. As trees grow, they would be expected to transition through vegetative succession from smaller size classes into larger size classes. Mid-successional forests are associated primarily with the small and medium forest size classes, but in some cases, forests in the large size class would also be considered mid-successional, depending on tree ages and species. Late successional forests are associated mainly with the very large forest size class, though stands in the large size class may be late

successional, again depending on tree ages and species. Refer to Appendix C (Forest Vegetation) for more detailed information about how the successional classes were created and categorized. The current condition and NRV of successional classes on BLM lands are depicted in Figure 5.

Figure 5 displays successional stages within the field office when examined across habitat type groups. The current amount (acres) of early and late open are similar to what SIMPPLLE predicted to be the average for NRV. There are currently not enough acres in the mid open stage of succession and too many acres of mid and late closed. It is important to note that values are within the minimum and maximum NRV values produced by SIMPPLLE, some are just closer to the modeled average. The figure displays successional stages within the field office when examined across habitat type groups. There is variation when looking at each habitat type group individually. More detailed analysis and additional figures can be found in Appendix C.

Figure 5. Current condition and NRV of successional classes on BLM lands across all habitat type groups



Wildland Fire and Fuels Management. Fire is an ecological process that has created, maintained and renewed the diversity of vegetative communities, which in turn sustains the associated plant and animal species. Fire regimes (e.g., frequency, size, severity, pattern) in the Field Office are described in the Habitat Group and Species Composition portion of the affected environment. The most common fire regimes on BLM-managed land feature low and moderate severity fire. Wildfire is typically a very impactful event, and in a matter of hours thousands of acres of mid or late successional forest can be converted to an open, early successional forest.

For thousands of years, wildland fire has shaped vegetation structure and composition in the Interior Columbia Basin (Johnson et al. 1994), and was the dominant disturbance process that historically

sustained forests and biodiversity at the watershed scale. Organized wildfire protection started in the planning area in 1921. The Blackfoot Fire Protection Association (BFPA) was formed that year, and provided wildfire protection to 1,272,536 acres of private, state, and federal land (Montana DNRC 2007). The BFPA provided fire protection to 125,000 acres of General Land Office unappropriated public domain lands, most of which later became the Missoula Field Office. The BFPA members included the General Land Office, USFS, State of Montana, and private industrial timberland owners. Over several decades, the BFPA built a system of roads, trails, and lookouts that made the organization highly effective in suppressing most wildfires at 10 acres or less in their protection. In 1971, the BFPA was dissolved and the BLM provided its own wildfire protection.

The BLM and USFS have been working together to suppress wildland fires dating back to an agreement entered in 1982 referred to as the BLM/FS Master Agreement. More recently the BLM, USFS, and Montana Department of Natural Resources and Conservation (DNRC) Southwestern Land Office entered an Annual Operating Plan to work together to suppress wildland fires in this area. The Annual Operating Plan establishes procedures for initial attack, escaped fire, and large wildland fire management. The Annual Operating Plan also requires the protection agencies (DNRC and USFS) to abide by the site-specific heavy equipment restrictions. To summarize, wildland fire protection of Missoula Field Office lands has been managed by the BFPA (1921 to 1971), the BLM (1971 to 1982), and DNRC (1982 to present), and the three operated under the same full suppression policy.

According to DNRC data from 1981 to 2013, over 253 wildfires have been suppressed in the forest vegetation analysis area—96 percent were kept below 10 acres in size, and 81 percent were started by lightning. These numbers are similar to the historic BFPA data for the planning area from 1923 to 1936. Since 1921, only nine wildfires have escaped initial attack.

Due to a lack of periodic fires across the forest vegetation analysis area, forest fuels have increased. Suppression and past timber management has altered the composition, structure, and density of the forests. There are more smaller, shade-tolerant trees per acre than were historically present. These conditions create ladder fuels, and can result in more intense and higher severity fires that burn more acres than historically. Many of the fire dependent species such as ponderosa pine and western larch are declining from the landscape.

The Garnet RMP management objective allows for the use of fire as a tool for consideration in vegetation and fuels management in conformance with other resource uses; however, the Garnet RMP broadly addresses fire management with sparse guidance for fuels management, prescribed fire, and fire suppression operations.

The Garnet RMP was amended by the Fire/Fuels Management Plan Amendment for Montana and the Dakotas (USDI-BLM 2003a), which provides guidance for wildland and prescribed fire. The amendment describes the use of prescribed fire for hazardous fuels reduction and resource benefit, and provides guidance for wildland fire operations. The goals within the plans include:

- Provide greater protections to human life.
- Reduce the risk and cost of severe wildland fires.
- Sustain the ecological health and function of fire-adapted grasslands, shrublands, and forestlands.
- Minimize the adverse effects of wildland fire suppression.
- Use fire and fuels management methods to reduce hazardous fuels while meeting other resource objectives.

The Missoula Field Office Fire Management Plan was developed in 2004, as required by the Garnet RMP, and tiers to the Fire/Fuels Management Plan Amendment. The Fire Management Plan was coordinated with fire and fuels management policy and actions being taken by the Lolo, Beaverhead-Deerlodge and Lewis and Clark National Forests; DNRC Southwestern Land Office; Southwest Zone of the Northern Rockies Coordinating Group; and departments within Missoula, Powell and Granite County governments.

Before 2001, the BLM forestry program planned and implemented vegetation management treatments including fuels reduction through timber sales, thinning, and prescribed burning. A more robust fuels program started in 2001, in response to the National Fire Plan, and has worked jointly with the forestry program to accomplish fuels reduction. Administrative procedures and processes governing preparation of projects to reduce hazardous fuel and restore healthy ecological conditions on BLM-managed land have undergone changes as a result of the Healthy Forest Initiative (HFI) and the Healthy Forest Restoration Act (HFRA). The HFRA provides improved statutory processes for hazardous fuel reduction projects on certain types of at-risk BLM-managed land, and provides other authorities and direction to help reduce hazardous fuels and restore healthy forest and rangeland conditions on land of multiple ownerships. Most of Missoula BLM's past fuel reduction projects resulted from watershed EAs, and are aimed at restoration of fire-adapted natural systems and reducing fuels in the WUI.

Missoula BLM never developed a fire management plan that enabled the use of fire for resource benefit, thus full suppression of wildfires has been our management. This management of wildfires has been very successful and most fires have been suppressed at less than 10 acres. Several fires have escaped initial attack, which are described above. Due to the success of a full suppression strategy, the natural fire cycles that occurred across the planning area have been disrupted, resulting in, among other things, a buildup of forest fuels.

The Missoula BLM works collaboratively with all partners to reduce the risk of catastrophic wildfire on federal, state, private and tribal lands. Collaboration enables the BLM to accomplish the goal of reducing the risk of catastrophic wildfire and managing healthy forests. The Missoula BLM is an active member of the Missoula County Cohesive Strategy Working Group, Blackfoot Prescribed Fire Working Group, Blackfoot Challenge Forestry Committee, Blackfoot Challenge Fuels Mitigation Task Force, and the Clearwater-Blackfoot Working Group. These collaborative efforts are striving to reduce hazardous fuels, increase landscape resiliency, and build fire adapted communities across multiple land ownership boundaries. The Missoula BLM also incorporates the Community Assistance Program to provide private landowners BLM funding to mitigate hazardous fuels on private lands through a cost share program managed by counties for over 15 years. Lastly, the Missoula BLM works to reduce wildfire risk in partnership with the Confederated Salish Kootenai Tribes under the Reserved Treaty Right Lands Program.

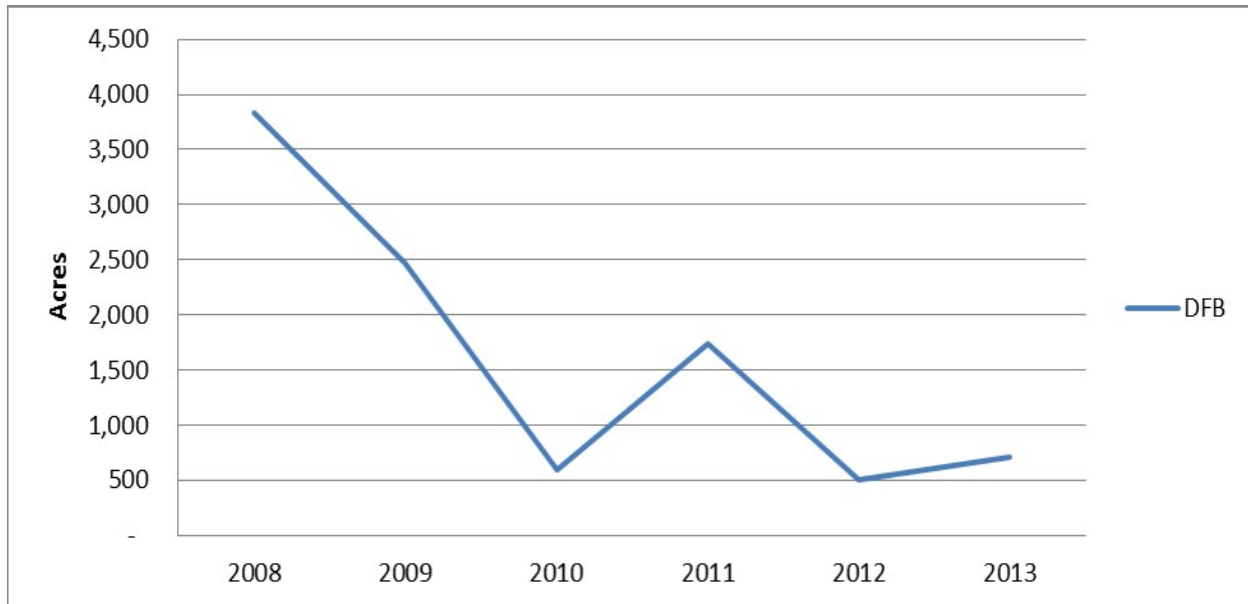
Forest insects and disease. Many insects and diseases affect vegetation in the forests on Field Office lands. Most are native and usually exist at relatively low population or intensity levels that do not cause notable large-scale or long-term impacts. The actions of insects and disease are natural ecological processes that have played a major role in the past and will continue into the future as a driver of vegetative change. Effects can be rather influential, such as when epidemic conditions for mountain pine beetle causes high mortality over the span of one year in lodgepole pine forests. More often, effects due to insects and disease occur more gradually, but still can cause major changes to vegetation conditions. In the absence of fire, insects and diseases account for an estimated 75 percent of change in vegetation over time (Byler and Hagle 2000).

Insects and diseases that are likely to have the most notable impacts on forest conditions at the landscape scale and/or over time listed from most to least predicted impacts are Douglas-fir beetle, mountain pine

beetle, and spruce beetle. Other insects or diseases that occur on a lesser scale are western spruce budworm, root diseases and white pine blister rust.

Douglas-fir is one of the most dominant and widespread species on Field Office lands, and Douglas-fir beetle is a chronic mortality agent within Douglas-fir stands, killing or injuring individuals and small groups of Douglas-fir across the forest every year. Beetle outbreaks and widespread mortality of trees occur periodically in this area, typically following stand disturbances, such as fire, severe drought and wind-throw, where large areas of weakened trees exist. Larger diameter trees (e.g., greater than 15 inches d.b.h.) are most vulnerable to beetle attack. Figure 6 displays the amount of recent Douglas-fir beetle activity within the three county area in which BLM lands are located. Douglas-fir beetle activity would likely be influenced by expected changes in climate. Beetle survival would be enhanced by warming temperatures and stress levels of host species would make them more vulnerable to beetle attack (Keane et al. 2015).

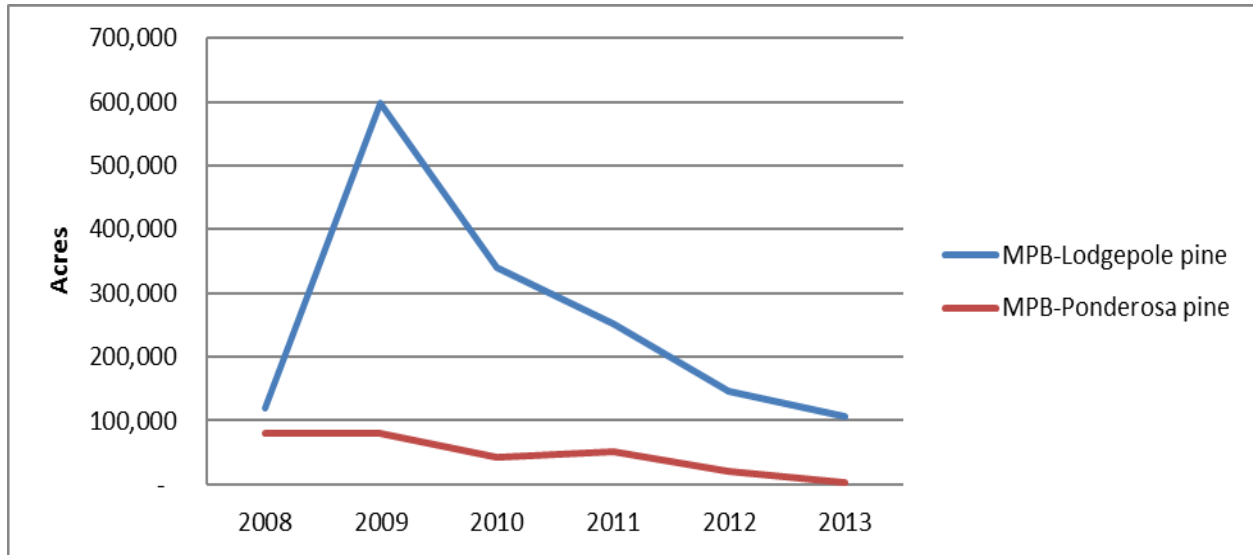
Figure 6. Missoula, Powell, and Granite Counties' Douglas-fir beetle-caused mortality



Mountain pine beetle is the most aggressive and persistent bark beetle. Host species are lodgepole pine, ponderosa pine, western white pine and whitebark pine. Lodgepole pine is its most abundant and widespread host species, and tends to grow in large, often nearly pure stands of similar size trees. This contributes to epidemic population levels of MPB periodically developing across this area, killing large numbers of lodgepole as well as spreading into the surrounding areas and killing trees of other pine species. Generally, the larger the tree diameter, the more susceptible it is to mountain pine beetle attack. During an infestation, the majority of trees can be killed in some susceptible stands over a relatively short time period (e.g., a few years), opening forest canopies enough to return them to the early stage of succession, providing regeneration opportunities for shade-intolerant tree species. They also commonly allow the growth release of understory shade-tolerant tree species that are already present on the site. Tree mortality also increases the amount of snags and dead, down woody material. This can influence the probability of large stand-replacing fires, which in turn can return the stand to the early successional stage. Figure 7 displays the amount of recent mountain pine beetle activity within the three-county area in which BLM lands are located. Potential climate variabilities in the future are likely to cause an increase in

bark beetle activity. Many bark beetle life history traits that influence beetle population success are temperature-dependent. Beetle populations may be favored by warming temperatures, due to potential for increased survival of beetles, and to increased stress of the host species. Stress of host trees due to changing water balance increases vulnerability of trees to bark beetle attack and mortality.

Figure 7. Missoula, Powell, Granite Counties' mountain pine beetle-caused mortality



Spruce beetle is the most significant natural mortality agent of mature spruce, and its host on Field Office lands is Engelmann spruce. Spruce beetle outbreaks cause extensive tree mortality and modify stand structure by reducing the average tree diameter, height, and stand density. Residual trees are often slow-growing small and intermediate-sized trees that eventually become dominant. As with Douglas-fir beetle, larger diameter trees are more susceptible to beetle attack. In the Rocky Mountain area, susceptibility, or hazard, of a stand to spruce beetle attack is based on the physiographic location, tree diameter, basal area, and percentage of spruce in the canopy. Spruce stands are highly susceptible if they grow on well-drained sites in creek bottoms, have an average d.b.h. of 16 inches or more, have a basal area greater than 150 square feet per acre, and have more than 65 percent spruce in the canopy. Spruce beetle is currently at endemic levels throughout the Field Office primarily due to the lack of widespread availability of stands containing larger spruce. Areas where large-diameter spruce-dominated forests develop are commonly associated with the moist areas and riparian zones, which tend to form relatively narrow linear or discontinuous patterns across the landscape.

Invasive Species. An invasive species as defined in Executive Order 13112 is an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Within the planning area, present invasive species consist of primarily exotic plant species. However, other types of organisms such as animals and pathogens are making their way closer to the planning area and could potentially impact activities on BLM lands within the next 20 years. Most of these species are associated with water bodies and have been designated by the state as Aquatic Nuisance Species. The State of Montana has developed priority categorization systems for noxious plants and Aquatic Nuisance Species. Both noxious weeds and Aquatic Nuisance Species have been identified as having the potential to cause economic and environmental harm and/or harm to human health.

Noxious weed invasion contributes to the loss of rangeland productivity, increased soil erosion, reduced water quantity and quality, reduced species and structural diversity, loss of wildlife habitat, and in some

instances, is hazardous to human health and welfare, as emphasized in the federal Noxious Weed Act of 1974 (PL 93-629, as amended by section 15 – Management of Undesirable Plants on Federal Lands, 1990). Some weed species pose a significant threat to multiple-use management of BLM land.

Noxious and invasive plant species, for the most part, are associated with areas experiencing natural or human-made disturbances. Noxious and invasive plants are found mainly along waterways, roads, recreational destinations, over-utilized rangeland, pipelines, drilling pads, rights-of-way, and livestock/wildlife paths and congregation areas. Data derived from state and BLM-based mapping suggests that approximately 37,000 acres or 23 percent of BLM land in the planning area is infested or potentially infested by at least one invasive species. These data include species that do not occur on state or county noxious weed lists, but are known to be invasive. These data do not include any grass species and incomplete information on some species. The species known to occur within the planning area (on private, state, and federal lands) are outlined in table 27 below.

Table 26. Acres of infested BLM-managed lands in the analysis area

County	BLM Acres	Infested Acres
Granite	45,952	12,933
Missoula	28,013	8,275
Powell	88,386	16,036
Total	156,731	37,244

The invasive species management program continually changes as a result of new introductions, additional inventory and the ongoing implementation of management projects. The BLM uses a full range of integrated pest management in the planning area. The basic management of noxious and invasive plants consists of:

- Early detection and rapid response (newly invading species);
- Containment and management (widespread weed infestations);
- Inventory, monitoring and evaluation; and internal and external awareness, education and outreach.

The control methods used to control noxious weeds include:

- **Chemical.** Application of herbicides by ground-based equipment and aerial applications.
- **Cultural.** Cultural practices are activities that purposefully enhance or maintain the growth of desired vegetation, including revegetation and changes in land use practices.
- **Biological.** Use of biological agents to control weed species.
- **Manual and Mechanical Control Methods.** These methods involve physically destroying the weed or interfering with reproduction by pulling, digging, or cutting.

The State of Montana currently designates 32 noxious plants and three regulated plants which are divided into five management priorities. Of the five management priorities, the BLM has only two priority categories on its lands in the planning area—Priority 2A and Priority 2B. Priority 2A is described as weeds common in isolated areas of Montana; the management criteria will require eradication or containment where less abundant; and management shall be prioritized by local weed districts. Priority 2B is described as weeds are abundant in Montana and widespread in many counties; management criteria

will require eradication or containment where less abundant; and management shall be prioritized by local weed districts.

The table below identifies the noxious plant name, Montana priority status, occurrence on public and private/state lands, and BLM acre classification.

Table 27. Noxious weed species in the analysis area

Name	Scientific Name	Status	Occurs on Public Lands	Occurs on Private/State Lands	BLM Acre Class*
Hoary cress (Whitetop)	<i>Cardaria draba</i>	MT Priority 2B	Yes	Yes	Trace
Musk thistle	<i>Carduus nutans</i>	BLM Invasive	Yes	Yes	High
Spotted knapweed	<i>Centaurea maculosa</i>	MT Priority 2B	Yes	Yes	High
Oxeye daisy	<i>Chrysanthemum leucanthemum</i>	MT Priority 2B	Yes	Yes	Mod
Canada thistle	<i>Cirsium arvense</i>	MT Priority 2B	Yes	Yes	Mod
Houndstongue	<i>Cynoglossum officinale</i>	MT Priority 2B	Yes	Yes	Mod
Leafy spurge	<i>Euphorbia esula</i>	MT Priority 2B	Yes	Yes	Mod
Orange hawkweed	<i>Hieracium aurantiacum</i>	MT Priority 2A	Yes	Yes	Low
Black henbane	<i>Hyoscyamus niger</i>	BLM Invasive	Yes	Yes	Low
Perennial pepperweed	<i>Lepidium latifolium</i>	MT Priority 2A	Yes	Yes	Trace
Dalmatian toadflax	<i>Linaria dalmatica</i>	MT Priority 2B	Yes	Yes	Mod
Yellow toadflax	<i>Linaria vulgaris</i>	MT Priority 2B	Yes	Yes	Low
Sulfur cinquefoil	<i>Potentilla recta</i>	MT Priority 2B	Yes	Yes	Mod
Common tansy	<i>Tanacetum vulgare</i>	MT Priority 2B	Yes	Yes	Mod
Meadow hawkweed	<i>Hieracium caespitosum</i>	MT Priority 2A	Yes	Yes	Mod
Tall buttercup	<i>Ranunculus acris</i>	MT Priority 2A	Yes	Yes	Trace
Hoary alyssum	<i>Berteroa incana</i>	MT Priority 2B	No	Yes	None

Source: All species on Montana's Noxious Weed List also appear on BLM's Invasive Plant List. This table was constructed using data from the County Weed Districts, The Invaders Database System, The USDA PLANTS Database and the Missoula Field Office.

** BLM Class Values: None = 0 acres; RARE = <1 acre; Trace = 1 to 5 acres; Low = 5 to 50 acres; Mod = 50 to 500 acres; High = > 500 acres.

Noxious weed distribution in the analysis area is based on habitat type groups. These groups have characteristics that either promote or limit the introduction and or spread of noxious weeds. Habitat type

groups 4 through 7 are low and very low risk for noxious weed invasion, these types have a limiting factor such as high elevation, north aspect, lower temperature or dense canopies that inhibit noxious weed spread. Localized infestations are possible on these sites, but do not compete well with native vegetation.

- 3 (high risk): Noxious weeds may frequently dominate native vegetation following disturbance or through invasion into an undisturbed community.
- 2 (moderate risk): Noxious weeds may dominate interspaces of native vegetation, but sites generally have a limiting factor that prevents full development of the weed.
- 1 (low risk): Noxious weeds occur as single plants or small groups, and will not dominate native vegetation.
- 0 (no risk): Environmental conditions are unsuitable for weed spread.

Vegetation treatments: timber harvest, thinning, and prescribed fire. Two broad categories of active vegetation treatments are evaluated in this EIS: timber harvest and prescribed fire. These treatments change forest conditions in both the short and long term. Timber harvest removes commercial timber products, and consists of three general types: even-aged regeneration harvests, group selection and commercial thinning. Timber harvest prescriptions in this analysis also incorporate non-commercial thinning of young sapling stands and tree planting, both treatments that also influence stand composition and structure in the short and long term. Prescribed fires are planned ignitions, where fire is deliberately applied to the landscape. Each of these treatments, how they may affect vegetation conditions, and a summary of past acres of treatments across the forest follows.

Regeneration harvest (even-aged). Regeneration harvest includes clearcuts, seedtree and shelterwood cuts with reserves, which remove the majority of the trees, opening up the forest canopy sufficiently to allow new tree seedlings to establish and grow. As a result of regeneration harvests, forest size class changes to seedling/sapling, an early successional forest condition. Forest dominance types and species presence may also change, depending upon the composition of the regenerated forest. Forest densities and forest fuels (i.e., downed wood, snags) may change, either reduced or increased depending upon the pre-harvest forest conditions.

Non-commercial thinning (sometimes called pre-commercial thinning) is not directly modeled and analyzed in this EIS, but is incorporated into the even-aged regeneration harvest prescriptions. This thinning typically occurs in stand of sapling size (1 to 5 inches d.b.h.), and reduces tree densities. Species compositions may change by targeting different species for retention or removal. Maintenance or improvement of tree growth typically occurs as a result of thinning. Forest structure is also affected over the long term (e.g., tree sizes, forest density).

Similar to non-commercial thinning, tree planting is also incorporated into the even-aged regeneration harvest prescriptions. Tree planting primarily influences species compositions and in some situations forest density.

Group selection. Group selection harvest is a type of uneven-aged regeneration harvest, converting portions of the forest to a seedling/sapling size class and potentially changing species composition. This conversion occurs gradually over a period of many decades, creating a multi-age and multi-size stand. Openings are created (appropriate in size to enable successful regeneration of desirable tree species) over a portion of the stand in each harvest entry. For example, a particular stand may have a treatment entry every 10 to 15 years, treating 20 percent of the stand each entry by creating small openings, resulting in the entire stand being treated over a 50- to 75-year period.

Commercial thinning. Commercial thinning removes fewer trees than in a regeneration harvest, leaving a forest that is less densely stocked, but still dominated by trees larger than seedling/sapling size class. The focus is not on regenerating a new forest stand, but in changing the condition of the current one. Not only is forest density reduced, but species compositions and forest size class may change by unequal removal of trees of different species or size. Tree growth is accelerated as a result of thinning activities.

Prescribed fire. Prescribed fire treatments are a planned fire ignition used to meet a variety of vegetation-related resource objectives, including improvement of wildlife habitat, stimulate shrub sprouting, reduce stand densities, reduce forest fuels (downed wood), create openings for early successional habitat, provide nutrient cycling and to restore natural disturbance processes.

Past treatments acres. Harvesting has been used on the Field Office lands as a tool used to achieve a variety of resource objectives, including but not limited to lowering fuels and fire risk; establishing desired tree species; improving tree growth; reducing impacts of insects or disease; contributing wood products to the local economy; improving wildlife habitat; and salvaging the economic value of trees killed by fire or other factors. Over the past 30 years, an estimated 10 percent (approximately 15,655 acres) of the Field Office lands have experienced some type of timber harvest (1986 to 2016). Looking at a more recent time period, from 2006 to 2015, approximately 5,486 acres have been harvested, suggesting that harvest levels have been fairly consistent over the past 30 years.

Since 1986, the 29-year average for thinning in the Field Office has been 232 acres a year. If broken into decades, each decade has seen an increase in precommercially thinned acres. This trend is a result of harvested stands from the 1970s and 1980s reaching a size and density requiring thinning to retain health and productivity. The long-term (29-year) average for planting is approximately 270 acres per year. More recently, an average of 123 acres per year between 2006 and 2016 have been planted. Planting is usually conducted for the purpose of establishing desired tree species on a site where natural regeneration is not expected to be sufficient.

3.2.2 Environmental Consequences: Forest Vegetation

Impacts common to all alternatives

Forest Vegetation Components. There are many similarities in forest vegetation components between the alternatives as shown in the trends that occur over the five-decade model period. Detailed results that are summarized in this section can be found in appendix C. The modeling analyzed how each alternative achieved or moved conditions toward the mid-range of NRV to accelerate rates of change related to promoting desired trends in species composition; how each alternative would shift more habitats and successional classes closer to the mid-range of NRV; and which alternative is best at achieving desired conditions and trends related to forest resilience. These components are discussed below and in the separate impacts under alternatives A, B, and C categories.

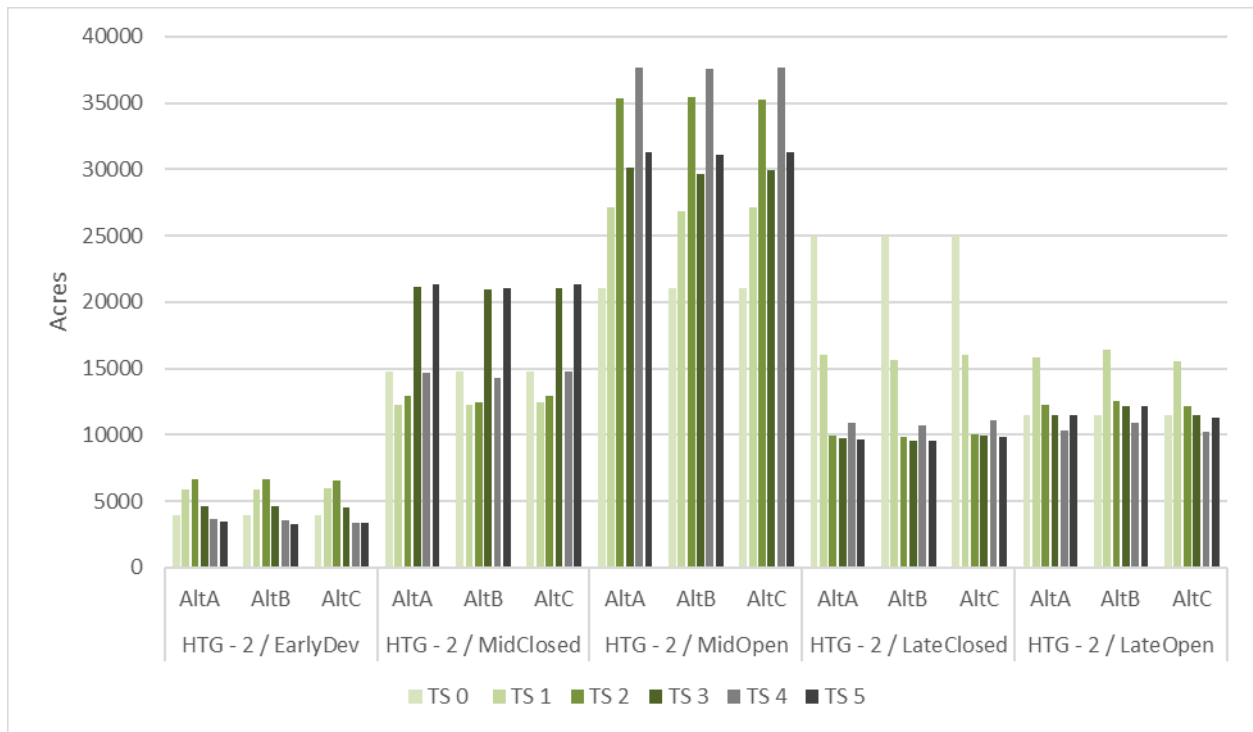
Species Composition. Every alternative would create species composition by moving toward or maintaining values within the NRV. Silvicultural prescriptions for forest management treatments would dictate the species to be favored or retained in different habitat type groups. Species favored for retention would emulate conditions that are near the midrange of NRV and be resilient to disturbance. The Alternative that proposes the greatest quantity of vegetation management moving conditions toward the midrange of NRV would therefore create the most amount of a desirable species composition. The extent to which each alternative moves conditions toward the midrange of NRV varies by alternative as described in Impacts under Alternatives A, B, and C below.

Landscape pattern and patch dynamics. Every alternative would create patch dynamics within NRV. The amount of forest vegetation in the Field Office that is moved toward NRV in terms of landscape dynamics would correspond to the amount of vegetation treatment in each alternative. At the project level, design features would be implemented to emulate natural patch sizes and distribution across landscapes, primarily focusing on creating more medium and large size patches and fewer small size patches. The ability to create wildlife habitat connectivity corresponds to landscape pattern as discussed in the affected environment. The extent to which each alternative would create patch dynamics within the forested landscape per decade differs by alternative as described in Impacts under Alternatives A, B, and C below.

Structure. Every alternative would change the successional classes. Successional classes were used to summarize changes in structure over time according to SIMPPLLE modeling outputs. Tree size classes, vertical layering categories (single story, two story or multistory) and density (canopy cover) outputs from SIMPPLLE were used to create five successional classes. Utilizing successional classes as a metric for structure allows for comparison and correlation between vegetation management and wildlife habitat. The five successional classes that were created are early development; mid-development open canopy; mid-development closed canopy; late-development open canopy and late-development closed canopy. Refer to the Appendix C for more detailed information about how the successional classes were created and categorized. The cool Douglas-fir habitat type group comprises the largest portion (50 percent) of lands within the Field Office. Therefore, this habitat type group had a big influence on model outputs and is utilized for discussion purposes more than other habitat type groups to discern environmental consequences among the alternatives.

Due to minimal differences in changes to structural stage among alternatives (illustrated in Figure 8 below) it is not necessary to examine the attainment of NRV by alternative. This figure illustrates the almost identical pattern in changes to structure among alternatives. This is due to small differences in the amount of vegetation treatments proposed for each alternative.

Figure 8. Differences in the alteration of structural stages among alternatives displayed by successional classes for a time period of five decades. TS 0 is the current condition and TS 1-5 correspond with the first through fifth decades



When evaluating the effects of alternatives across all HTGs, SIMPPLLE modeling predicted an increase in the amount of acres in early development and mid-development open canopy successional states, a slight decrease in the mid-development closed canopy successional state and a slight increase in late-development open canopy successional states. Late-development closed canopy is predicted to decrease across the HTGs but varies in quantity among individual HTGs. As is the case for current conditions, values are within the minimum and maximum range of NRV. Implementing action alternatives would reduce the amount of mid-development and late-development closed successional states, which are currently overabundant. There would be little change to late development open canopy, which is currently already near the mid-range of NRV. There would be moderate increases in the amount of mid open, which is currently lacking in abundance.

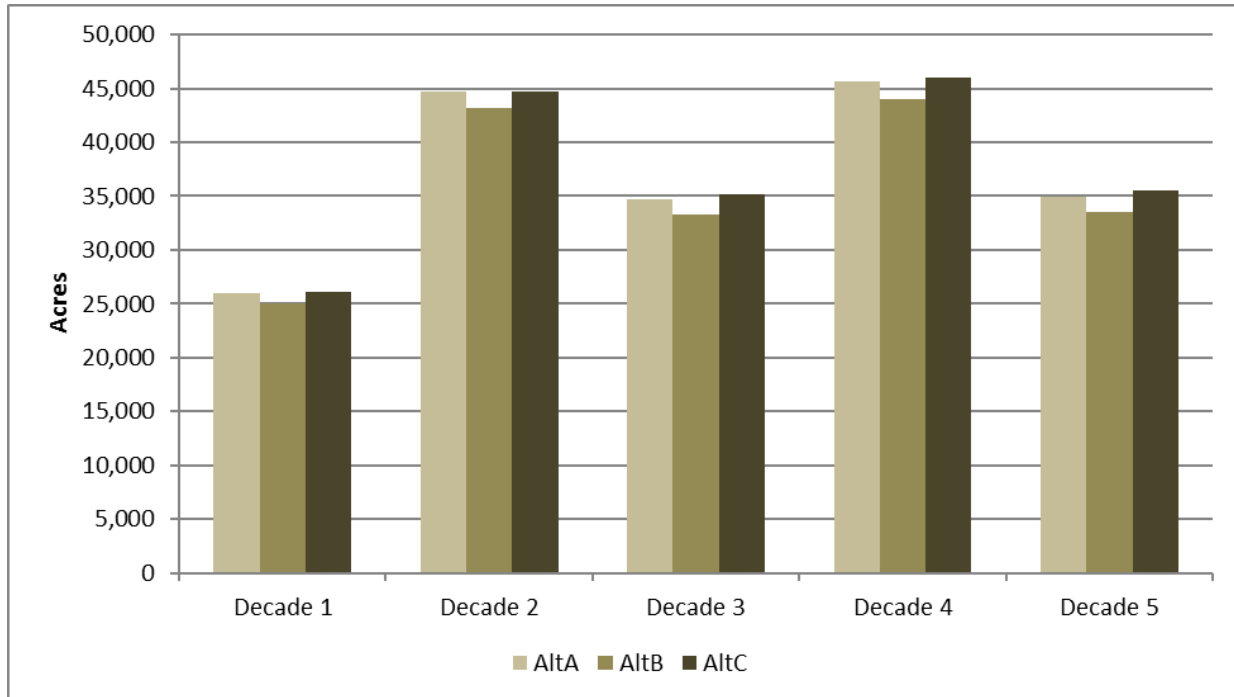
The maximum and minimum values for NRV are the outcome of running the SIMPPLLE model for just over 1,000 years. The box plots and current values give a visual display of how the model predicts the implementation of Alternative B would move structural stages within the NRV over the next 50 years. Looking at predicted changes to successional classes compared to NRV by HTG offers some differing results between the warmer/drier and the colder/wetter HTGs. The warmer/drier HTGs (1 and 2) show the mid open stands are in the lower end of NRV currently, with an accumulation of mid and late closed stands. HTG-6 shows that late closed stands are currently below the NRV and over five decades under Alternative B late closed stands may shift to within NRV. These colder/wetter HTGs would have historically held a larger percent of the area in a late closed class due to the nature of the mix of shade-tolerant species coupled with infrequent fire return intervals. The overall lack of late development currently in HTG-6 is most likely attributable to 1970 and 1980s era logging, which also explains the abundance of mid development stands currently. Successional classes for HTGs 1, 2, and 4 are within NRV and no alternative moves any successional classes out of NRV. Figures for HTGs 1, 2, 4 and 6 are contained in Appendix C.

Increases in open canopy and reductions in closed canopy structural stages within the dry HTGs suggest that resilience in forests would increase through the reduction in competition and associated moisture and nutrient deficiencies. Resulting effects include improved tree vigor and growth; reduced forest fuel loading from tree mortality and potential severity of fires when they do occur; and decreased impacts due to insects and disease, particularly bark beetles and western spruce budworm.

Risk of disturbance (resilience). Vegetation treatments proposed under every alternative would create a degree of resiliency to Douglas-fir beetle infestations and changing climatic conditions. Due to a combination of the high amount of Douglas-fir located across the Field Office, overstocked stands (due to absence of fire from 1930-2000), and the warmer, drier climate assumptions that were run using the SIMPPLLE model, Douglas-fir beetle outbreaks are severe in terms of area impacted throughout the five decade period, depicted in Figure 8. Extensive areas having high-density stands (which are the mid and late closed successional classes) across the field office create conditions that are at high risk to large-scale Douglas-fir beetle activity. This modeled output is supported by research from the Region 1 Forest Health Protection Group and predictions made in the Northern Rockies Climate Change Vulnerability Report (Halofsky et al. 2018).

The degree of resiliency differs by alternative and this difference, how proposed treatments in different alternatives impacted the risk of disturbance which affects resilience to changing climactic conditions, is the biggest discernable impact of vegetation treatments shown by SIMPPLLE modeling. The difference between alternatives is shown in Figure 9 below, and described in further detail in the impacts sections below.

Figure 9. The level of Douglas-fir beetle outbreaks predicted on BLM lands by SIMPPLLE for Alternatives A, B, and C expressed as an average of 30 SIMPPLLE simulations



Aquatic Habitat and Special Status Species. The management of aquatic habitat, including special status species, will have environmental consequences to forest vegetation management and as a result, forest products. Special status species include listed, proposed, candidates, and sensitive species. The need to

protect special status species as well as certain other species of fish and wildlife could impact the amount of surface-disturbing activities that take place. Projects would need to comply with the applicable threatened and endangered species conservation strategy and recovery plan. Project or activities that could affect fisheries may need to have design features, be relocated, or in some cases, dropped from consideration. There would be no difference in these impacts across alternatives since the miles of Bull Trout critical habitat and acres of fish key watersheds is consistent across alternatives.

Wildlife and Special Status Species Habitat. Wildlife such as big game and migratory birds, and special status species (listed, proposed, and sensitive species including candidates) may impact forest vegetation and products. Canada lynx and grizzly bear are two examples. The Canada Lynx Conservation Assessment and Strategy emphasizes minimization of pre-commercial thinning projects that reduce snowshoe hare habitat in seedling/sapling sized stands in lynx habitat within lynx analysis units (LAUs) and critical habitat. This Plan has an objective to consider thinning methods within lynx habitat and lynx critical habitat in the early successional state if treatments would result in short-term effects with long-term benefits to snowshoe hare, red squirrel, and lynx. Precommercial thinning is one of the most effective tools available to emulate disturbance and trend forests toward natural ranges of species composition, densities, size classes (e.g., large and very large trees), and improved resilience over time. One of the biggest concerns related to restrictions on pre-commercial thinning is the potential impacts on western larch and its contribution to forest resilience. Western larch grows very poorly in high-density conditions. Optimization of growth is realized when trees have sufficient growing space which can be accomplished by thinning, prescribed burning or both.

The Canada Lynx Assessment and Strategy (LCAS) also requires to “manage so that no more than 30 percent of the lynx habitat in an LAU is in an early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (i.e., does not provide winter snowshoe hare habitat). Emphasize sustaining snowshoe hare habitat in an LAU. If more than 30 percent of the lynx habitat in an LAU is in early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (e.g., clearcuts, seed tree harvest, precommercial thinning, or understory removal), no further increase as a result of vegetation management projects should occur on federal lands. Recognizing that natural disturbances and forest management of private lands also will occur, management-induced change of lynx habitat on federal lands that creates the early stand initiation structural stage or silviculturally treated to re horizontal cover should not exceed 15 percent of lynx habitat on federal lands within a LAU over a 10-move year period.” This RMP has an objective that identifies the need to create lynx habitat in a pattern across landscapes over space and time (WL-OBJ-03) so a requirement to maintain the LCAS recommendations for early stand initiation (early successional stages) should not affect attainment or movement toward the midrange of NRV if there are no large-scale disturbances as described previously. However, wildfires that burn with greater intensity and that cover larger areas than in the past are expected to be a common disturbance in the future. Wildfires of this nature will likely cause large areas to remain in early to mid-development successional stages (which do not have the opportunity to mature into late successional stages) or to eventually shift cover types from trees to shrubs, forbs and grasses in the case of repeated fire occurrences in the same areas. Fires of this nature would cause the size and distribution of early and mid-development successional patches to be misaligned with NRV. Actively managing forested landscapes within LAUs should help to moderate fire spread and intensity.

Multi-story hare habitat is likely to have forest structures and densities that tend to be of higher susceptibility to high severity fire as well as to damage and mortality of the true firs and spruce from western spruce budworm, bark beetles, and other agents. With predicted and modeled potential for high severity fires and insect infestations that will likely occur, the above stated limitations could affect attainment or movement toward the midrange of NRV for vegetation that remains after a large-scale disturbance since the maximum allowable amounts of habitat affected by the disturbance would disallow

any additional management for 10 years within an LAU. The ability to increase early successional species in lynx habitat, specifically western larch, would be most affected by the inability to create open conditions across portions of the landscape, either through prescribed fire or harvest which western larch needs to successfully regenerate.

Every alternative would maintain existing levels of open motorized road density in grizzly bear zone 1 habitat at the 2011 baseline (1.70 mi/mi²). Motorized use by agency personnel or others authorized by the appropriate agency personnel would be allowed. Roads could be constructed for the implementation of forest management but not open to the public. Thus, no impacts to forest management are anticipated.

Backcountry Byways and National Trails. The Garnet Backcountry Byway has had no impact on vegetation management in the past and is not anticipated to have impacts as a result of implementing any of the alternatives in the future. The Lewis and Clark National Historic Trail corridor would have minor impacts to forest vegetation as management to protect Lewis and Clark National Historic Trail values could place restrictions that would prevent certain types or amounts of vegetative treatments, but these impacts are unlikely.

Wilderness Study Areas (WSAs). WSAs could result in reduced flexibility and options for vegetation management to be moved toward or maintain NRV and associated forest product harvest and removal. Use of prescribed fire could be utilized. Since the amount of WSAs is constant among the alternatives there would be no difference in the effect of WSAs on vegetation management between alternatives. If released by Congress, 17,362 acres would be available in the harvest land base under the action alternatives. Of those acres, restrictions may occur within lynx habitat within the LAUs.

Cultural: Surface disturbing activities must comply with Section 106 of the NHPA for federal undertakings. Cultural Resource Inventories will be completed prior to these actions and impacts to sites eligible for NHPA listing may need to be mitigated.

Impacts under Alternative A

Species Composition. The least amount of species composition moved to the midrange of NRV (7 percent per decade) would occur under Alternative A. This is the lowest quantity of vegetation management moving toward the midrange of NRV among the three action alternatives.

Landscape Pattern and Patch Dynamics. Alternative A would create the least amount of patch dynamics within the NRV (7 percent per decade). This would provide the least opportunity to address habitat connectivity through vegetation management.

Risk of Disturbance. Due to implementation of the second highest amount of vegetation treatments occurring in Alternative A of approximately 1,200 acres per year, it is predicted to create an amount of resilience to climate dependent disturbances such as large-scale wildfire and insect and disease events including Douglas-fir beetle infestations but to a lesser degree than Alternative B as shown in Figure 9.

Air quality. Alternative A would have the least amount of vegetative treatments to move conditions toward the midrange of NRV among the alternatives, creating the greatest amount of acres having conditions conducive to large-scale wildfire events, which typically cause an exceedance of air quality standards.

Areas of Critical Environmental Concern. The proposed ACECs include management that would protect relevant and important values, which could place minor restrictions on certain types of vegetative treatments. The management direction for the Bear Creek Flats ACEC (565 acres), Limestone Cliffs (20 acres), and Phil Wright Rock (640 acres) allows for forest management.

Impacts under Alternative B

Species Composition. The greatest quantity of species composition moving toward or maintaining values within NRV (10 percent of the forested landscape per decade) would occur under this Alternative. This is the highest amount of vegetation management moving toward the midrange of NRV.

Landscape Pattern and Patch Size. Alternative B would create the most amount of patch dynamics within the NRV (10 percent of the forest landscape per decade). This would provide the most opportunity to address habitat connectivity through vegetation management.

Risk of Disturbance. Due to implementation of the highest amount of vegetation treatments occurring in Alternative B of approximately 1,500 acres per year, it is predicted to create the most amount of resilience to climate-dependent disturbances such as large-scale wildfire and insect and disease events including Douglas-fir beetle infestations as depicted in Figure 9.

Air Quality: This alternative has the highest amount of vegetative treatments to move conditions toward the midrange of NRV among the alternatives, and would create a reduced amount of Field Office area acres having conditions conducive to large-scale wildfire events, creating the lowest potential for exceedance of air quality standards.

Areas of Critical Environmental Concern. The Phil Wright Rock ACEC (640 acres) management direction to protect relevant and important values allows for forest management, but could place minor restrictions on certain types of vegetative treatments.

Impacts under Alternative C

Species Composition. The second highest amount of species composition moving toward or maintaining values within NRV (8 percent of the forested landscape per decade) would occur under this alternative. This is 2 percent fewer acres of the forested landscape per decade moving toward the midrange of NRV than Alternative B.

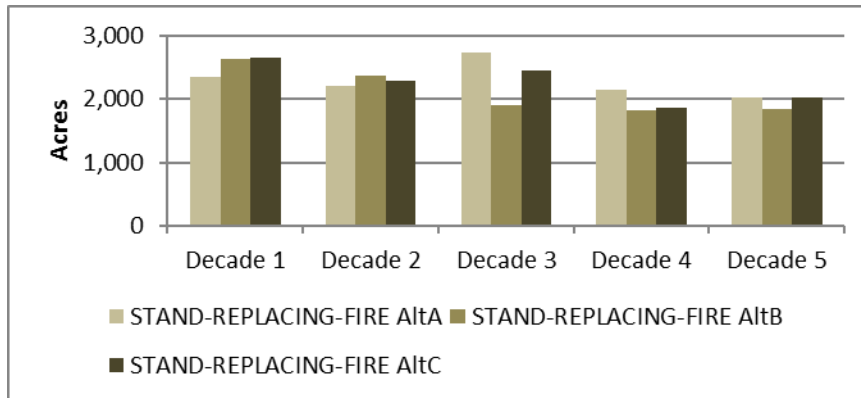
Landscape Pattern and Patch Size. Alternative C would create the middle amount of patch dynamics within NRV (8 percent of the forested landscape per decade). This would create an opportunity to address habitat connectivity through vegetation management, though by 2 percent less per decade than Alternative B.

Risk of Disturbance. Due to implementation of the highest amount of vegetation treatments occurring in Alternative C of approximately 1,000 acres per year, it is predicted to create the least amount of resilience to climate dependent disturbances such as large-scale wildfire and insect and disease events including Douglas-fir beetle infestations as depicted in Figure 9.

Areas of Critical Environmental Concern. The proposed ACECs include management that would protect relevant and important values, which could place minor restrictions on certain types of vegetative treatments. The management direction for the Phil Wright Rock (640 acres) allows for forest management, but construction of new roads is not allowed.

Air Quality: Alternative C would fall between A and B. SIMPPLLE modeling showing the differences in stand-replacing wildfire potential is located in Appendix A.

Figure 10. The level of stand-replacing fire predicted on BLM lands by SIMPPLLE for Alternatives A, B and C expressed as an average of 30 SIMPPLLE simulations



Lands with Wilderness Characteristics. Protecting wilderness characteristics in Alternative C would impact the ability to manipulate forest vegetation mechanically on approximately 2,523 acres of forested vegetation, which has the impact of reduced acres available for harvest.

Open Motorized Road Density: Approximately 105,911 acres of big game winter range would also be managed at existing levels (~~baseline~~) of open motorized road density using 2011 as the baseline (1.70 mi/mi²) in addition to the NCDE Grizzly bear zone 1 areas.

Cumulative Impacts

Approximately 2.2 million acres of other federally managed lands (50 percent of the analysis area) would tend to be managed in a similar manner to the BLM, which is managed for forest health and restoration with associated commodity outputs from restorative vegetation treatments. Additional effects on forested vegetation would occur from forest product removal, wildland fire suppression, fuel reduction activities, stand-replacing fires, and large-scale insect and disease outbreaks on the other federally managed lands.

There are approximately 326,000 acres of state-managed lands (8 percent of the analysis area). State forests and woodlands would tend to be managed for timber products and commodities. Although 30,000 acres would be managed by the Lubrecht Experimental Forest for research in forestry, resource management, and ecosystem science. Active forest management is implemented on the experimental forest as part of these management objectives.

There are approximately 1.6 million acres of private lands (38 percent of the analysis area). Vegetation management would likely include loss of vegetation from road construction and residential development, effects of continued livestock grazing, forest fuel reduction in urban interface areas, and timber harvest for commercial uses. Of the private ownership, the Nature Conservancy owns approximately 150,000 acres of land intended to be transferred to public management (whether federal, state, county, or other). The Blackfoot Community Conservation Area is a community-owned forest of approximately 5,609 acres focused on cooperative management.

Similar to the analysis of BLM lands, there are minimal differences between alternatives in structural stages on multiple land ownerships, so examination of the movement toward predicted midrange NRV conditions by alternative would be redundant. Cumulative effects of Alternative B are similar to the effects on BLM lands. As a result of implementing the alternatives, SIMPPLLE modeling predicted an increase in the amount of acres in early development and mid-development open-canopy successional states, a slight increase in the mid-development closed-canopy successional state (which is the single

difference from modeled results on BLM lands) and an increase in late-development open canopy successional states. Similar to modeling done on BLM lands, implementing the action alternatives would cumulatively reduce the amount of late-development closed-canopy successional states, which are currently overabundant. Values remain within the minimum and maximum range of NRV. There would be a predicted cumulative increase in the late-development open canopy successional state, moving conditions closer to average NRV values. Alternatives B and C would increase the amount of early development, mid-development open-canopy, and mid-development closed-canopy successional stages, which are currently slightly lacking in abundance across all land ownerships.

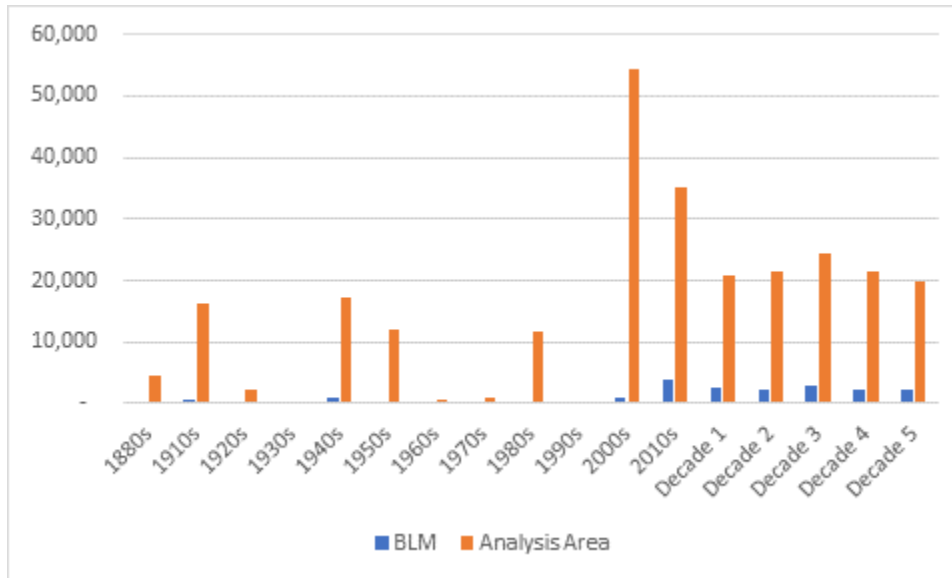
Cumulatively, as in the analysis on BLM lands, the predicted changes suggest that resilience in forests would be increased through the reduction in competition and associated moisture and nutrient deficiencies. These modeling results illustrate that landscape-scale management actions across jurisdictional boundaries would facilitate movement toward average NRV values.

3.2.3 Environmental Consequences: Wildland Fire Management

Impacts common to all alternatives

Wildfire. The SIMPPLLE model was used to estimate wildfire activity for five decades into the future. Best available information was used to build the fire suppression logic and assumptions within the model.

Figure 11. Historic and future (modeled) acres of wildfire



The figure above depicts the historic acres burned in wildfires per decade, and the average predicted acres that will be burned in the next five decades.

Under every alternative, the model predicts about the same amount of wildfire for the next five decades on both BLM-managed lands and across the forest vegetation analysis area (see Table 28 and Table 29). While not as high as the last two decades, the model predicts a small decreasing amount of wildfire for the next five decades above the historical averages from the 1880s through the 1990s. See the tables below for exact numbers.

Table 28. Total modeled acres of wildfire on BLM per alternative

Modeled Decade	Alt A Min.	Alt A Average	Alt A Max.	Alt B Min.	Alt B Average	Alt B Max.	Alt C Min.	Alt C Average	Alt C Max.
Decade 1	810	2,697	7,100	1,510	3,101	8,170	1,120	2,952	7,920
Decade 2	860	2,394	7,730	420	2,600	9,800	480	2,495	8,470
Decade 3	740	2,932	6,010	690	2,091	4,730	910	2,571	5,910
Decade 4	780	2,313	6,700	390	1,956	8,910	770	1,970	6,260
Decade 5	830	2,170	5,440	750	2,020	4,140	610	2,210	5,740
Average	804	2,501	6,596	752	2,354	7,150	778	2,440	6,860

Table 29. Total modeled acres of wildfire on forest vegetation analysis area per alternative

Modeled Decade	Alt A Min.	Alt A Average	Alt A Max.	Alt B Min.	Alt B Average	Alt B Max.	Alt C Min.	Alt C Average	Alt C Max.
Decade 1	13,000	20,913	29,940	14,100	23,313	44,500	11,530	22,312	34,920
Decade 2	11,560	21,575	39,720	12,380	22,320	42,290	9,790	21,045	38,460
Decade 3	11,500	24,318	42,030	12,630	21,109	48,500	12,080	20,852	35,080
Decade 4	12,020	21,612	31,420	11,140	22,457	47,750	10,100	19,194	41,230
Decade 5	11,100	19,929	44,340	11,880	19,911	32,550	10,450	20,785	44,320
Average	11,836	21,669	37,490	12,426	21,822	43,118	10,790	20,838	38,802

Under each alternative, the total acres of fire is predicted to slowly decrease and the type of wildfire changes over time. On BLM managed lands, both stand-replacing and mixed severity wildfires decrease in acres over the five-decade simulation. Light-severity fire stays at a consistent level. These trends are consistent across the alternatives. The majority of the acres burned per decade are in stand-replacing wildfires, while the light-severity fires are at a very low level. This is a result of the way we currently manage wildfires, which effectively suppresses the low-severity fires. Those fires that do escape initial attack are usually on the most extreme days in the most extreme seasons, and result in stand-replacing fires.

FMZ Designation. Each alternative would have FMZ1, FMZ2, and FMZ3 delineated. While FMZ2 and FMZ3 will allow more flexibility in managing wildland fires, full suppression will continue to be the primary wildland fire management strategy. It will likely take 10 to 20 years to treat enough vegetation and develop plans with our protection agencies and cooperators to manage a wildfire to achieve resource management objectives. Regardless of FMZ, our management of wildfires will continue to impact vegetation as it did in the past. The result will be a continuation of increasing small shade-tolerant tree densities, creating ladder fuels, declining fire-dependent species, and more intense and severe wildfires.

Fuels Treatments. Given the time frames and constraints for developing more flexibility in managing wildfires, fuels treatments will be critical tools to reduce fuels and to move to NRV.

Under every alternative, most of the fuels treatments would be designed to reduce fuels and move forest conditions to NRV. The effects of these treatments in the alternatives are very similar. They will decrease the amount of stand-replacing and mixed-severity fire on BLM-managed lands. Light-severity fire will stay the same, very low. Prescribed fire will increase the acres of light- and mixed-severity fire, resulting in reducing fuels and moving forests to NRV.

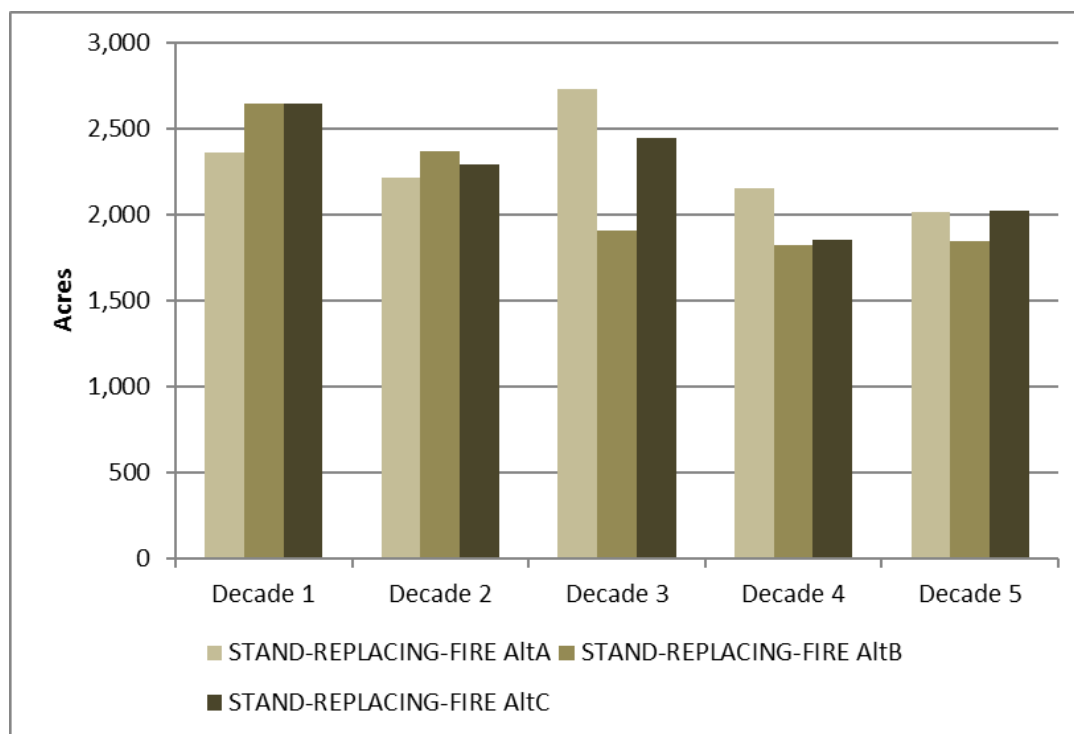
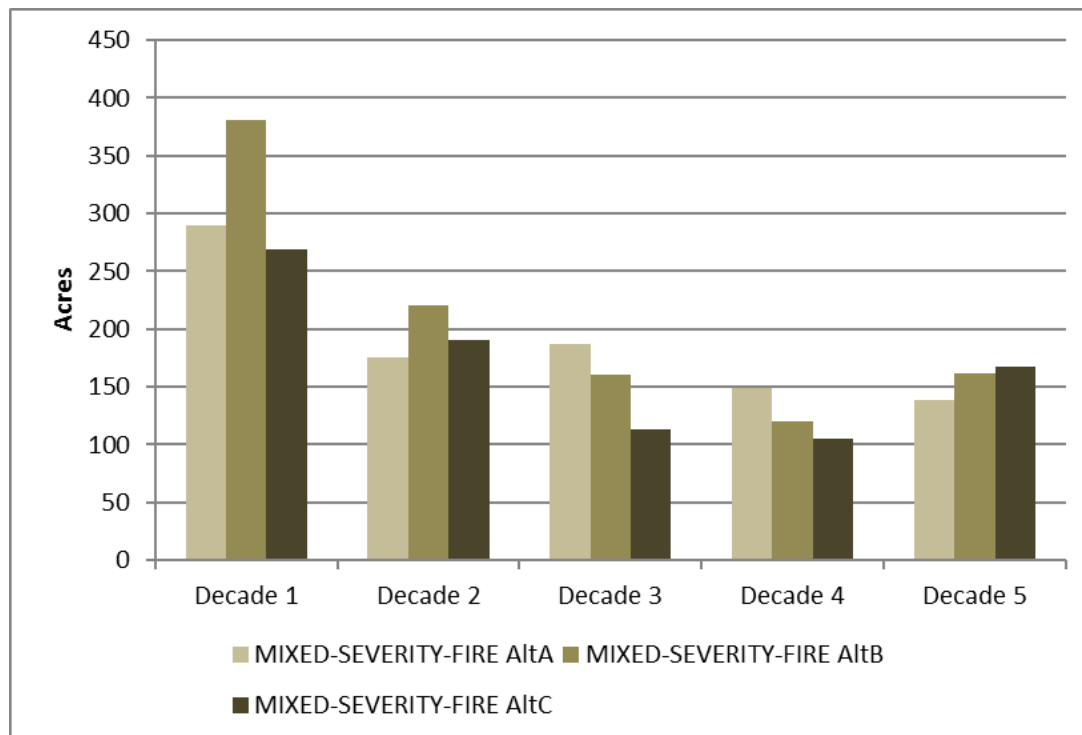
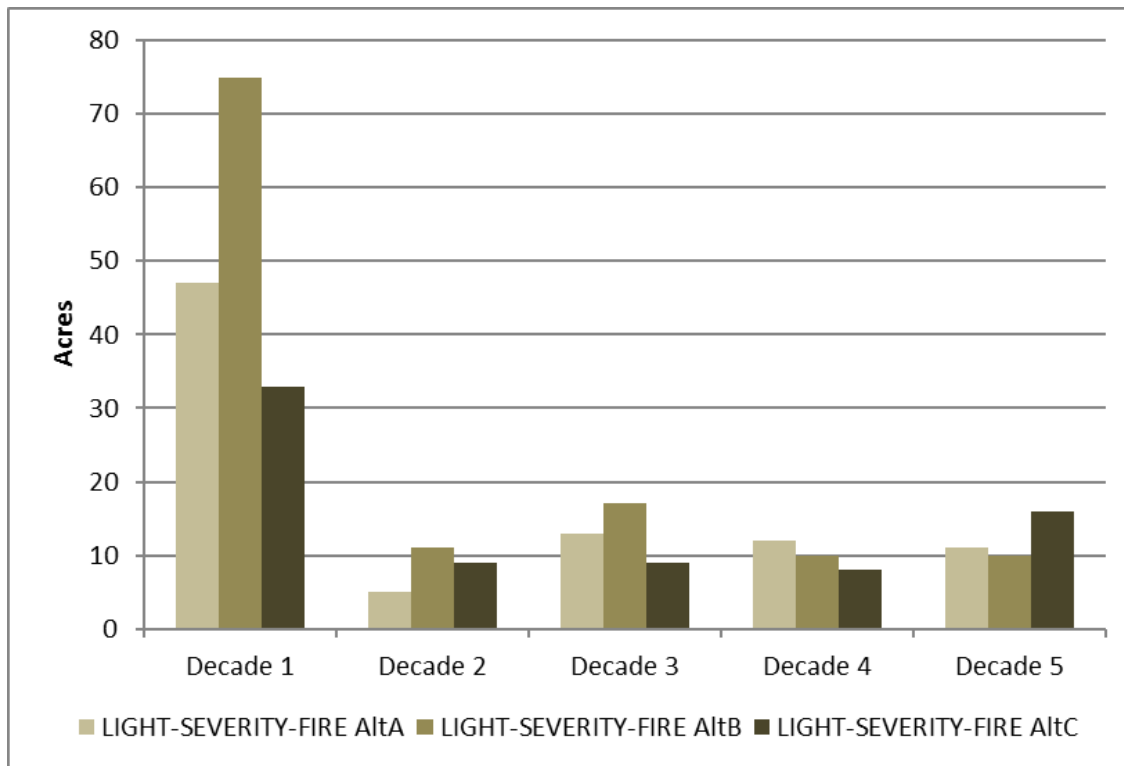
Figure 12. Modelled acres of stand-replacing wildfire on BLM per alternative**Figure 13. Modelled acres of mixed-severity wildfire on BLM by alternative**

Figure 14. Modelled acres of light-severity wildfire on BLM by alternative

Air Quality. The ability to use prescribed fire to maintain and/or restore fire-adapted natural systems, or to use prescribed fire to reduce hazardous fuels in the wildland-urban interface, is dependent upon air quality regulations. Therefore, to the extent that air quality regulations may become more stringent in regards to the quantity and timing of smoke emissions, there could be substantial effects on the ability to use prescribed fire as a tool. If past trends of increasing regulations and decreasing prescribed burn opportunities continue, the effects could be substantial and would likely result in not being able to use prescribed fire to make meaningful improvements to forest and fuel conditions and to meet objectives.

Aquatics, watershed, soil, and riparian management. The consequences of plan components related to the ability to restore or maintain natural systems or reduce hazardous fuels would be generally similar under the alternatives. To meet the plan direction associated with these resources, there would likely be occasions where prescribed fires could not be used due to the potential negative effects that those activities could have on the resources. Fuels management activities occasionally require soil disturbing activities or road construction, which might have to be limited to meet other plan direction. Although it is difficult to quantify the effects, every alternative would have components that, in certain circumstances, would limit the use of fire for maintenance or would limit fuels treatments.

Wildlife Management. Generally, wildlife management direction has low impact on fire and fuels management within the WUI because management direction recognizes the importance of managing vegetation to modify fire behavior. Additionally, most WUI treatments are in lower elevation, dry Douglas-fir forests, which were historically open with low fuel loadings. In these areas, multiple objectives including reducing fuels, moving forests to NRV, and managing wildlife habitat can be met.

Opportunities to conduct vegetation treatments, including prescribed fire or mechanical fuels reduction treatments, outside the priority areas are limited under current lynx management direction. The

restrictions on treatments within these forest conditions are likely to reduce the ability and effectiveness of achieving desired forest and fuel conditions outside the priority areas. Lynx management direction restricts treatments in multistory hare habitat and young seedling/sapling forests. Thinning of dense sapling stands is typically designed to create future forests composed of larger trees and desired species (such as fire-resistant western larch). These forests are more resilient in the face of future wildfire events and may burn less severely, reducing potential future impacts to values at risk. Thinning dense seedling/sapling stands in lynx habitat is not allowed under current management direction. Treatments in multi-story forests that provide hare habitat that would result in it no longer qualifying as multi-story hare habitat is also not allowed. This includes both mechanical and prescribed burn treatments.

Historic Areas. The use of heavy equipment for wildland fire management would not be allowed in historic properties eligible for the National Register of Historic Places unless approved by line officer due to extraordinary circumstances. These properties make up a small area (less than 300 acres), have good access, already have fuels treatments around them, and are pre-identified. Due to these factors, the restriction poses no impact to wildland fire management.

Recreation Management. Generally, recreation management direction has low impact on fire and fuels management within the WUI because management direction recognizes the importance of managing vegetation to modify fire behavior. Timing restrictions for big game general hunting can have negative impacts to fuels reduction treatments, but will be addressed in site specific NEPA planning.

Wilderness Study Areas (WSAs). WSAs could result in reduced flexibility and options for wildland fire management. Prescribed fire could be utilized as a tool. Since the amount of WSAs is constant among the alternatives, there would be no difference in the effect of WSAs on wildland fire management between alternatives. WSAs are in an FMZ3 in every alternative, require the use of MIST tactics, restrict heavy equipment when managing wildfires, and have similar vegetation conditions. These factors combined will make initial attack on wildfires less successful in the WSAs.

If the WSAs are released, FMZ designation will not change. Those lands will remain in an FMZ3. With the exception of the Wales Creek ACEC (5,602 acres), MIST tactics and restricting heavy equipment will no longer be required during wildland fire management on these lands. Due to fewer restrictions, initial attack would be more successful on these lands, and there would be more flexibility to conduct fuels treatments.

Impacts under Alternative A

FMZ Designation. Approximately 37,400 acres are designated as FMZB (FMZ1), 102,700 acres are in FMZC (FMZ2), and there are 0 acres in FMZD (FMZ3). Alternative A offers the least flexibility for wildland fire management, due to having 0 acres in FMZ3.

Fuels Treatments. Under Alternative A, the BLM would treat 12,000 acres per decade. Alternative A does not prioritize fuels treatments, thus other resource values will take precedence over fuels objectives on some projects.

Areas of Critical Environmental Concern. The Bear Creek Flats ACEC, Limestone Cliffs ACEC (20 acres), and Phil Wright Rock ACEC (640 acres) would have minor impacts to wildland fire management. Management to protect relevant and important values could place restrictions in some ACECs that would prevent certain types of vegetative treatments. Management to protect relevant and important values could place restrictions in some ACECs that would prevent certain types of vegetative treatments.

Impacts under Alternative B

FMZ Designation. 43,606 acres would be designated in FMZ1, where values at risk are high and full suppression would be the main wildland fire management strategy. Low-severity fires would be easily suppressed and prescribed burns and mechanical treatment would be used to treat vegetation. Alternative B has 80,365 acres in FMZ2 and 30,643 acres in FMZ3. Both FMZ2 and FMZ3 are intended to allow more flexibility in how wildfires are managed. FMZ3 has fewer constraints, thus wildfires would be the primary tool used to manage vegetation. In FMZ2, there would be a combination of wildfires, prescribed fire, and mechanical treatments to manage vegetation.

Fuels Treatment. Under Alternative B, the BLM would treat 15,000 acres per decade. Alternative B prioritizes fuels treatments designed to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure within the 1-mile WUI buffer and in FMZ1 (51,254 acres), which is approximately 32 percent of BLM-managed lands. Acres in both FMZ1 and the 1-mile WUI buffer will increase over time as lands are acquired and the WUI expands. Approximately 9.2 percent of BLM lynx habitat could be affected by fuels treatments in these areas. Alternative B provides more flexibility to manage fuels in both acres and priority.

Areas of Critical Environmental Concern. The Phil Wright Rock ACEC (640 acres) would have minor impacts to wildland fire management. Management to protect relevant and important values could place restrictions in some ACECs that would prevent certain types of vegetative treatments.

Lewis and Clark National Historic Trail. The Lewis and Clark National Historic Trail corridor, totaling 6,829 acres in Alternative B, would have minor impacts to wildland fire management. Management to protect Lewis and Clark National Historic Trail values could place restrictions that would prevent certain types or amounts of vegetative treatments, but is unlikely.

Impacts under Alternative C

FMZ Designation. 43,606 acres would be designated in FMZ1, where values at risk are high and full suppression would be the main wildland fire management strategy. Low-severity fires would be easily suppressed and prescribed burns and mechanical treatment will be used to treat vegetation. Alternative C has less in FMZ2 (50,861 acres) and more in FMZ3 (68,385 acres). Both FMZ2 and FMZ3 are intended to allow more flexibility in how wildfires are managed. FMZ3 has fewer constraints, thus wildfires would be the primary tool used to manage vegetation. In FMZ2, there would be a combination of wildfires, prescribed fire, and mechanical treatments to manage vegetation.

Fuels Treatments. Under Alternative C, the BLM would treat 10,000 acres per decade. Alternative C prioritizes fuels treatments designed to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure within the 1-mile WUI buffer (7,648 acres), which is approximately 5 percent of the BLM-managed lands. Acres in both FMZ1 and the 1-mile WUI buffer will increase over time as lands are acquired and the WUI expands. Approximately 1 percent of BLM lynx habitat could be affected by fuels treatment in these areas. Alternative C provides less flexibility than Alternative B for fuels management, and will have the least impact on fuels reduction, because it will treat the least amount of acres and it only prioritizes fuels treatments on 5 percent of BLM-managed lands.

Areas of Critical Environmental Concern. The Limestone Cliffs ACEC (20 acres) and Phil Wright Rock ACEC (640) would have minor impacts to wildland fire management. Management to protect relevant and important values could place restrictions in some ACECs that would prevent certain types of vegetative treatments. Additionally, Phil Wright Rock ACEC would require the use of MIST tactics, and

restricts heavy equipment when managing wildfires. These factors combined will make initial attack on wildfires less successful.

Lewis and Clark National Historic Trail. The Lewis and Clark National Historic Trail corridor, totaling 12,827 acres in Alternative C, would have minor impacts to wildland fire management. Management to protect Lewis and Clark National Historic Trail values could place restrictions that would prevent certain types or amounts of vegetative treatments, but is unlikely.

Lands with Wilderness Characteristics. Similar to the impacts of WSAs, managing areas for wilderness characteristics would impact the ability to manipulate forest vegetation mechanically on the 2,523 acres of forested vegetation in Alternative C. Lands with wilderness characteristics are in an FMZ3 in Alternative C, require the use of MIST tactics, restrict heavy equipment when managing wildfires, and have similar vegetation conditions. These factors combined will make initial attack on wildfires less successful on lands where wilderness characteristics are protected.

Cumulative effects

Wildfire. Total acres of wildfires regardless of alternative will slowly decline over the next five decades. About 8 percent of the forest vegetation analysis area is predicted to burn in wildfires over the next 50 years. Again, we see the same trend across the forest vegetation analysis area that we see on BLM-managed lands: the vast majority of those acres burned will be in the stand-replacing wildfire type, while light-severity fire is very low acres per decade. This is due to 83 percent of the land in the forest vegetation analysis area being in BLM, State, or private ownership, which will have very similar full suppression wildland fire management. This type of wildland fire management effectively suppressing the light- and mixed-severity fires, while a few wildfires escape initial attack on the most extreme days during the most extreme seasons and result in large stand-replacing fires.

If we look at acres of wildfire by type of fire, we see similar results for light- and mixed-severity wildfires: light-severity stays the same, and mixed-severity fires decrease in acres over time. Stand-replacing fire has a different trend. The acres stay static per decade, and burn about 20,000 acres per decade.

FMZ Designation. Most lands in the forest vegetation analysis area (75 percent) will be managed in a similar strategy to FMZ1 (private and state ownership). The result will be a continuation of increasing small shade-tolerant tree densities, creating ladder fuels, declining fire-dependent species, and more intense and severe wildfires.

Fuels Treatments. Across the forest vegetation analysis area, approximately 70,000 acres (5 percent) will be treated with similar treatments per decade. Most of these treatments would be designed to reduce fuels and produce forest products. The effects of these treatments in each alternative are very similar. They will decrease the amount of mixed-severity fire across the forest vegetation analysis area. Stand-replacing and light-severity fire will not decrease or increase, but rather stay static over the next five decades. Prescribed fire will only make up a fraction of these treatments. Most will be mechanical treatments.

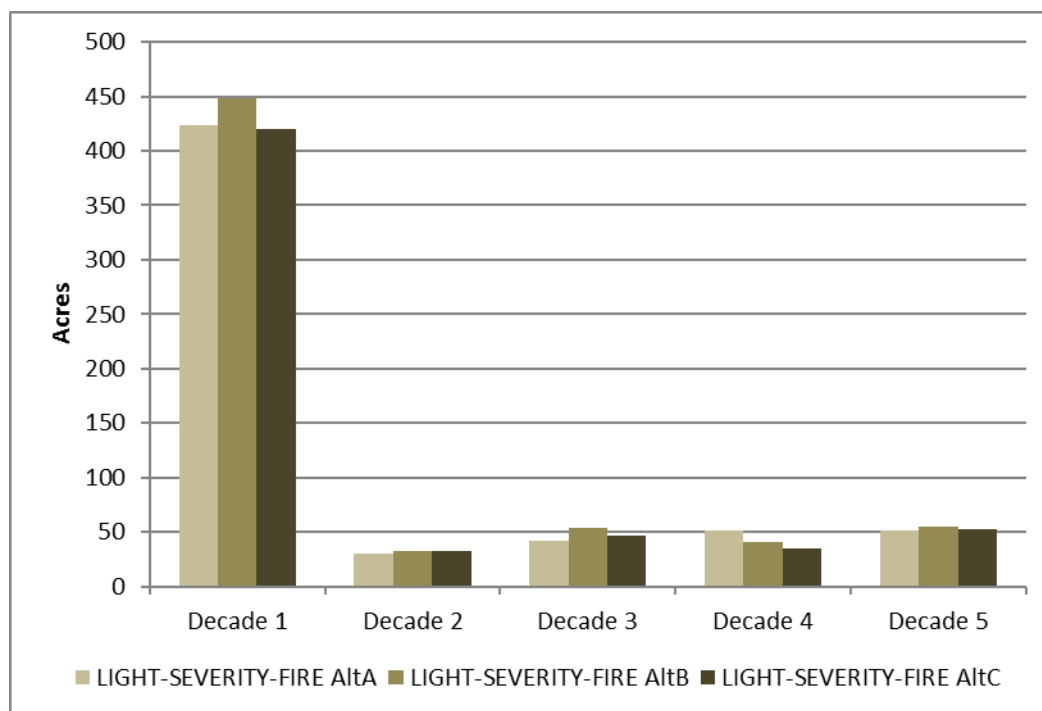
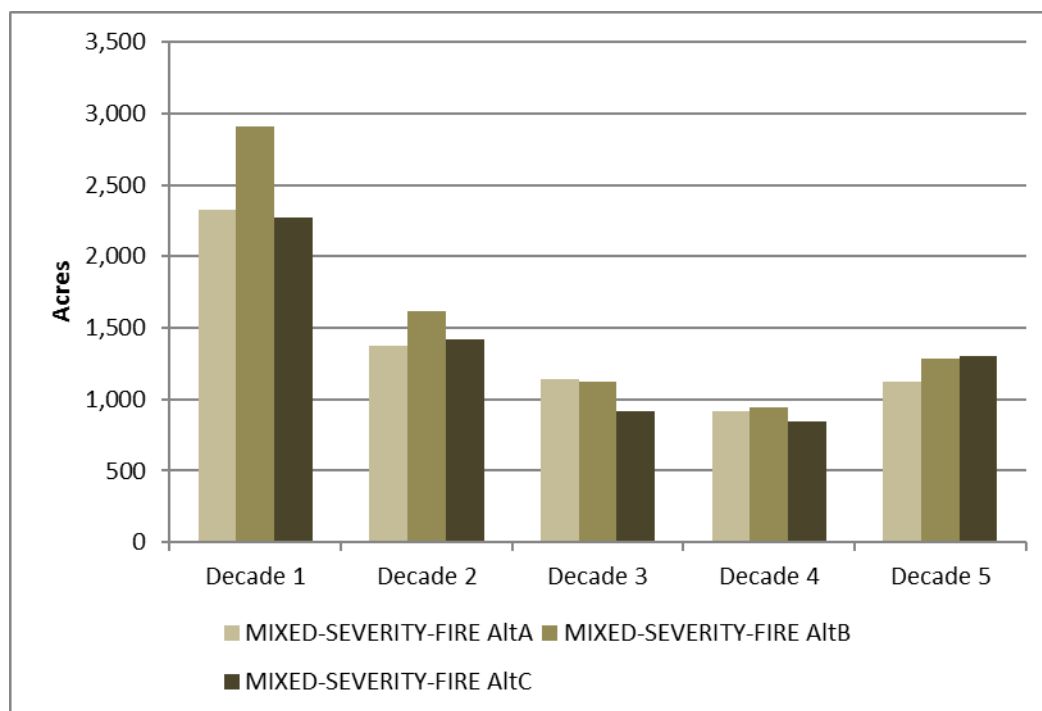
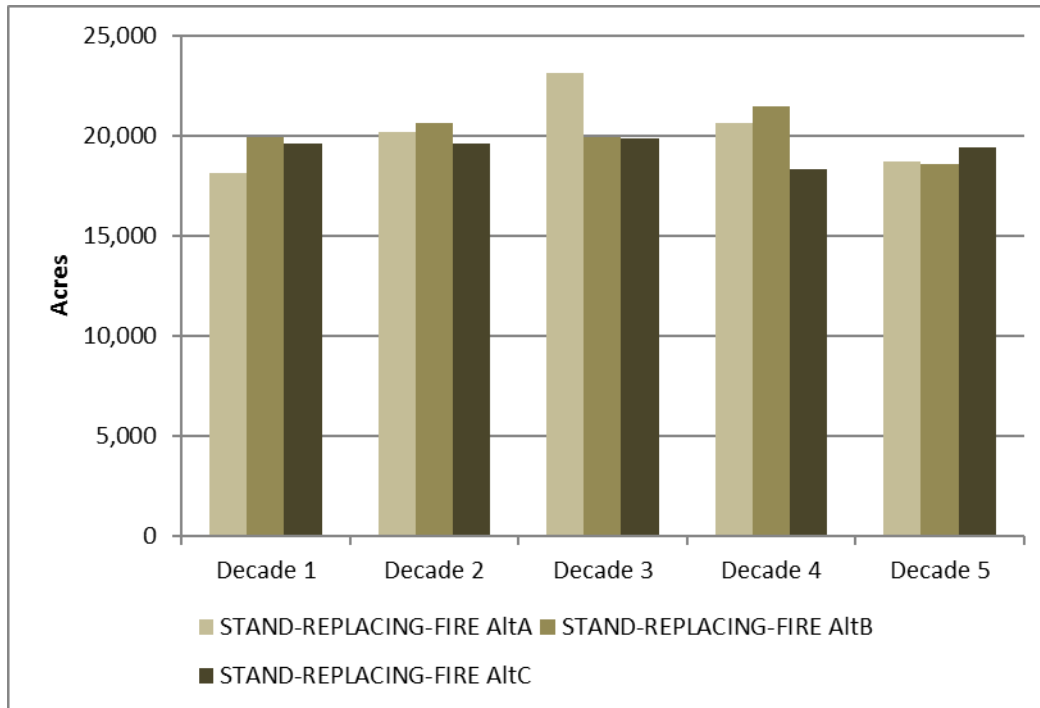
Figure 15. Modeled acres of light-severity wildfire across forest vegetation analysis area by alternative**Figure 16. Modeled acres of mixed-severity wildfire across forest vegetation analysis area by alternative**

Figure 17. Modeled acres of stand-replacing wildfire across forest vegetation analysis area by alternative

3.2.4 Environmental Consequences: Grassland and Shrublands

Effects Common to All Alternatives

Proposed management of the following resource uses would have no anticipated impacts to rangeland vegetation: Cultural Resources; Fisheries, Geology, Paleontology, Wild and Scenic Rivers, Environmental Justice, Vegetation – Riparian and Wetlands, ACEC, Lewis and Clark National Historic Trail, Wilderness Study Areas, LWC, and Visual Resources.

The direct effects to grassland and shrubland communities result from surface-disturbing and other activities that cause vegetation removal and mechanical damage to plants. Surface-disturbing activities can affect vegetation to varying degrees depending on the type of disturbance, amount, location, soil and vegetation type, season, climatic factors, and surface hydrology. Activities such as livestock grazing, mining, recreation, wildfire, and vegetative treatments (e.g., prescribed fire, chemical, or biological) also have direct effects on these vegetative communities, which both may be adverse and beneficial.

The relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities would be affected under the alternatives. However, implementation of any alternative would not result in the complete elimination of a plant species, plant community, or seral stage. Seasonal restriction, project access, development, and vegetative resource management activities are designed to reduce the amount of surface disturbance. These practices would support soil fertility and productivity and would help maintain healthy and diverse vegetation.

Fire. Wildfires and prescribed fires consume above-ground biomass and have a direct impact on rangelands. Factors such as intensity, duration, soil moisture, vegetation type, fuel type and density, and

time of year determine the severity of the impact. Wildfires can result in relatively high rates of mortality to some shrub species that do not sprout from root crowns (e.g., sagebrush and bitterbrush). Impacts to these shrubs could persist mid to long term. Other species of shrubs sprout from root crowns following fire, resulting in a possible shift in composition to higher percentage of shrubs that regenerate from root sprouts. High-intensity wildfires can have high mortality rates on most grasses and forbs by killing roots and growing points.

Prescribed fire and mechanical treatments, or in combination, would reduce conifer encroachment in grasslands and shrublands, assisting to establish pre-fire suppression conditions. Grasses, forbs, and shrubs would increase in density and vigor with the removal of conifers. Prescribed fire ignition can be controlled to times of year when it is less likely to damage grasses and forbs. However, some loss of sagebrush and bitterbrush can be expected with low-intensity prescribed fires. Prescribed fire and mechanical treatments reduce fuel loading, minimizing the risk of high-severity wildfires, therefore, short-term effects associated with these treatments generate long-term benefits by reducing the risk of highly damaging severity wildfires. Implementation of prescribed fire and mechanical treatments or other appropriate methods to restore desired ecological conditions of rangelands would improve soil and vegetation quality in the long term.

Noxious weeds. Treatments to reduce noxious weeds in grasslands and shrublands could have short-term localized mortality of native plants (primarily forbs) associated with them, but would benefit these areas overall by reducing or eliminating competition from noxious weeds and allowing native plants to dominate. The amount affected would vary with herbicide application methods. Aerial application may be used on large areas of heavy weed infestations. Ground broadcast would be used on small areas of heavy infestations. Hand spot application would be the most common method and would have little effect on other vegetation provided the application would target specific individual weed plants.

Travel management. Travel on roads through grassland and shrubland habitats would continue to impede re-establishment of grassland and shrubland vegetative species within their routes. The severity of disturbance would depend upon soil conditions, frequency and vehicle type. Travel during wet soil conditions could lead to rutting and the creation of alternative routes, parallel and/or braided roads resulting in larger areas of soil and vegetative disturbance. Roads would also continue to facilitate introduction and spread of noxious weeds.

Minerals. Leasing solid minerals would lead to disturbances and removal of vegetation during exploration and/or development. Reclaimed land could reduce plant species diversity potentially for decades following mining. Site-specific measures, BMPs, and reclamation standards would be implemented and monitored to minimize effects. Reclamation of these disturbed sites would increase vegetation cover, productivity, and diversity in the long term. Approximately 3 percent of BLM-managed land in the tri-county management area is non-forested (less than 10 percent canopy), therefore, the probability of mineral activity affecting grasslands and shrublands is minimal.

Recreation. Recreational use could result in soil and vegetation disturbances. Disturbance would be the greatest in areas of concentrated use, such as roads, hiking trails, and dispersed or developed campgrounds. These disturbances could result in localized soil compaction and erosion affecting soil and vegetation quality. The effects would depend on duration and circumstance of use.

Land use authorizations. Requests for land use authorization (rights-of-way, leases or permits) will be analyzed and design features applied on a project level basis through the environmental review process. Terms and conditions for rights-of-way, corridors, and development areas will incorporate applicable BMPs, current professional practice, and recent scientific findings to protect soils and vegetation resources. Surface disturbing effects would not occur in exclusion areas; therefore, there would be no soil and vegetation disturbance effects in these areas. If a surface disturbing activity would be allowed in an

avoidance area, site-specific measures would be developed to protect soils and vegetation from long-term degradation.

Impacts under Alternative A

Under this alternative, the direct and indirect impacts to grasslands and shrublands are expected to remain the same as they have during the life of the current RMP.

Livestock grazing. Approximately 117,774 acres or 72 percent BLM lands are available for livestock grazing while the remaining 44,810 acres (28 percent) are unavailable. Acres available for term leases is 111,721 acres (96 percent) with 6,179 AUMs and 6,053 acres (4 percent) with 113 AUMs for prescriptive grazing. Up to 96 percent of available lands are subject to livestock grazing impacts. The remaining 4 percent are for prescription grazing only and would receive temporary short-term grazing impacts.

Livestock grazing would stimulate biomass production for some grass species and most shrubs, and reduce production of other species that are sensitive to grazing. Plant species diversity may be reduced in localized areas near water sources or salting areas where animals congregate. Species with low palatability, including most noxious weeds and some invasive species would increase in density on some sites, predominantly those with severe ground cover loss or in bunchgrass communities. Implementation of livestock grazing guidelines to promote vegetative recovery and maintenance would minimize these impacts and could result in a net improvement to the health of grassland and shrubland communities where grazing has caused degradation. Upon determination that an allotment is not meeting rangeland health standards causal factor is livestock grazing, then the BLM would take action to achieve or make progress toward meeting rangeland health standards, including standard 1 and 5, within one year. Prescriptive grazing could be used as a management tool to reduce fine fuels assisting in the reduction of frequency and intensity of wildland fire. In addition, prescriptive grazing can be used to achieve specific habitat objectives such as the reduction of noxious weeds. Lands available for prescription grazing may or may not be grazed depending on amount of litter build up or vegetative treatment. It is estimated that if prescription grazing is used; it may only occur once or twice every 10 to 20 years.

The construction/installation of range improvement projects such as livestock fences, spring development and pipelines will affect grassland and shrubland vegetation. The purpose of these projects are to facilitate livestock distribution and management to achieve a more uniform forage utilization pattern. Construction activities at the location of the range improvement would affect vegetation in the short term. Range improvements would be a positive effect on vegetation in the long term by dispersing livestock foraging and improved herd management. Temporary range improvements normally remain for a few years, therefore they only result in short term impacts. Current range improvements within the field office are listed in Table 30.

Table 30. Range improvements on BLM-managed lands in the planning area

Range Improvement Type	Number of Projects	Miles
Fences	127	~175
Spring Developments	69	n/a
Pipelines	6	<2
Cattle Guards	33	n/a

Vegetation Management including fire/fuels. The BLM would allocate 37,400 acres into Fire Management Zone 1 (full suppression) and 102,700 acres into Fire Management Zone 2 (suppression, may use wildland fire as a benefit as appropriate). The BLM would treat approximately 20,000 acres

infested acres of noxious and invasive species per decade. The BLM would treat approximately 12,000 acres per decade to achieve the natural range of variability, which may benefit rangeland vegetation as well.

Land use authorizations. The BLM would manage 533 acres as right-of-way exclusion area.

Recreation. The BLM would continue to manage four special recreation management areas where recreation would be a priority and it is reasonably foreseeable that recreation related activities—hiking, fishing, hunting—are expected to continue and increase.

Cumulative Impacts for Alternative A

The BLM's past, present, and future goals are to maintain, improve, and/or restore vegetation quality by preventing and reducing vegetative impacts through various projects and actions. At the project level, surface-disturbing activities are subject to evaluation to develop appropriate BMPs or design features to minimize grassland and shrubland effects.

Past and present actions that have affected and would affect vegetative resources include mineral exploration and development, improper livestock grazing, fire/fuels management, travel management, noxious weeds, travel management, minerals, recreation, and land authorizations.

Vegetation manipulation projects or management activities that cause ground-disturbing activities could affect grassland and shrublands through the introduction of invasive species. The integrated weed management actions applied would slow the spread and reduce the establishment of noxious weeds. Prescribed fire and fuel treatments to achieve the natural range of variability would have a positive long-term effect on vegetative communities. Vegetation manipulation projects may cause short-term effects to rangeland. The long-term effects for vegetation manipulation projects would be improved vegetative condition, plant composition, habitat diversity and improved forage production.

In the reasonable and foreseeable future, livestock grazing is expected to continue. Approximately 117,774 acres or 72 percent BLM lands would be available for livestock grazing. It is anticipated there would be few changes to livestock carrying capacities. Changes in AUMs would be determined and analyzed on a project level basis.

In the reasonable and foreseeable future, range improvements are expected to be constructed when they provide a benefit to public land and/or other resources. Range improvements will be removed when they no longer provide a benefit to public land or other resources. It is difficult to predict the future construction or removal of range improvements due to unknown needs or benefits and to include land tenure actions.

Long-term climate trends and the effects of climate variability on vegetation communities are uncertain; however, it has been hypothesized that altered conditions driven by long-term climate trends could largely be responsible for driving changes in plant community composition over which BLM may have little control. Most researchers agree that if current predictions for climate occur, a shift in species habitat from lower to higher elevation and southern to northern latitude will occur. A great deal of uncertainty lies in whether it will get wetter or drier, or if a change in the timing of precipitation would occur.

The timing of precipitation is fundamental in determining vegetation communities. Precipitation received during the growing season would favor grasslands. Hotter, drier climates tend to favor more annual type grass and forb species that are capable to rapidly take advantage of moisture when available. If the climate across the planning area shifts toward a hotter, drier climate, plant communities are likely to transition more toward drought-tolerant species. This would most likely result in a decline of forage

production and carrying capacity. However, if the climate shifts toward a hotter, wetter, more intense precipitation scenario, plant communities are likely to increase in forage production and carrying capacity. Managing vegetation based upon these scenarios is unrealistic. Greater emphasis should be placed on proactive management. Monitoring will be fundamental to successfully adapt to change.

Impacts under Alternative B

Treat vegetative communities to achieve desired forage conditions for big game and domestic livestock forage, which includes prescribed fire and mechanical treatments. On restoration projects, plant native species when feasible.

Livestock grazing. Approximately 145,558 acres (90 percent) of BLM lands are available for livestock grazing, while the remaining 17,027 acres (10 percent) are unavailable. Acres available for term leases are 103,192 acres (71 percent) with 5,954 AUMs, and 42,366 acres (29 percent) with 706 AUMs for prescriptive grazing.

Livestock grazing would stimulate biomass production for some grass species and most shrubs, and reduce production of other species that are sensitive to grazing. Plant species diversity may be reduced in localized areas near water sources or salting areas where animals congregate. Species with low palatability, including most noxious weeds and some invasive species would increase in density on some sites, predominantly those with severe ground cover loss or in bunchgrass communities. Implementation of livestock grazing guidelines to promote vegetative recovery and maintenance would minimize these impacts and could result in a net improvement to the health of grassland and shrubland communities where grazing has caused degradation. Upon determination that an allotment is not meeting rangeland health standards causal factor is livestock grazing, then the BLM would take action to achieve or make progress toward meeting rangeland health standards, including standard 1 and 5, within one year.

Prescriptive grazing could be used as a management tool to reduce fine fuels assisting in the reduction of frequency and intensity of wildland fire. In addition, prescriptive grazing can be used to achieve specific habitat objectives such as the reduction of noxious weeds. Lands available for prescription grazing may or may not be grazed depending on amount of litter build up or vegetative treatment. It is estimated that prescription grazing may only occur once or twice every 10 to 20 years.

Vegetation Management including fire/fuels. The BLM would allocate 43,602 acres into Fire Management Zone 1 (full suppression), 88,365 acres into Fire Management Zone 2 (suppression, may use wildland fire as a benefit as appropriate), and 30,643 acres into Fire Management Zone 3 (use wildlife fire as a benefit, suppress as appropriate). The BLM would treat approximately 21,000 to 50,000 infested acres of noxious and invasive species per decade. The BLM would treat approximately 15,000 acres per decade to achieve the natural range of variability, which may benefit rangeland vegetation as well.

Recreation. The BLM would manage five Special Recreation Management Areas totaling 71,181 acres, where recreation would be a priority, and it is reasonably foreseeable that recreation-related activities—hiking, fishing, hunting—are expected to continue and increase.

Land use authorizations. The BLM would manage 23,480 acres as right-of-way exclusion area.

Cumulative Impacts for Alternative B

Under this alternative, approximately 145,558 acres (90 percent) of BLM lands are available for livestock grazing and will be subject to livestock impacts. Acres available for term leases are less compared to Alternative A, consequently long term impacts would be less overall within the planning area. Acres for prescription grazing are greater under this alternative with expected short-term impacts. Cumulative livestock impacts within areas available for grazing are expected to be similar under the alternatives.

With less acres available for term grazing leases, it is anticipated there would be fewer range improvements constructed in the future. Due to the increase in acres designated for prescription grazing, an increase in temporary range improvements is expected. In the foreseeable future, the short-term and long-term effects of these range improvements would be similar as described in Alternative A.

The effects of vegetation management projects (e.g., fire/fuels/weeds) on areas to emphasize healthy rangeland conditions would be the same as described in Alternative A. This alternative has the largest amount of acres for weed treatment and would have long-term benefits for rangelands on a larger scale.

The effects of Special Recreation Management Areas on grasslands and shrublands are similar as described under Alternative A. In the foreseeable future, recreation-related activities are expected to increase.

Impacts under Alternative C

Treat vegetative communities to achieve desired forage conditions for big game, which includes prescribed fire and mechanical treatments. On restoration projects, plant native species only.

Livestock Grazing. Approximately 107,341 acres (66 percent) of BLM lands are available for livestock grazing, while the remaining 55,244 acres (34 percent) are unavailable. Acres available for term leases are 101,509 acres (95 percent) with 5,892 AUMs and 5,832 acres (5 percent) with 122 AUMs for prescriptive grazing.

Livestock grazing would stimulate biomass production for some grass species and most shrubs, and reduce production of other species that are sensitive to grazing. Plant species diversity may be reduced in localized areas near water sources or salting areas where animals congregate. Species with low palatability, including most noxious weeds and some invasive species would increase in density on some sites, predominantly those with severe ground cover loss or in bunchgrass communities. Implementation of livestock grazing guidelines to promote vegetative recovery and maintenance would minimize these impacts and could result in a net improvement to the health of grassland and shrubland communities where grazing has caused degradation. Upon determination that an allotment is not meeting rangeland health standards causal factor is livestock grazing, then the BLM would take action to achieve or make progress toward meeting rangeland health standards, including standard 1 and 5, within one year.

Prescriptive grazing could be used as a management tool to reduce fine fuels assisting in the reduction of frequency and intensity of wildland fire. In addition, prescriptive grazing can be used to achieve specific habitat objectives such as the reduction of noxious weeds. Lands available for prescription grazing may or may not be grazed depending on amount of litter build up or vegetative treatment. It is estimated that prescription grazing may only occur once or twice every 10 to 20 years.

Vegetation management including fire/fuels. The BLM would allocate 43,365 acres into Fire Management Zone 1 (full suppression), 50,861 acres into Fire Management Zone 2 (suppression, may use wildland fire as a benefit as appropriate), and 68,385 acres into Fire Management Zone 3 (use wildlife fire as a benefit, suppress as appropriate). The BLM would treat approximately 16,000 to 38,000 infested acres of noxious and invasive species per decade. The BLM would treat approximately 10,000 acres per decade to achieve the natural range of variability, which may benefit rangeland vegetation as well.

Land use authorizations. The BLM would manage 39,490 acres as right-of-way exclusion area.

Recreation. The BLM would manage two Special Recreation Management Areas totaling 46,523 acres where recreation would be a priority, and it is reasonably foreseeable that recreation-related activities—hiking, fishing, hunting—are expected to continue and increase.

Cumulative Impacts for Alternative C

Under this alternative, approximately 107,341 acres (66 percent) of BLM lands are available for livestock grazing. The acres available for term leases are less than the other two alternatives, therefore the overall long term impacts would be the least within the planning area. The approximate acres (5,832) for prescription grazing is the least under this alternative with similar expected short term impacts as described in Alternative A.

With less acres available for term grazing leases under this alternative, it is anticipated there would be fewer range improvements constructed in the future. Due to the decrease in acres designated for prescription grazing, it is anticipated that fewer temporary range improvements would be constructed in the future. In the foreseeable future, the short-term and long-term effects of these range improvements would be similar as described in Alternative A. These range improvements would have the least effect on grassland and shrubland vegetation compared to the other alternatives.

The effects of vegetation management projects (e.g., fire/fuels/weeds) on areas to emphasize healthy rangeland conditions would be the same as described in Alternative A. Weed treatment acres per decade are greater than Alternative A; however, maximum treatment is less than in Alternative B. These vegetation projects under this alternative would be at a moderate scale compared to the other alternatives.

Under this alternative, the effects of Special Recreation Management Areas would have the largest impact on grasslands and shrublands compared to other alternatives. As recreational activities are expected to increase over time with every alternative, the potential impacts with this alternative would increase with use of roads, hunting, hiking, and developed or dispersed campgrounds.

3.3 Resources

3.3.1 Air Quality

Key Points

Air quality in the planning area is generally good. The main concern related to BLM-managed lands is with particulate emissions from wildfire and prescribed fire. Under each alternative, the BLM would continue participation in the Montana-Idaho Airshed Group, which through the Airshed Management System, manages smoke impacts from prescribed fires. Wildfire smoke can affect human health, and forest management practices can influence wildfire activity levels.

The study area has continued to experience warmer temperatures over the past 70 years and precipitation has increased as well. Winter temperatures have warmed more than the summer temperatures, and less precipitation is falling as snow (Western Regional Climate Center, <https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?mt5745>). Under every alternative, the BLM would disclose greenhouse gas emissions related to livestock grazing, prescribed burns, and wildfire, and continue to implement Bureau policies.

Indicators

Air quality indicators include criteria air pollutants, hazardous air pollutants, and sulfur and nitrogen compounds, which could contribute to visibility impairment and atmospheric deposition. State and federal ambient air quality standards set the maximum ambient concentration thresholds for criteria air pollutants, and the Montana Department of Environmental Quality Prevention of Significant Deterioration Program establishes allowable increases in pollutant concentrations for class I areas (such as national parks) and class II areas (the remaining areas of the state). Impacts to air quality-related values are assessed at class I areas and sensitive class II areas that are designated by the U.S. Fish and Wildlife Service, U.S. Forest Service, or National Park Service.

- Atmospheric (greenhouse gas) concentrations and air, soil, and water temperatures.
- Greenhouse gas emissions from livestock grazing, prescribed burns, and wildfire

Criteria air pollutants. Air quality standards for criteria air pollutants have been established by the U.S. Environmental Protection Agency, and are identified as the National Ambient Air Quality Standards (NAAQS). Concentrations of air pollutants greater than the primary NAAQS represent a risk to human health, while concentrations above the secondary NAAQS represent a risk to public welfare or the environment. Federal criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀, PM_{2.5}), sulfur dioxide (SO₂), and lead. Two other types of pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are regulated as precursor pollutants that can form ozone in the atmosphere. Montana criteria pollutant standards include an additional standard for settleable particulate.

Criteria air pollutants monitored in the planning area include ozone in Missoula and PM_{2.5}, and PM₁₀ in Missoula and at several additional sites. The nearest monitors for carbon monoxide, nitrogen dioxide, and sulfur dioxide are located at the EPA's National Core (NCore) multipollutant site near Sieben's Flat in Lewis and Clark County, east of the planning area. The Montana Department of Environmental Quality does not operate any lead monitors in the state.

Hazardous air pollutants. A wide variety of hazardous air pollutants have been defined. Although these pollutants do not have federal air quality standards, acceptable exposure thresholds do exist. Montana has established an ambient concentration standard for hydrogen sulfide (H₂S), which is also a federal

hazardous air pollutant. Ambient concentrations of hazardous air pollutants are not monitored on a regular basis within the planning area.

Montana and National Ambient Air Quality Standards. Montana Ambient Air Quality Standards (MAAQS) and NAAQS identify maximum limits for criteria air pollutant concentrations at the locations to which the public has access. The MAAQS and NAAQS are legally enforceable standards. Implement concentrations above the MAAQS and NAAQS represent a risk to human health that, by law, require public safeguards. State standards for federally regulated criteria pollutants must be at least as protective of human health as federal standards and may be more restrictive.

Prevention of Significant Deterioration (PSD) Program. The PSD program of the Clean Air Act ensures that air quality in areas meeting the NAAQS does not deteriorate significantly, while maintaining an allowable margin for future growth. Under the PSD program, each area in the United States is classified by the air quality in that region according to the following system:

- *PSD Class I Areas:* Areas for which pristine air quality is desirable (such as national parks, large wilderness areas, and some Native American Indian reservations) are accorded the strictest protection from air quality degradation. Only very small incremental increases in pollutant concentrations are allowed in order to maintain superior air quality in these areas.
- *PSD Class II Areas:* Areas that are not designated Class I are designated Class II. Moderate incremental increases in pollutant concentration are allowed, although the concentrations are not allowed to reach the concentrations set by Montana and federal standards (MAAQS and NAAQS).
- *PSD Class III Areas:* Originally envisioned for highly industrialized areas, no areas have yet been designated Class III. Concentrations in these areas would be allowed to increase up to the MAAQS and NAAQS.

The Missoula planning area includes PSD Class I and Class II areas.

Geographic and Temporal scales

The geographic scale of this air quality assessment extends through the nine-county planning area and as far east as the EPA's National Core (NCORE) monitoring station near Helena. The temporal scale discussed focuses on the term of the RMP.

Analytical Methods and Assumptions

This air quality assessment is based on an analysis of available ambient air quality monitoring data that has been collected across the assessment area, a review of published documents, discussion with state and local air quality officials, and staff expertise. The assessment assumes that the monitoring data collected is representative of the planning area and that unknown pollution sources do not exist.

The climate assessment is based on a review of available climate data (Western Regional Climate Center, <https://wrcc.dri.edu/summary/Climsmidwmt.html>), the 2015 Missoula BLM Analysis of the Management Situation, BLM guidance, and a calculation of greenhouse gas emissions across the three proposed alternatives. The analysis uses the Fire Order Fire Effects Model (FOFEM) developed by Intermountain Fire Sciences Lab (Keane 2017) to estimate emissions from wildland and prescribed fire as further described in Appendix A. The analysis calculates greenhouse gas (GHG) emissions using the EPA's Compilation of Air Pollutant Emissions Factors (EPA 2009) as outlined in Appendix A.

Air Quality Related Values

Visibility. Visibility can be expressed in terms of deciviews, a measure for describing humans' perceived changes in visibility. One deciview is defined as a change in visibility that is just perceptible to an average person, which is equivalent to approximately a 10 percent change in light extinction. To estimate potential visibility impairment, monitored particulate and aerosol concentrations are used to estimate visibility conditions for each day monitored. These daily values are ranked from clearest to haziest, and divided into three categories to indicate:

- The mean visibility for all days (average).
- The 20 percent of days with the clearest visibility (20 percent clearest).
- The 20 percent of days with the worst visibility (20 percent haziest).

The Interagency Monitoring of Protected Visual Environments (IMPROVE) network has measured visibility in national parks and some wilderness areas in the U.S. since the 1980s. Five IMPROVE stations are located in the planning area, including sites in the Cabinet Mountains Wilderness, Flathead Indian Reservation, Glacier National Park, Monture, and Sula Peak.

Atmospheric deposition. Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic systems. Much of the concern about deposition is due to the secondary formation of sulfur and nitrogen compounds from nitrogen oxides and sulfur dioxide, which may contribute to acidification of lakes, streams, and soils and affect other natural system characteristics, including nutrient cycling and biological diversity.

Air pollutants can be deposited by either wet mechanisms (rain or snow), or dry mechanisms (gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation). One Clean Air Status and Trends Network (CASTNet) station is located in Glacier National Park. To measure dry and wet deposition, three National Atmospheric Deposition Program stations operate in the planning area, including two in Glacier National Park (one each in Flathead and Glacier Counties) and one at Lost Trail Pass in the Bitterroot National Forest (Ravalli County).

Affected Environment

Air quality condition. Air quality is generally good throughout the planning area due to the low population density and scarcity of industrial air pollution sources. Concentrations of carbon monoxide, nitrogen dioxide, sulfur dioxide, and ozone are well below federal and state standards. However, some cities in tight valleys have experienced elevated concentrations of PM₁₀ and PM_{2.5} due to emissions from vehicle traffic road dust and residential wood combustion, coupled with atmospheric inversions during winter. Particulate emissions from wildfires and prescribed burns also affect the planning area, sometimes severely.

The Montana Department of Environmental Quality operates many monitors in the planning area, as described in the Air Quality Monitoring Network Plan (MDEQ 2017). A monitor in Missoula measures ambient concentrations of ozone, PM₁₀, and PM_{2.5}. PM₁₀ is monitored at five additional monitors (Flathead Valley, Kalispell, Libby, Thompson Falls, and Whitefish), while PM_{2.5} is monitored at Flathead Valley, Frenchtown, Libby, and Hamilton. Carbon monoxide and nitrogen dioxide are not monitored in the planning area; the nearest monitor for these pollutants is the NCore monitor located at Sieben's Flat in Lewis and Clark County, east of the planning area. Table 31 provides a summary of ambient air quality standards and recent monitoring data (MDEQ 2017). Some very high particulate measurements caused by exceptional events (wildfires) are not included in this table, as they do not count toward compliance with the standards.

Table 31. Monitoring data comparison to Montana and national ambient air quality standards

Pollutant	Averaging Time	MAAQS	NAAQS	Concentration	Standard Type (P = Primary, S = Secondary)	Monitoring Site ¹
Carbon monoxide (CO)	1-hour ²	23 ppm	35 ppm	0.839 ppm	P	Sieben's Flat
	8-hour ²	9 ppm	9 ppm	--	P	--
Nitrogen dioxide (NO ₂)	1-hour ³	0.30 ppm	100 ppb		P	Sieben's Flat
	Annual ⁴	0.05 ppm	53 ppb		P, S	Sieben's Flat
Lead	Quarterly ¹⁵	1.5 µg/m3	1.5 µg/m3	--	--	--
	3-month ¹⁵	--	0.15 µg/m3	--	--	--
Ozone	Annual ⁵	0.10 ppm	--	--	--	--
	8-hour ⁶	--	0.075 ppm	0.119 ppm	P, S	Missoula
PM ₁₀	24-hour ⁷	150 µg/m3	150 µg/m3	105 µg/m3 45 µg/m3 73 µg/m3 97 µg/m3	P, S	Flathead Co., Libby, Missoula, Sanders
	Annual ⁸	50 µg/m3	--	--	P, S	--
PM _{2.5}	24-hour ⁹	--	35 µg/m3	25 µg/m3 43 µg/m3 55 µg/m3 35 µg/m3 41 µg/m3	P, S	Flathead, Frenchtown, Hamilton, Libby, Missoula
	Annual ¹⁰	--	12 µg/m3	5.4 µg/m3 8.6 µg/m3 7.9 µg/m3 9.7 µg/m3 7.1 µg/m3	P	Flathead, Frenchtown, Hamilton, Libby, Missoula
	Annual ¹⁰	--	15 µg/m3	--	S	--
Sulfur dioxide (SO ₂)	1-hour ^{11, 12}	0.50 ppm	75 ppb	2.5 ppb	P	NCore
	3-hour ¹³	--	0.5 ppm	--	S	--
	24-hour ¹⁴	0.10 ppm	--	--	P	--
	Annual ⁴	0.02 ppm	--	--	P	--
Fluoride	Monthly ¹⁵	50 µg/g	--	--	--	--
In Forage	Grazing Season ¹⁵	35 µg/g	--	--	--	--
Hydrogen Sulfide (H ₂ S)	Hourly ⁵	0.05 ppm	--	--	--	--
Settleable Particulate	30-Day ¹⁵	10 g/m2	--	--	--	--
Visibility	Annual ¹⁶	3×10-5/m	--	--	--	--

¹The Sieben's Flat NCore monitor is located north of Helena, in Lewis and Clark County, east of the planning area. Locations for other monitors can be found in the MDEQ Air Quality Monitoring Network Plan (MDEQ 2017).

²For NAAQS: no more than one exceedance per calendar year; for MAAQS - no more than one exceedance per consecutive 12 months.

³For NAAQS: 98th percentile, averaged over 3 years; for MAAQS - not to be exceeded more than once over any 12 consecutive months.

⁴For NAAQS: annual mean not to be exceeded; for MAAQS - arithmetic average over any four consecutive quarters not to be exceeded.

⁵Not to be exceeded more than once per consecutive 12 months.

⁶Fourth-highest daily maximum 8-hour ozone concentrations in a year, averaged over 3 years.

⁷Not to be exceeded more than once per calendar year on average over 3 years.

⁸3-year average of the arithmetic means over a calendar year.

⁹98th percentile, averaged over 3 years.

¹⁰Annual mean, averaged over 3 years, NAAQS promulgated December 14, 2012.

¹¹For NAAQS - 99th percentile of daily maximum 1-hour concentrations in a year, averaged over 3 years.

¹²For MAAQS - violation when exceeded more than 18 times in any 12 consecutive months.

¹³No more than one exceedance per calendar year (secondary NAAQS).

¹⁴For MAAQS - no more than one exceedance per 12 consecutive months, 24-hour defined as 24 consecutive hours (rolling average).

¹⁵Not to be exceeded. For NAAQS, this is a 3-year average.

¹⁶Average over any four consecutive quarters.

The following areas are designated as nonattainment or maintenance areas by the U.S. Environmental Protection Agency, because they did not meet NAAQS in the past: Columbia Falls (PM₁₀); Flathead County (PM₁₀, for a portion of the county); Libby (PM₁₀); Lincoln County (PM_{2.5}, for a portion of the county); Missoula (PM₁₀); Missoula (CO) maintenance area; Polson (PM₁₀); Ronan (PM₁₀); Thompson Falls (PM₁₀); and, Whitefish (PM₁₀). Although recent data demonstrate compliance with the NAAQS, these areas have not been redesignated to attainment status.

The Missoula City-County Health Department submitted a request to the U.S. Environmental Protection Agency requesting redesignation of the Missoula nonattainment area to attainment in February 2015 (Federal Register 2017). This request is still pending. The Health Department is working on a second, 10-year maintenance plan.

Air quality trends. Ambient concentrations of most criteria-air pollutants within the planning area remained stable over the last five years or decreased slightly. Ozone concentrations at the Missoula monitor decreased, and PM₁₀ and PM_{2.5} concentrations throughout the planning area decreased at all but one monitor. At Thompson Falls, PM₁₀ concentrations have risen over the last five years. Hazardous air pollutant concentrations are not routinely monitored, and no trends are available for these pollutants.

The Clean Air Act requires visibility improvements in Class I areas until the area achieves natural visibility. Eight Class I areas are located within or adjacent to the planning area: Anaconda-Pintler Wilderness (USFS); Bob Marshall Wilderness (USFS); Cabinet Mountains Wilderness (USFS); Flathead Indian Reservation (Tribal); Glacier National Park (NPS); Grand Teton National Park (NPS); Mission Mountains Wilderness (USFS); Scapegoat Wilderness (USFS); and Selway-Bitterroot Wilderness (USFS).

Visibility is monitored at sites included in the IMPROVE Network. There are five IMPROVE sites located in the planning area. Visibility trends are stated in terms of standard visual range in kilometers and are provided for the 20 percent clearest days, 20 percent average days, and 20 percent haziest days. Visibility has improved slightly at the five locations.

Table 32. IMPROVE Monitors in the Planning Area

Location	County	Monitor ID	Latitude	Longitude
Cabinet Mountains Wilderness	Sanders	CABI1	47.9549	-115.6709
Flathead Indian Reservation	Lake	FLAT1	47.7734	-114.269
Glacier National Park ¹	Flathead	GLAC1	48.5105	-113.9966
Monture	Powell	MONT1	47.1222	-113.1544

Location	County	Monitor ID	Latitude	Longitude
Sula Peak ²	Ravalli	SULA1	45.8598	-114.0001

Source: IMPROVE 2015.

¹ Data are not available for 2009.

² Data are not available for 2008 and 2010.

Climate condition. The climate in much of the planning area is characterized as a modified north Pacific coast climate, because it is influenced by moisture from the Pacific Ocean (Western Regional Climate Center (WRCC) 2017). The Rocky Mountains create complex terrain with steep valleys that often experience thermal inversions during the winter. Although the climate is somewhat moderated by Pacific Coast influences, temperature extremes do occur. From 1948 through 2014, temperatures in Missoula were recorded to reach 107 degrees Fahrenheit at lower elevations and dropping as low as –32 degrees Fahrenheit. Summers are generally warm and short, and winters are long and cold. Precipitation varies greatly with altitude and is less than 14 inches per year in Missoula. Mountain snowpack can reach 100 inches at high elevations. In Missoula, wind direction is variable, and wind speed is generally light to moderate. Table 33 shows temperature, precipitation, and wind data for Missoula.

Table 33. Normal Missoula Temperature, Precipitation, and Wind Data

Climate Component	Missoula
Mean maximum temperature ¹	56.7 °F
Mean minimum temperature ¹	32.7 °F
Mean annual precipitation ¹	13.62 inches
Mean annual snowfall	45.8 inches
Mean annual snow depth	1 inch
Mean annual wind speed ²	4.7 miles per hour
Prevailing wind direction ³	northwest

¹ Based on climate normal during the period from 1/1/1948-1/20/2015 (WRCC 2017).

² Based on 2001-2011 (WRCC 2017).

³ Based on 1992-2002 (WRCC 2017).

The global average surface temperature has increased approximately 1.5 degrees Fahrenheit from 1880 to 2012 (Intergovernmental Panel on Climate Change 2014). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of the Earth's atmosphere, up to 4 to 12 miles above the Earth). Current ongoing global climate variability is caused, in part, by the atmospheric buildup of greenhouse gases, which may persist for decades or even centuries. Each greenhouse gas has a global warming potential that accounts for the intensity of each the gas's heat trapping effect and its longevity in the atmosphere (USDI-BLM 2010). The buildup of greenhouse gases such as carbon dioxide, methane, nitrous oxide, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the sun, and re-emit a larger portion of the Earth's heat back to Earth. Chapter 2 of the Climate Change Supplementary Information Report (USDI-BLM 2010) describes climate science in more detail.

Within the planning area, increasing temperatures are evident for the annual average, average maximum, and average minimum temperatures. Minimum temperatures are increasing at a faster rate of 0.48 degree Fahrenheit per decade than the average (0.43 degree Fahrenheit) or maximum (0.38 degree Fahrenheit) temperatures, which are increasing at a rate of 0.36 degree Fahrenheit and 0.30 degree Fahrenheit, respectively. Since 1948, total precipitation increased moderately by an average 0.12 inch per decade,

while snowfall decreased by 2.14 inches per decade (see Appendix A for temperature and precipitation data). The substantive impacts related to climate within BLM's management include carbon storage, and GHG emissions from prescribed burning and livestock grazing.

Environmental Consequences

Impacts common to all alternatives

Air quality forecast. With the possible exception of particulate emissions from natural and prescribed fire, good air quality is expected to continue within the planning area. Emissions from many existing sources are decreasing due to more stringent federal and state emission standards. For some pollutants, particularly nitrogen dioxide, total emissions in the planning area could decrease from current levels if current population and industrial activity remain stable or increase slightly. Compliance with the MAAQS and NAAQS is expected to continue in areas attaining the standards, and air quality is improving in localized areas that are designated nonattainment for the PM₁₀ and PM_{2.5} NAAQS.

The review of air quality compliance monitoring does not include forest fire smoke particulate impacts. These data points are flagged through an exceptional event process and not included in the design value reporting. Forest fire impacts into communities can be severe and even healthy adults can be adversely impacted. During the summer of 2017, smoke impacts in the Seeley Lake area were bad enough that the Missoula City-County Health Department recommended evacuations of children and sensitive adults. Forest fire activity levels are sensitive to climate variables (drought and heat) and to forest management practices. Historic fire suppression policies resulted in a buildup of fuels across the planning area. These fuel loadings and the trend toward warmer and drier summers have the potential to increase smoke impacts from wildfire.

The direct effects of BLM management actions on air quality are a function of timber harvest, prescribing burning, wildfire, and cattle grazing. Data used include modeled vegetation and fire with calculated emissions. Appendix A contains the modeling for air quality and climate. Under the alternatives, there are fire-related impacts and increases to greenhouse gas emissions.

Prescribed Fire. Under the alternatives, the amount and type of prescribed fire and forest vegetation treatments, many promoting forest health while reducing lethal fire risk, will result in a reduction of the severity of wildfires. Table 35 displays the smoke emissions per decade, which is described later in this section.

Table 34. Comparison of Prescribed Fire by Alternative

Type of Prescribed Fire	Alternative A	Alternative B	Alternative C
Underburn-low elevation	2,500	5,250	3,500
Mixed severity	1,000	2,250	1,500

Table 35. Smoke emissions (tons) per decade by alternative for prescribed fires

Metric	Alternative A	Alternative B	Alternative C
Consumption	54,597	118,152	78,768
CO ₂	80,157	173,195	115,464
CO	9,443	20,581	13,721
CH ₄	443	965	643

Metric	Alternative A	Alternative B	Alternative C
NO _x	76	162	108
SO ₂	55	118	79
PM 2.5	759	1,652	1,101
PM 10	895	1,949	1,299

Under the alternatives, wildfires would occur, resulting in CO₂ emissions (in tons) as displayed in the table below. As with prescribed fires, emission estimates are based on values from the following table.

Table 36. Comparison of Projected Average Decadal Wildfire Acres and Emissions for the Next Five Decades

Modeled Decade	Alternative A Acres	Alternative A Tons CO₂	Alternative B Acres	Alternative B Tons CO₂	Alternative C Acres	Alternative C Tons CO₂
Decade 1	2,697	87,470	3,101	100,573	2,952	95,740
Decade 2	2,394	77,643	2,600	84,324	2,495	80,919
Decade 3	2,932	95,092	2,091	67,816	2,571	83,384
Decade 4	2,313	75,016	1,956	63,438	1,970	63,892
Decade 5	2,170	70,378	2,020	65,513	2,210	71,676
Averages	2,501	81,120	2,354	76,333	2,440	79,122

Impacts under Alternative A

GHG emissions. Using USDA cattle inventories (USDA 2018) and EPA emission factors (EPA 2009), the total methane produced through enteric fermentation was calculated in the three-county area and for each alternative. Livestock grazing would contribute approximately 36,126.57 kg methane per year. Prescribed fire would result in approximately 80,157 CO₂ emissions per decade.

Sequestration via silvicultural treatments. The volume (MBF) of carbon sequestered via silvicultural treatments by decade would be approximately 44,100. MBF was used as a surrogate for carbon sequestered because it takes into account the final merchantable volume that will go into lumber after limbs, bark, and other non-merchantable portions are removed.

Impacts under Alternative B

Air Quality: the greatest impact to air quality from prescribed fire, grazing, and wildfire.

GHG emissions. Livestock grazing would contribute 37,895.00 kg methane per year. Prescribed fire would result in approximately 173,195 CO₂ emissions per decade, which should result in the lowest decadal average emissions from wildfire due to treatments. This would result in averages a 7 percent reduction in lethal fire per decade for the next 50 years (Appendix A).

Sequestration via silvicultural treatments. The volume (MBF) of carbon sequestered via silvicultural treatments by decade would be approximately 47,000. MBF was used as a surrogate for carbon sequestered because it takes into account the final merchantable volume that will go into lumber after limbs, bark, and other non-merchantable portions are removed.

Impacts under Alternative C

Air Quality: the least effects to air quality from prescribed fire and grazing.

GHG Emissions: Livestock grazing would contribute the fewest GHG with approximately 34,530.38 kg methane per year. Prescribed fire would result in approximately 115,464 CO₂ emissions per decade, which should result in lower emissions from wildfire due to reduced burned areas although less than Alternative B.

Sequestration via silvicultural treatments. The volume (MBF) of carbon sequestered via silvicultural treatments by decade would be approximately 28,225. MBF was used as a surrogate for carbon sequestered because it takes into account the final merchantable volume that will go into lumber after limbs, bark, and other non-merchantable portions are removed.

Cumulative effects.

Local, state, and federal planning efforts characterize cumulative effects. The Missoula Conservation and Climate Action Plan (Missoula 2012) and the Greenhouse Gas Emission Inventory (Missoula 2010) include targets to be carbon neutral by 2025, a 30 percent reduction by 2017, and a 50 percent reduction by 2020. The Montana Department of Environmental Quality establishes state-related air quality standards; those standards are related to, and supported by national air quality standards. Forest plans for the Lolo, Beaverhead-Deerlodge, Helena-Lewis and Clark, and Flathead National Forests also provide planning goals and objectives. The baseline GHG emissions anticipated from domestic livestock in the three-county analysis area (Missoula, Granite, and Powell Counties) would be approximately 4,630,080 kg methane per year from 806,400 animal unit months total. Methane emissions from each alternative would account for less than 1 percent of total emissions from the three-county area.

3.3.2 Aquatic Habitat and Special Status Species

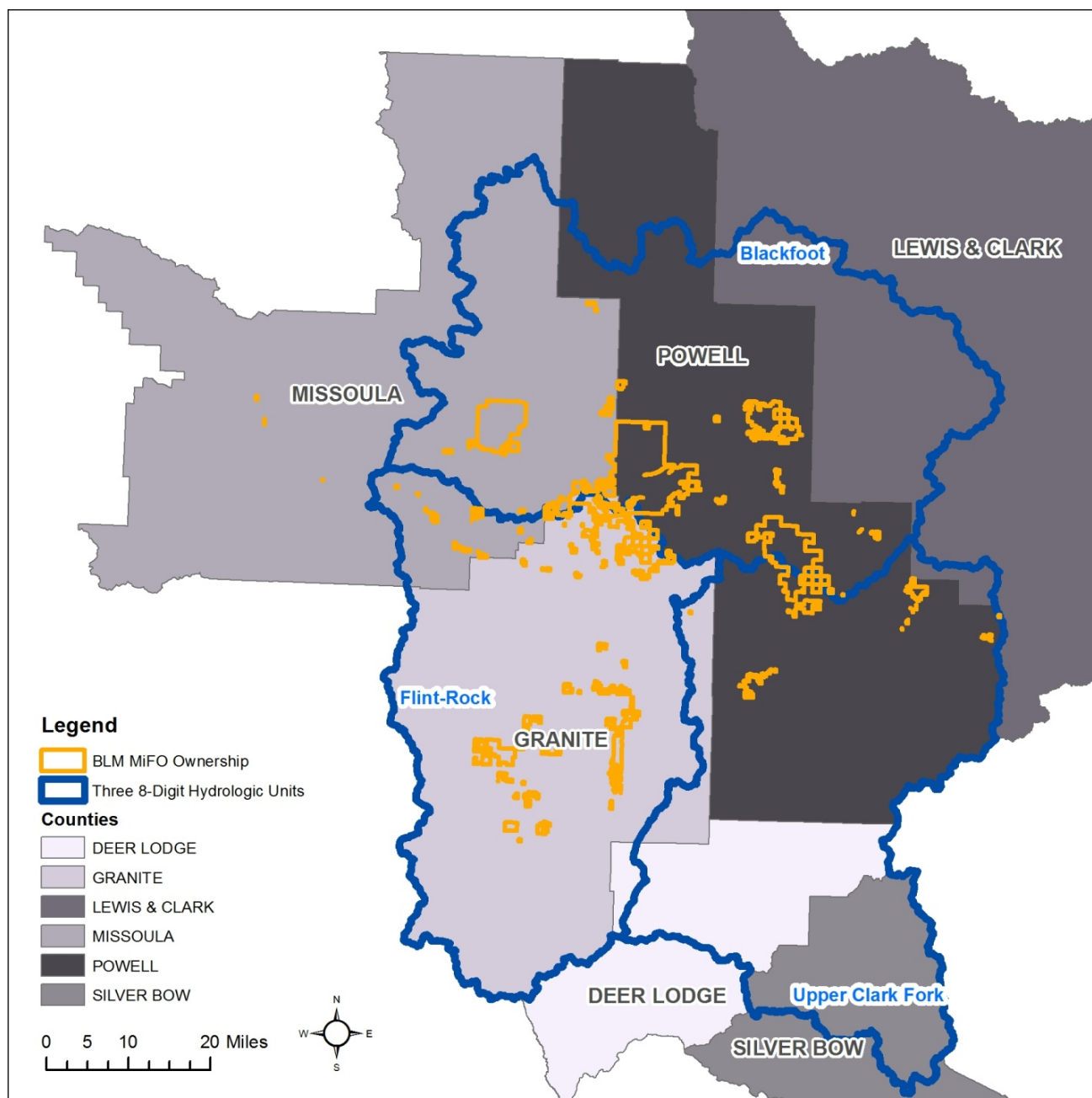
Indicators

- Ability to protect, or improve, or maintain habitat within riparian habitat conservation areas.
- Ability to protect, improve, or maintain miles of special fisheries. Special status fish-bearing stream miles within right-of-way exclusion areas and ACECs with aquatics-related relevant and important values.
- *Western toad and pearlshell mussel populations*
- *Livestock management.* Stream miles available or unavailable to grazing across the alternatives; whether rangeland health standards are achieved or making progress to achieve.
- *Fuels treatments in fire management zone one and wildland urban interface.* Stream miles of bull trout critical habitat and occupied habitat; miles of westslope cutthroat trout occupied streams; miles of suitable western pearlshell mussel habitat; and acres of suitable habitat for western toad.
- *Minerals.* Stream miles of bull trout critical habitat and occupied habitat; miles of westslope cutthroat trout occupied streams; miles of suitable western pearlshell habitat; and acres of suitable habitat for western toad with moderate or high potential for mineral activities.

Geographic and Temporal scales

The three watershed scales most relevant to the implementation of the proposed alternatives are sub-basin, watershed, and sub-watershed. The three hydrologic units in the analysis area include the Upper Clark Fork, Flint/Rock, and Blackfoot sub-basins, and are found within Granite, Powell, Missoula, Lewis and Clark, Deer Lodge, and Silverbow Counties (Figure 18). There are five small parcels of BLM-

managed lands within the decision area, but outside this analysis area. These parcels, in the Middle Clark Fork Hydrologic Unit, were considered, but not rigorously analyzed, because of the minor potential to influence aquatic habitat. BLM-managed lands only account for approximately 1.24 out of 1,323 perennial stream miles in the Middle Clark Fork Hydrologic Unit. The impacts from these outlying areas are incorporated into the effects determination. The temporal scale for this analysis is the life of the plan, which is expected to last 20 to 30 years.

Figure 18. BLM-managed lands and the three 8th-digit HUCs used for the analysis area

The analysis area contains approximately 4,274 perennial stream miles and 19,665 acres of lakes and reservoirs. Of this, approximately 119 miles of perennial streams are in the decision area (table 37). The BLM does not manage any lakes or reservoirs within or bordering BLM-managed lands.

Table 37. Miles of perennial streams and acres of lakes reservoirs in 8-digit hydrologic units by analysis and decision area

Sub-basin (8-digit hydrologic unit code)	Analysis area stream miles	Decision area stream miles	Analysis area lake and reservoir acres	Decision area lake and reservoir acres
Blackfoot	1,642	82	9,086	0
Flint-Rock	1,233	24	5,164	0
Upper Clark Fork	1,399	13	5,415	0
Total	4,274	119	19,665	0

Source: Montana National Hydrography Dataset-
http://geoinfo.msl.mt.gov/geography/water_information_system/nhd_high_resolution_data_download.aspx

Analytical Methods and Assumptions

- The BLM will follow the Recovery Plan for the Conterminous United States Population of Bull Trout (USDI Fish and Wildlife Service 2015), or as amended. Additionally, recovery is supported through the Conservation Strategy for Bull Trout on USFS lands in Western Montana (USDA Forest Service 2013), and the Updated Interior Columbia Basin Strategy: (ICBEMP 2014), across the alternatives.
- Interim standard RHCA widths are 300-feet slope distance on each side of a fish-bearing stream and 150 feet on non-fish-bearing streams and wetlands, lakes, ponds, and reservoirs. INFISH also includes provisions for using modified RHCA widths to adjust for project considerations and site-specific data. The BLM would define the RHCA distance based on site-specific, project-level analyses.
- Riparian management objectives (RMOs) (such as water temperature, pool frequency, width to depth ratio, bank stability, and large woody debris) can be measured to assess the condition of RHCAs. Applicable RMOs will be identified using watershed or site-specific analyses and utilized on a project level to ensure that aquatic habitat is maintained or approved (see Appendix B).
- This analysis considers bull trout surrogate for aquatic habitat health for westslope cutthroat trout western pearlshell mussel and western toad. Although bull trout are the focus of the Bull Trout Recovery Plan (USFWS 2015), the species is also keystone to healthy forest and aquatic systems. In general, strong bull trout populations correspond well with strong populations of westslope cutthroat trout and other sensitive or listed species. Managing for strong bull trout populations and habitat in many cases will lead to better overall aquatic species health.
- Best management practices and conservation measures from appendix P will be implemented to minimize potential impacts to aquatic resources and meet riparian-wetland management objectives.
- Fish key watersheds (see appendix B) are identified to emphasize protection of stronghold populations of aquatic species. The emphasis on restoration would likely be greater in the fish key watersheds.
- Cultural and wildlife resource-management activities will have no discernible impact to aquatic resources.

- Livestock grazing is one of the key management issues with regard to aquatic habitat. BLM pastures associated with any riparian habitat conservation area that occur within a sub-watershed containing ESA-listed fish are subject to long-term monitoring and annual grazing indicators. Grazing practices that prevent the attainment of desired aquatic habitat conditions can result in modification, relocation, or discontinuation.
- Overall, the decision consists of only 4.2 percent of the analysis area, and the ability of the BLM to influence potential landscape and watershed-level management decisions and land use activities is relatively small. The BLM assumes that abiding by the Bull Trout Recovery Plan is adequate for protecting the species. The BLM will initiate consultation with the USFWS in compliance with Section 7 of the Endangered Species Act, as appropriate, on a project-by-project basis.

Affected Environment

The primary sub-basins within the decision area are the Upper Clark Fork, Flint-Rock Creek, and Blackfoot (Table 38). Within this broad geographic area are a variety of aquatic habitat types including large rivers, perennial and intermittent streams, small lakes, and wetlands. The availability of habitat for fishes, amphibians, aquatic reptiles, and invertebrates varies by location, elevation, and proximity to landforms and vegetation.

Table 38. Miles of stream in 8-digit hydrologic units by analysis and decision area

Sub-basin (8-digit hydrologic unit code)	Analysis area stream miles	Decision area stream miles	Analysis area acres
Blackfoot	4,717	355	9,086
Flint-Rock	3,494	107	5,164
Upper Clark Fork	3,447	30	5,415
Total	11,658	491	19,665

The following sections contain an overview of existing aquatic resource conditions. For a detailed description of historic land use activities in the Upper Clark Fork, Blackfoot, and Rock Creek Watersheds, as well as life history characteristics and population trends for the aquatic species within the decision area, please refer to section 2.16.2 of the 2016 Missoula RMP Analysis of the Management Situation.

Native fishes. BLM-managed lands in the planning area provide habitat for eleven species of native fish, including bull trout (listed as threatened under the Endangered Species Act), and westslope cutthroat trout (a BLM-sensitive species). Lesser-known native species in the decision area include mountain whitefish, several species of sculpins, and a variety of minnows and suckers (see Table 39). Bull trout and westslope cutthroat trout were historically common throughout the decision area, but are now reduced to resident populations or locally extirpated. Currently, the key factors limiting recovery are competition and hybridization with non-native species, habitat loss, water temperature, and over harvest due to angling. Table 40 identifies miles of stream occupied by bull trout and westslope cutthroat trout in the analysis and decision areas.

Table 39. Native-fish species and their occurrence in the planning area

Common Name	Scientific Name	Occurrence
Bull trout	<i>Salvelinus confluentus</i>	<i>Fluvial:</i> Sub-adults and adults live in larger streams and rivers and spawn in smaller tributary streams. <i>Resident:</i> Live and spawn in smaller tributaries and headwater streams.
Westslope cutthroat trout	<i>Oncorhynchus clarki lewisi</i>	<i>Fluvial:</i> Sub-adults and adults live in larger streams and rivers and spawn in smaller tributary streams. <i>Resident:</i> Live and spawn in smaller tributaries and headwater streams.
Mountain whitefish	<i>Prosopium williamsoni</i>	Present in larger, cold-water streams with abundant clear gravel and rubble.
Cedar sculpin	<i>Cottus schitsuumsh</i>	Likely present in the mainstem Clark Fork River.
Columbia slimy sculpin	<i>Cottus cognatus</i>	Throughout the planning area in clear, cold, rocky streams.
Rocky Mountain sculpin	<i>Cottus bondi</i>	Found in larger rivers and lower ends of large tributaries.
Largescale sucker	<i>Catostomus macrocheilus</i>	Sporadically present across the planning area in larger rivers and slower-moving tributary streams. Less common in high-gradient systems.
Longnose sucker	<i>Catostomus catostomus</i>	Sporadically present across the planning area, but most abundant in the larger rivers.
Longnose dace	<i>Rhinichthys cataractae</i>	Widespread, but sporadically present across the planning area. Most abundant in the larger rivers.
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>	Sparsely present and found only in larger rivers.
Redside shiner	<i>Richardsonius balteatus</i>	Found in larger rivers: Nevada Creek, Union Creek, and streams of the Murray-Douglas area.

Table 40. Miles of perennial stream bull trout critical habitat, occupied bull trout, and occupied westslope cutthroat trout by 8-digit HUC sub-basin

Resource	Blackfoot analysis area	Blackfoot decision area	Flint-Rock analysis area	Flint-Rock decision area	Upper Clark Fork analysis area	Upper Clark Fork decision area	Total analysis area	Total decision area
Bull trout critical habitat	359	18.8	349	7.2	122	0.2	830	26.2
Occupied bull trout	541.8	20.7	451.5	7.9	86.8	0.2	1,080.1	28.8
Occupied westslope cutthroat trout	1,448.2	86.5	943.3	18.9	782.0	5.9	3,173.5	111.3

Bull trout (threatened) and Bull Trout Critical Habitat. In July 1998, bull trout was listed as threatened under the Endangered Species Act. On January 14, 2010, the USFWS revised its 2005 designation of critical habitat for bull trout (USFWS 2010). Just over 27 miles of stream habitat, and no lake habitat, are designated Bull Trout Critical Habitat in the decision area, including the Upper Clark Fork River, Flint Creek, Rock Creek, and the Blackfoot River (to include the lower portions of Belmont and Gold creeks). The designation of critical habitat by the USFWS is intended to provide sufficient habitat to allow for genetic and life history diversity, ensure bull trout are well distributed across habitats, ensure sufficient

connectivity among populations, and allow the ability to address threats facing the species. Figure 19 and Figure 20 show bull trout presence and critical habitat in relation to the analysis and decision areas.

Figure 19. Bull trout distribution and presence

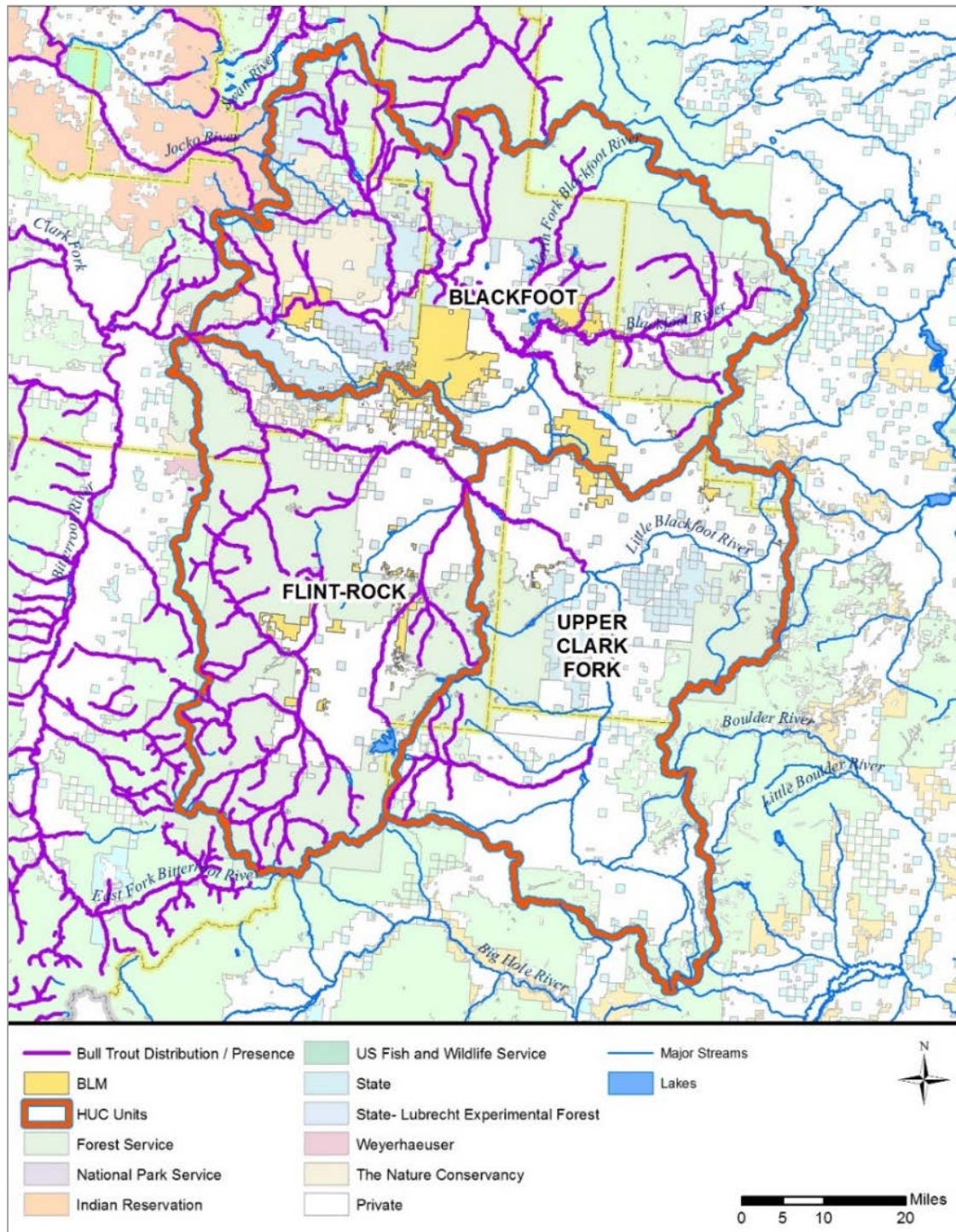
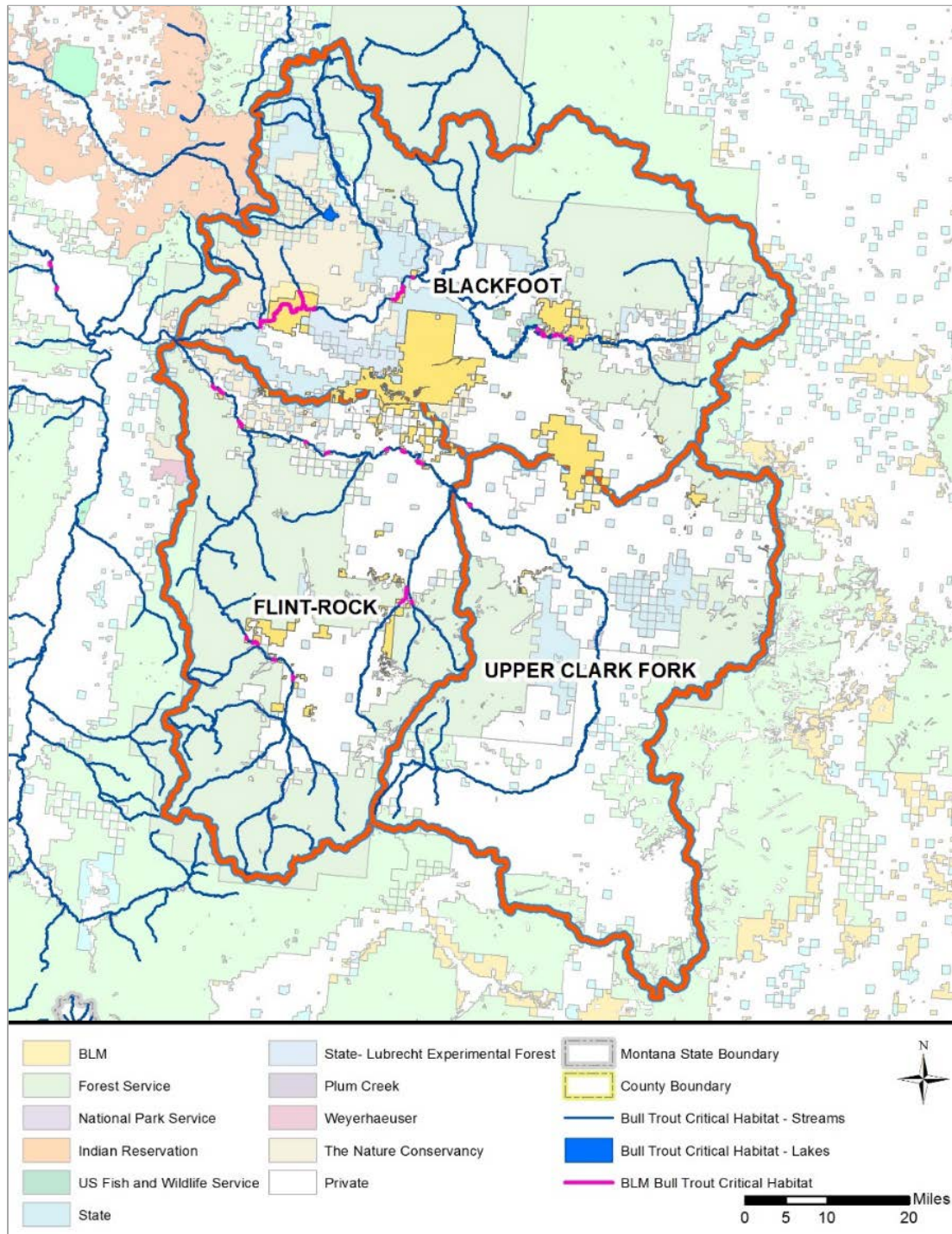
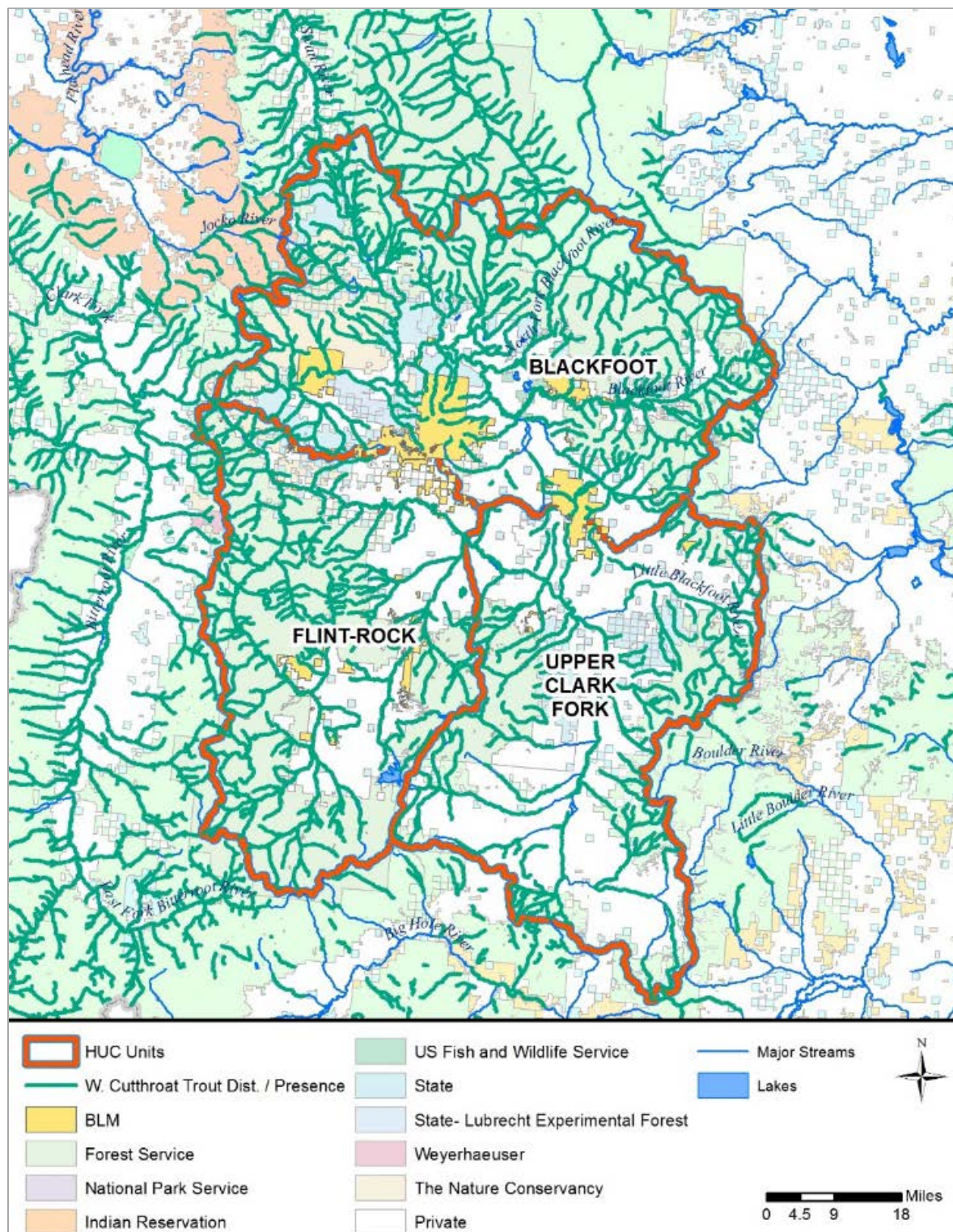


Figure 20. Bull trout critical habitat

Westslope cutthroat trout. Though population numbers have declined from those recorded historically, westslope cutthroat trout remain the most widespread species on Missoula BLM-managed lands. Westslope cutthroat trout are found throughout the planning area in habitats ranging from large rivers to small tributaries. Genetic sampling indicates that many headwater populations on BLM-managed lands are genetically pure strains (no introgression with rainbow trout). BLM headwater streams containing

these fish provide important refugia for some of the last remaining genetically pure populations of westslope cutthroat trout. Figure 21 shows the distribution of westslope cutthroat trout in relation in the decision area.

Figure 21. Distribution of westslope cutthroat trout in the decision area



Non-native fishes. A variety of non-native species are also found in the planning area, including trout (rainbow and brown), char (brook trout), pike, spiny rayed fish (bass, perch), and a variety of minnows and suckers. Non-native fish prey on native species, and out-compete natives for food and habitat. Non-native species interbreed with native taxa (such as rainbow with cutthroat trout; brook with bull trout). The full effects of hybridization on these species is poorly understood, but it is clear that even a modest amount of hybridization can decrease the reproductive success of hybrid individuals (Muhlfeld et al. 2009).

Table 41. Non-native fish species and their occurrence in the planning area

Common Name	Scientific Name	Occurrence
Brook trout	<i>Salvelinus fontinalis</i>	Sporadically present across the planning area. Tend to co-occur with bull trout. In some places (such as Ward creek), brook trout have completely replaced native cutthroat trout.
Brown trout	<i>Salmo trutta</i>	Occur in larger rivers and lower-gradient reaches of larger tributaries.
Largemouth bass	<i>Micropterus salmoides</i>	Sparsely present in the Clark Fork River.
Northern pike	<i>Esox lucius</i>	Sparsely present in the Clark Fork and Blackfoot rivers.
Pumpkinseed	<i>Lepomis gibbosus</i>	Sparsely present in the Clark Fork River.
Rainbow trout	<i>Oncorhynchus mykiss</i>	Common in larger rivers. Co-occur with fluvial westslope cutthroat trout. Of smaller planning area streams, most abundant in Belmont Creek.
Yellow perch	<i>Perca flavescens</i>	Sparsely present in the Clark Fork and Blackfoot Rivers.

Within the decision area, there is only one known stream (Ward Creek) where brook trout have completely displaced native fish. Thus, non-native fish populations seem to pose less risk to native populations in our region compared to regions east of the Continental Divide. Montana Fish, Wildlife, and Parks manages fish populations while cooperating agencies such as the BLM manage the associated habitat. Montana Fish, Wildlife, and Parks management includes restoring and maintaining native populations, providing put-and-take fishing opportunities, and maximizing sport-fishing potential of native and non-native species. The BLM manages habitats on many streams that provide the spawning and rearing habitat that sustain game fish in the Clark Fork, Rock Creek and Blackfoot Rivers. If the presence of non-native fish are adversely affecting the viability of native fish and desired aquatic species, the BLM will consult and cooperate with Montana Fish, Wildlife, and Parks and other agencies on necessary actions.

Amphibians. The decision area contains a variety of habitats including ponds, wetlands, streams and seeps important to a variety of amphibian and aquatic reptiles ranging from river-bottom oxbows to higher altitude wetlands and beaver ponds. There are approximately 2,897 acres of ponds and wetlands, and 495 miles of ephemeral or year-round streams in the decision area.

Table 42. Acres of wetlands in the analysis and decision areas

Wetland type	Decision area acres	Analysis area acres
Blackfoot Sub-basin		
Freshwater Emergent Wetland	547	27,700
Freshwater Forested Wetland	185	6,982
Freshwater Forested/Shrub Wetland	0	1
Freshwater Pond	18	2,831
Freshwater Scrub-Shrub Wetland	241	11,965
Lake	140	6,251
Riparian Emergent	37	805
Riparian Forested	350	8,955
Riparian Scrub-Shrub	204	2,393
Riverine	291	5,080
Blackfoot Sub-basin Subtotal	2,013	72,962
Flint-Rock Sub-basin		
Freshwater Emergent Wetland	238	20,134
Freshwater Forested Wetland	1	847
Freshwater Pond	16	1,044
Freshwater Scrub-Shrub Wetland	80	4,907
Lake	0	4,345
Riparian Emergent	45	1,285
Riparian Forested	241	5,579
Riparian Scrub-Shrub	61	1,603
Riverine	103	2,727
Flint-Rock Sub-basin Subtotal	784	42,472
Upper Clark Fork Sub-basin		
Freshwater Emergent Wetland	39	16,978
Freshwater Forested Wetland	0	136
Freshwater Pond	0	2,093
Freshwater Scrub-Shrub Wetland	13	8,110
Lake	0	4,084
Riparian Emergent	14	3,322
Riparian Forested	13	4,006
Riparian Scrub-Shrub	19	5,773
Riverine	3	1,747
Upper Clark Fork Sub-basin Subtotal	100	46,250
Total	2,897	161,684

Source: Montana Wetland and Riparian Framework—
https://mslservices.mt.gov/Geographic_Information/Data/DataList/datalist_Details.aspx?did=%7bf57e92f5-a3fa-45b2-9de8-0ba46bbb2d46%7d

Table 43. Occurrence of amphibians and aquatic reptiles in the analysis area

Common Name	Scientific Name	Occurrence
Columbia spotted frog	<i>Rana luteiventris</i>	Widespread across the planning area in sites with emergent vegetation.
Long-toed salamander	<i>Ambystoma macrodactylum</i>	Widespread across the planning area in diverse habitats ranging from small high-elevation low-gradient streams and sloughs (such as Cottonwood and Chamberlain Meadows), permanent beaver ponds, and perennial side channels and sloughs adjacent to the Blackfoot and Clark Fork Rivers. Appear more common in lentic sites that lack fish.
Pacific tree frog	<i>Pseudacris regilla</i>	Two populations documented on lands managed by the Missoula BLM (Russell Gates parcel on the Blackfoot River and Lower Blackfoot River Corridor). Are also likely present in low-elevation sloughs and wetlands associated with BLM-managed reaches of the Clark Fork River.
Painted turtle	<i>Chrysemys picta</i>	Sporadically present in backwater sloughs of the Blackfoot and Clark Fork Rivers and lower-elevation sites with warmer, permanent water. Common in small ponds and lakes in BLM-managed lands in the lower Ward Creek area. Observed in small ponds in the Warm Springs Creek area.
Rocky Mountain tailed frog	<i>Ascaphus montanus</i>	Presence and distribution across the decision area is poorly documented as no systematic surveys have been performed. MTFWP has records of tailed frogs in Fred Burr, Gold, Ward, and Warm Springs Creeks. They are likely present in other planning area streams.
Western toad	<i>Anaxyrus boreas</i>	Widespread distribution and occurrence can be expected anywhere in the planning area.
Northern leopard frog	<i>Lithobates pipiens</i>	Likely extirpated from the analysis area.
American bullfrog	<i>Lithobates catesbeianus</i>	Present in Ravalli and Missoula Counties, but no record in the decision area.

Native amphibians and aquatic reptiles are important biological and cultural resources whose conservation is important to their own survival, but also to the survival of taxa in aquatic and terrestrial food webs. Amphibians have complex life cycles with life history stages that require specific habitats that may be spatially separate (Maxell 2000). Loss or degradation of any one of these components could result in the decline or local extirpation of a species. Impacts for these species are addressed as appropriate through examining changes to the environments that fulfill the habitat needs for each life stage (overwintering, foraging, breeding, and migratory). This analysis focuses on foraging and breeding habitats, as overwintering and migratory habitats are difficult to quantify. In this analysis, stream miles wetland acres are the indicators of foraging and breeding habitats.

Amphibian-species population data within the decision area is incomplete and surveys are ongoing. In 2005, the Montana Natural Heritage Program completed a BLM Missoula Field Office herpetofauna report (Maxell 2005) and since 2016, approximately 30 sites have been surveyed for amphibian breeding and presence on BLM-managed lands. Presence of breeding populations of western toad, long-toed salamanders, Pacific tree frogs, and Columbia spotted frogs have been confirmed. However, without long-term population data, it is difficult to assess current conditions as compared to historical population levels in the decision area.

Special status amphibians. Western toad (*Anaxyrus boreas*) and Northern leopard frog (*Lithobates pipens*) are the two sensitive status amphibians in the planning area. Western toads have been recorded in the nine counties of the planning area and are present and breeding within the decision area. Prior to large declines and extirpation events during the 1980s, northern leopard frogs were recorded in Lincoln, Missoula, Ravalli, Flathead, Lake and Sanders Counties of the planning area. No native (i.e., not introduced) species observations have been recorded from surveys in the planning area after that time. Northern leopard frogs have never been recorded in the decision area. (Maxell pers. comm 2018). For the purposes of this planning document, northern leopard frogs are considered extirpated from the decision area, and are not included in analyses. If the species were found within the decision area in the future, its habitat would be managed in accordance to the BLM special status species policy and in cooperation with other Federal, Tribal and State agencies.

Non-native amphibians. Non-native amphibians include the American bullfrog (*Lithobates catesbeianus*), which has been introduced in river valley bottoms in Montana, including in Missoula, Ravalli, Flathead and Sanders Counties in the planning area. American bullfrogs have not been recorded in the decision area. American bullfrogs were introduced around the same time as large native amphibian population declines, but they do not appear to have caused widespread declines of the native amphibians. However, the current impact of bullfrogs on native herpetofauna is not fully known and this does not mean that they will not cause extirpations of amphibians, invertebrates, or other vertebrates as they become more widespread (Maxell et al. 2009).

Special status aquatic invertebrates. Twelve streams within the decision area have been sampled for western pearlshell mussel (*Margaritifera falcata*), a BLM sensitive species that was formally widespread and abundant across the Pacific Northwest. Occupied area and populations are declining and Montana currently has only 14 “excellent” viable populations out of approximately 200 previously known locations (Stagliano 2010). In the decision area, Wales Creek and Upper Willow Creek have two of the remaining 14 viable populations and are important for the viability of the species.

Environmental Consequences

Potential impacts to special status fish, amphibians, and other aquatic species are attributable to land-management activities (such as grazing, mining, recreation, etc.). Effects of the most potentially impactful activities are described in sections below.

Impacts common to all alternatives.

Under the alternatives, the BLM would strive to maintain healthy and functioning aquatic, riparian, and wetland systems that support native and desired non-native aquatic and terrestrial wildlife. This is achieved by preserving, maintaining, and enhancing riparian habitat conservation areas, which will in turn protect water quality and important riparian management objectives (such as stream temperature, pool frequency, and sedimentation). A common goal across the alternatives is to manage habitat and protect species protected under the Endangered Species Act through accordance with USFWS recovery plans and conservation agreements.

Various management activities may affect stream, riparian, and wetland habitats as well as local populations of fish and amphibians. These uses are described here in terms of their potential to increase erosion and sedimentation, their ability to alter the physical and chemical properties of water, or by their influence on the timing or magnitude of surface water runoff. These impacts may result in undesirable changes to stream channels and banks, water quality, and aquatic habitat. The BLM will utilize conservation measures and management practices to mitigate potential impacts from these activities. Under the alternatives, projects would be analyzed and monitored for potential impacts to aquatic habitat.

Multiple-indicator monitoring would occur using a variety of factors including streambank alterations, woody browse, and stubble heights for analyzing impacts to riparian health.

Under the alternatives, Fish Key Watersheds would be priority areas for restoration (Appendix B).

Livestock Grazing. Livestock grazing will have some degree of impact on aquatic resources under the alternatives. However, the BLM will design livestock grazing management allotments in a way to avoid or lessen impacts to riparian vegetation and aquatic habitat.

The potential impacts of livestock grazing to riparian habitats, aquatic species, and water quality have been widely studied across the western United States. Potential direct impacts to aquatic species are trampling of individual fish, spawning salmonid redds, and larva and eggs in the case of amphibians. There are many indirect impacts from livestock grazing to aquatic species. Grazing can result in the trampling and alteration of stream banks and riparian vegetation which, in turn, reduces cover for aquatic species, generates sediment delivery, and widens and alters channel function and pool frequency. The widening of channels, trampling, and consumption of riparian vegetation can reduce shade, which decreases the ability of vegetation to moderate water temperature and decreases cover for aquatic species. For amphibians, indirect impacts include contamination of water through defecation, increased levels of parasites, increased sedimentation, soil compaction, and changes and damage to bank structure, substrate composition, and vegetation. Livestock grazing can also result in a loss of riparian willows, which could result in the reduction or extirpation of beaver, an important habitat creator for amphibians. These factors could contribute to degradation or loss of important overwintering and breeding habitat. The BLM will avoid or lessen potential impacts to aquatic resources under the alternatives through adjusting site-specific rangeland health management. Under the alternatives, the BLM has already taken action to meet progress within the nine allotments found to not meeting standards causal factor livestock. Special status fish-bearing stream reaches accessible by cattle will be monitored annually using multiple-indicator monitoring throughout the grazing period. Failure to comply with the terms of the grazing lease (which may include features such as woody browse, stubble height, and streambank alteration requirements), would result in adjustments, modification, or discontinuation of the lease. Utilizing multiple-indicator monitoring and enforcing standards specified in grazing leases will reduce the long-term potential impacts to aquatic resources by highlighting problem areas early, and providing the necessary time for recovery. Vegetation can be protected and improved with fencing, timing or changes to season of use to avoid sensitive periods in the spring and fall, reductions in grazing intensity, or removal of livestock. Allotment timings are designed to not overlap with breeding and development periods of fish and amphibians. Any new livestock handling or management facilities, including corrals and stock tanks, will be located outside of riparian habitat conservation areas.

Vegetation Management. Under the alternatives, the impacts of vegetation management will be avoided or lessened through the use and implementation of watershed-conservation practices and INFISH strategies. Riparian habitat conservation areas will provide protection from ground disturbing activities in riparian areas adjacent to vegetation management activities, minimizing potential impacts to riparian management objectives and local populations of fish and amphibians. Under the alternatives, forest management activities would need to adhere to RHCAs and RMOs protection. In estimating the forest harvest base, the BLM assumed the protection of RHCAs would result in approximately 6,876 acres of riparian areas would not be included in the forest harvest base, and an additional 7,640 acres would be considered restricted due to riparian condition. This is based on the past 20 years of implementing the principles of INFISH to project-level forest management activities.

Potential impacts to aquatic resources from vegetation management, (including timber harvest, fuel treatments, fuelwood cutting, and salvage operations) can impact aquatic species and habitat in a variety of ways. Direct impacts usually occur through major ground disturbances related to these activities, but

most impacts are indirect in nature, and are normally the result of connected activities. Timber harvest often involves the construction of new roads, and the disruption of ground cover leading to increased erosion, runoff, and sedimentation into streams. Sedimentation is detrimental to fish and stream-dwelling amphibians such as Rocky Mountain tailed frogs and can lead to a decrease in pool frequency. In addition to new roads, many old roads are re-opened, which can have direct impacts on amphibian species accustomed to using the road for sunning or nighttime foraging (Maxell pers. comm 2018).

Vegetation removal near streams decreases the amount of large woody debris available for recruitment into the stream; additionally, a reduction in vegetation decreases shade and cover and can increase stream temperature. Vegetation removal at a broader scale can affect stream flow, increasing summer flows and the risk of flooding. Amphibians can benefit from new forest openings created by timber harvest by providing new areas for basking or foraging. Limited tree removal adjacent to seasonal wetlands can increase the time they persist due to a decrease in evapotranspiration. Tree removal can also cause increased water temperature, leading to faster development of larva.

Potential impacts of vegetation management to aquatic resources will be avoided or lessened through the use and implementation of riparian management objectives and riparian habitat conservation areas, streamside management zone law, and Montana Forestry BMPs (see Appendix P). This would occur during project planning using watershed or site-specific information and analyses. If unable to identify RMOs and define an RHCA width, then the standard RHCA widths defined in INFISH would apply (see Appendix B). Any proposed vegetation management activities within RHCAs will be for restoring, enhancing or protecting the physical and biological characteristics of the RHCA, including RMOs, and will not retard or impair the attainment of RMOs.

Wildland Fire and Fuels Management. Wildland fire can potentially impact aquatic resources when riparian vegetation is burned, in some cases exposing mineral soil and leading to increases in sediment delivery to streams. Wildland fire suppression tactics can also impact riparian areas, particularly when it is necessary to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure. Activities such as tree felling, fireline placement, operation of heavy equipment and crossing streams can produce short and long-term impacts to aquatic resources. Potential impacts include, contaminant delivery to streams and a reduction in riparian vegetation, which may increase sedimentation and stream temperature. Under the alternatives, potential impacts from wildland fire suppression will be prevented or lessened using management guidelines. Placement of wildland fire operations will avoid riparian habitat conservation areas unless granted exception by a resource advisor. Water quality and aquatic resources will be monitored as soon as possible if chemical retardants, foam, or additives are delivered to surface waters. If management actions are taken that damage RHCAs due to fuels management treatments or wildland fire suppression tactics, a rehabilitation plan would be implemented to re-attain RMOs.

Under the alternatives, prescribed fire and mechanical fuels treatments would be utilized to promote a healthy landscape and reduce the potential for wildfire. Design features and BMPs would be used to lessen or avoid potential impacts to aquatic resources. Prescribed burns within RHCAs must also contribute to the attainment of RMOs. Potential impacts to aquatic resources from prescribed fire are similar to those described for wildland fire, but happen much less frequently and are less severe in nature. The potential mechanical treatments that reduce fuels to prepare for prescriptions within RHCAs can also create short-term increases in stream sedimentation due to soil disturbance and riparian vegetation removal that are offset in the long term by vegetation restoration and reduced risk of large wildland fires. Prescribed burning can result in the direct mortality of amphibians as it usually takes place in the wetter seasons of spring or fall when amphibians are most active on the ground during seasonal migrations and foraging. Because prescribed burns only occur when environmental and fuel conditions allow attainment

of desired objectives, and this usually occurs in the spring, the time before re-vegetation occurs is expected to be short across the alternatives. Burns in the fall could potentially cause greater loss of riparian vegetation and increased sedimentation. Under the alternatives, with design features and RMOs, potential impacts to aquatic resources due to prescribed burns would be negligible.

Lands and realty. Roads and rights-of-way can affect aquatic species and habitat in numerous ways. Vegetation removal is often required when roads are built. Impacts to aquatic habitat and species from a reduction in vegetation include an immediate or long-term decrease in large woody debris, increased sediment and potential chemical or petroleum delivery, accelerated erosion, and decreased shade and cover. Over time, pool formation and frequency, water temperature, stream flows and channel morphology can be indirectly impacted. These impacts are especially damaging when roads are located near streams and other riparian habitats. Additionally, road related stream crossings can create barriers to fish migration when not properly designed. Bull trout are especially sensitive to the increases in sediment delivery associated with roads (Lee et al. 1997), and amphibians are inordinately affected by roads if trampling from automobiles occurs in breeding sites, migration areas, overwintering sites, or any other location where local populations are concentrated.

Since the Garnet RMP was originally adopted, the Missoula Field Office has acquired many additional land parcels with high-density road systems. While project-level planning has considered the effects of these roads on aquatic species and habitat, there is still a need to determine the analysis area-wide influence of existing roads on riparian management objectives. The alternatives do not make any significant changes to BLM access roads. The Field Office will develop a travel management plan after the completion of the RMP, and road systems will be analyzed during that process. The open motorized road density within the NCDE Zone 1 will not exceed 2011 baseline standards (1.70 mi/mi²). Any roads found to not meet INFISH standards and guidelines will be prioritized for potential decommissioning, especially in areas containing designated critical habitat.

Under the alternatives, planned roads and rights-of-way are subject to best management practices. Project planning will also identify riparian habitat conservation areas and management objectives, seasonal closures, and relocation or obliteration of roads, especially in, or near, riparian habitat. Temporary road construction will be considered on a project-level basis under all alternatives, but these roads may only be built in riparian habitat conservation areas when the short-term negative effects are outweighed by long-term benefits (such as restoration). Temporary roads will be decommissioned upon the completion of project implementation. If these measures are properly implemented, impacts to aquatic habitat due to roads and rights-of-way from any of the alternatives should be minimized over the life of the plan.

Recreation. Recreation in the decision area is likely to increase over the life of the plan. Potential impacts are difficult to describe in detail since the specifics in recreation trends and development are unforeseeable. Any development of new recreation sites and expansion of existing sites will involve planning and consistency with BMPs and management actions (Appendices B and P).

Potential impacts from recreational activity, especially when located streamside or in concentrated areas, can cause riparian degradation. Direct impacts may include trampling and capturing of individuals, angling mortality, streambank erosion, soil compaction, reduced vegetative cover, increased nutrient loading and pathogen levels due to human waste, sediment delivery, spread of disease and pathogens such as chytrid fungus in toads, and increased likelihood of aquatic invaders or non-native species. Recreation impacts can widen channels, alter stream function, reduce the ability of vegetation to moderate water temperature, and lead to the degradation or extirpation of local species populations.

The Lower Blackfoot Corridor currently contributes the most impacts to aquatic resources due to recreational activity and this is expected to continue over the life of the plan. Current proposed

management actions and proposed supplemental rules for the Dupont parcel and Bear Creek Flats (see Appendix P) are consistent with the need to modify recreational facilities impacting aquatic resources and are considered to lessen potential impacts to aquatic resources in the Lower Blackfoot Corridor.

All alternatives incorporate best management practices (Appendix P) that protect, maintain, and enhance riparian zones (where feasible) and aquatic species habitat through site-by-site consideration of riparian management objectives. Where recreational activities are holding back the attainment of riparian management objectives, those activities may be adjusted or eliminated. The BLM will monitor recreation areas to modify management actions as necessary. These measures are deemed to avoid or lessen potential impacts from recreation on aquatic habitat and species.

Minerals. Currently, mining in the decision area is recreational and small in scale. Large increases in mining activity are not predicted, but cannot be ruled out. Leasable, salable, and locatable minerals may occur within aquatic habitat. Impacts to aquatic habitat from mining activities can cause direct physical disruption that harms or causes mortality of individual aquatic species. Direct physical disruption of stream and banks correspondingly alters cover, stream flow, shading, large woody debris, bank stability, and sediment delivery. A decrease in shading due to lack of riparian vegetation can indirectly cause an increase in stream temperature. Increased fine sediment delivery ultimately reduces pool volume and frequency. Disruption of stream banks and stream flow can indirectly create stream passage barriers at a range of flows. Acid waste, toxic metals, or other chemical alteration to water quality can also cause direct mortality of aquatic species.

The BLM will prevent any undue and unnecessary degradation to aquatic species and their habitat for locatable mineral exploration and development in a riparian habitat conservation area under the alternatives. . The BLM will require and review filed Notices and Plans of Operations to prevent unnecessary and undue degradation to aquatic habitat and water quality. For locatable mineral exploration greater than casual use, a Plan of Operations is required (subject to environmental analysis) within ACEC or any lands or waters known to contain Federally proposed or listed threatened or endangered species critical habitat.

Placement of mineral project-related infrastructure will avoid RHCAs, and where no alternative exists, the facilities will be designed and constructed in a manner to avoid impacts to aquatic resources. Any roads within RHCAs no longer required for mineral or land-management activities will be closed, revegetated, and obliterated. Solid and sanitary waste facilities are prohibited in RHCAs. If no alternative exists, facilities will be monitored to avoid adverse effects to aquatic resources and desired stream function. Aquatic habitat affected by mineral activity within an RHCA will be maintained, protected, and rehabilitated, and final reclamation must meet the goals and objectives of the RHCA or will not be recommended.

Potential impacts to aquatic resources from mineral related activities are analyzed by stream miles of bull trout critical and occupied habitat, occupied westslope cutthroat trout, occupied western pearlshell mussel, and acres of potential western toad habitat across zones with moderate to high potential for mineral activities (Table 44). The moderate and high potential ratings used in this analysis do not predict with certainty that mineral activities will occur, but are based on geologic occurrence and past and present mining claims and activities. As a result, these ratings do not change across alternatives and there are currently no planned or foreseeable future projects.

Across the alternatives, there is moderate to high potential for mineral development on 1.72 miles of bull trout critical and 2.16 miles of bull trout occupied habitat. Approximately 17.6 stream miles occupied by westslope cutthroat trout have moderate/high potential. There are approximately 0.4 miles of western

pearlshell mussel habitat and 1,035 acres of potentially suitable western toad habitat with moderate/high potential for mining activities.

Table 44. Summary of stream miles/acres with moderate or high mineral development potential common to all alternatives

Resource	<u>High Potential</u> Lode				<u>Moderate Potential</u> Lode	
Stream Miles Bull trout Critical Habitat	Flint Creek (0.4)	Clark Fork River (0.3)	0	Blackfoot River (0.29) Flint Creek (0.73) Total Miles:1.02	0	0
Stream Miles Occupied Bull Trout	Flint Creek (0.4)	Clark Fork River (0.3)	0	Blackfoot River (0.29) Flint Creek (0.73) Total Miles:1.02	Upper Willow (0.44)	0
Stream Miles Occupied Westslope Cutthroat Trout	Elk Creek (0.50) Flint Creek (0.43) Union Creek (0.51) Total Miles: 1.44	Carpenter Creek (0.18) Clark Fork River (0.29) Elk Creek (0.16) Henderson Creek (1.17) Douglas Creek (0.15) Total Miles: 2.13	Elk Creek (0.35)	Alder Gulch (0.67) Carpenter Creek (0.40) Blackfoot River (0.29) Cramer Creek (0.38) Elk Creek (0.54) Flint Creek (0.72) Ophir Creek (0.26) Smart Creek (0.77) Total Miles:4.03	Carpenter Creek (0.41) Cowan Gulch (0.29) Elk Creek (0.51) Ophir Creek (1.05) Upper Willow Creek (0.44) Pikes Peak Creek (0.19) Rich Spur Gulch (1.11) Yourname Creek (4.62) Total Miles: 8.62	Alder Gulch (0.67) Carpenter Creek (0.37) Total Miles: 1.04
Stream Miles Occupied Western Pearlshell	0	0	0	0	Upper Willow Creek (0.44)	0
Acres of predicted suitable Western Toad habitat ¹	222	0	152	438	85	138

Impacts under Alternatives A, B, and C

Livestock Management. The potential impacts of livestock grazing to aquatic resources are analyzed using stream miles open to grazing (Table 45) and stream miles occupied by sensitive status fish in allotments not meeting rangeland health standards, causal factor livestock (Table 46) across the alternatives. Alternative B has the highest number of stream miles open to grazing, which can increase the risk of potential impacts. Alternative B does not have a stubble height standard, but is typically identified

¹ MTNHP data - email correspondence 5/27/2018

at the site-specific level. Alternative C has the least potential for impacts to aquatic resources with the least stream miles open to grazing along with more stringent stubble height standards of 6-inch stubble height.

The BLM has taken action to make progress in the nine allotments that did not meet standards, causal factor livestock grazing, and would continue to do so under all alternatives.

Table 45. Stream miles open to grazing across alternatives

Analysis	Alternative A	Alternative B	Alternative C
Stream Miles (MTNHD) in available or prescriptive grazing allotments	Available – 352.53 Prescriptive – 26.07 Total – 378.60	Available – 323.40 Prescriptive – 131.21 Total – 454.61	Available – 318.14 Prescriptive – 25.33 Total – 343.47

Table 46. Stream miles with special status fish species in grazing allotments not meeting rangeland health standards

Allotment Name	Total bull trout occupied in allotment	Total bull trout critical habitat in allotment	Bull trout presence and impacted by grazing	Bull trout critical habitat in allotment and impacted by grazing	Total westslope cutthroat presence in allotment	Westslope cutthroat presence in allotment and impacted by grazing
Antelope Creek East	NA	NA	NA	NA	0.25	0.25
Arrastra Creek	1.32	0	0.50	0	1.32	0.50
Brazil Creek	NA	NA	NA	NA	6.45	1.0
Cottonwood Creek	NA	NA	NA	NA	1.21	1.21
Douglas Creek	NA	NA	NA	NA	7.70	1.0
Ram Mountain	0.44	0.35	0	0	3.11	0
Warm Springs Creek	NA	NA	NA	NA	2.44	1.50
Windlass Gulch	0.85	0.80	0	0	1.93	0.31
Yourname Creek	NA	NA	NA	NA	1.63	1.63

Lands and realty. The amount of aquatic habitat impacted by lands, specifically roads and right of ways, differs across alternatives. The increases in ROW exclusion and avoidance areas in alternatives B and C are deemed a positive impact to aquatic resources as ROW exclusion areas are unavailable for right-of-ways and avoidance areas are generally not available for large-scale infrastructure. The increase in acres limited or closed to motorized and non-motorized travel in alternatives B and C are also beneficial to aquatic resources as roads that are closed to travel deliver less sediment impacts to streams.

Table 47. Acres ROW exclusion or avoidance across alternatives

ROW category	Alternative A	Alternative B	Alternative C
ROW exclusion areas	533(<1%)	23480 (14%)	39,490 (24%)
ROW avoidance areas	21,317(13%)	46,988(@*%)	55,062(33%)

Table 48. Acres open, limited and closed to motorized and non-motorized travel

Travel management category	Alternative A	Alternative B	Alternative C
Open	0	0	0
Limited	137,052	133,770	131,696
Closed	25,562	28,844	30,918

Fire and Fuels Management. Under alternatives B and C, fuels treatments including mechanical, manual and prescribed fire are the priority in FMZ1 and one-mile WUI buffer (Alternative B) and the 1-mile WUI buffer (Alternative C). Table 46 summarizes habitat for special status aquatic species within these areas. Design features, BMPs, and RMOs are applicable at the project level if treatments occur in RHCAs (Appendices G, P); however, there is potential that the need to protect life; increase the safety of firefighters; and protect property, improvements, and infrastructure, will be a greater priority than attainment of RMOs (such as water temperature or large woody debris) in some cases. Alternative C has the least potential impacts to aquatic resources.

Table 49. Summary of stream miles/acres within priority fuels management areas

Analysis	Alternative B (inside FMZ 1 or WUI <1 mile)	Alternative C (inside WUI < 1 mile)
Stream miles bull trout presence	15.24	9.655
Stream miles bull trout critical habitat	14.22	9.15
Stream miles WCT presence	23.46	12.21
Stream Miles (MTNHD)	157.81	37.65
Acres of wetlands	1,553.93	466.48
Acres of wetland with 100-meter buffer	15,412.22	4,205.72

Cumulative Impacts. The cumulative impacts analysis area is the three sub-basins encompassing the decision area: Flint-Rock, Blackfoot, and Upper Clark Fork, as outlined in the geographic scale section above.

Historical cumulative impacts from land use activities within the analysis area have increased erosion, altered hydrologic regimes, created barriers, degraded riparian habitat, and increased the numbers and impacts of exotic species.

Management activities, such as grazing, recreation, and timber harvest, on other public lands within the analysis area can have impacts on aquatic resources on BLM-managed lands. Portions of both the Upper Clark Fork, Rock Creek sub-basins are managed by the Beaverhead-Deerlodge National Forest. Upstream sub-basins of the Blackfoot River are managed by the Helena and Lewis and Clark National Forest. Downstream portions of Rock Creek are managed by the Lolo National Forest. The BLM Butte Field Office has minor holdings in upper parts of both the Blackfoot and Upper Clark Fork HUCs. The other federal land management agencies have similar riparian management guidance (INFISH, Best Management Practices) as the BLM.

State-owned school trust lands are managed by the Montana Department of Natural Resources (MTDNR). Direct and indirect impacts from land use activities on these jurisdictions will be similar to the impacts

mentioned in the section above. Utilization of BMP and state standards in these areas will minimize the cumulative impacts to BLM lands and the cumulative impacts to the analysis area as a whole.

The majority of lands in the analysis area are owned by private entities ranging from cattle ranchers and farmers to non-governmental organizations like The Nature Conservancy. Approximately 45.5 percent of lands within the analysis area are privately owned (Table 50). Over the past decade, BLM has acquired several thousand acres from The Nature Conservancy in the Gold Creek area on the Lower Blackfoot River. Future acquisitions of The Nature Conservancy lands in the Lower Blackfoot Areas are reasonably foreseeable.

Within the planning area, mineral development activities have a higher potential for cumulative impacts to aquatic resources than most other resource uses. In particular with placer projects that tend to be developed on deposits within riparian areas, surface disturbance and heavy equipment operation presents a higher risk of introducing sedimentation and other contaminants to surface water. Environmental consequences of these impacts include riparian habitat and water quality degradation, resulting in reduction of aquatic species populations. As impacted water flows downstream, contaminants such as these have the potential to influence much larger areas than the relatively small, short-term footprint of the mining operation.

Table 48 displays drainages within moderate to high mineral development potential (see Appendix E for an explanation of development potential). While BLM cannot predict specific mining and mineral processing techniques that would be used through the life of the land use plan, impacts may occur in and downstream of drainages identified with moderate to high mineral development potential. Best management practices and required design features (Appendix P) would be applied on a case-by-case basis, reducing these potential impacts at the project level. Operations must adhere to all to the performance standards listed under 43 CFR 3809.420, including compliance with all laws such as the Clean Water Act and Endangered Species Act.

Table 50. Land ownership in the analysis area

Owner	<u>Blackfoot</u> Acres	<u>Blackfoot</u> Percent of HUC	<u>Flint-Rock</u> Acres	<u>Flint-Rock</u> Percent of HUC	<u>Upper</u> <u>Clark Fork</u> Acres	<u>Upper Clark</u> <u>Fork</u> Percent of HUC	Total Acres	Total Percent of analysis area
Private	622,539	42.0%	439,975	37.7%	689,149	57.3%	1,751,663	45.5%
US Forest Service	636,135	42.9%	654,062	56.1%	376,159	31.3%	1,666,357	43.3%
State of Montana	114,426	7.7%	29,166	2.5%	122,184	10.2%	265,776	6.9%
US Bureau of Land Management	98,314	6.6%	38,569	3.3%	12,546	1.0%	149,428	3.9%
Water	5,995	0.4%	3,949	0.3%	569	0.0%	10,513	0.3%
Other Federal	4,528	0.3%		0.0%	1,598	0.1%	6,126	0.2%
Salish and Kootenai Tribal Lands	274	0.0%		0.0%		0.0%	274	0.0%
City Government		0.0%	11	0.0%		0.0%	11	0.0%
Total	1,482,210	100.0%	1,165,733	100.0%	1,202,205	100.0%	3,850,148	100.0%

Fisheries. Many cumulative factors will impact fisheries on and around BLM-managed lands. The Beaverhead-Deerlodge National Forest submitted a corrected Final Environmental Impact Statement in January 2009 (USFS 2009). In this plan, INFISH direction is incorporated into all watersheds on the Beaverhead-Deerlodge National Forest. Further, coordination with USFWS, federal, state, and local agencies, an objective to prioritize bull trout restoration activities, with consideration given to population status and health of bull trout core areas, have been added to the Revised Forest Plan. The Helena and Lewis and Clark National Forest is currently working on the Revised Forest Plan and the Lolo National Forest is in the early stages of drafting a new Forest Plan. Once completed, these plans should mirror others in the region, such as the Flathead National Forest and Beaverhead-Deerlodge National Forest, in adopting INFISH strategies and emphasizing management practices that promote the health of bull trout core areas. The BLM Butte Field Office RMP was approved in 2009, and adopted more stringent riparian standards to its management practices. Multiple use management in these jurisdictions will have similar impacts to those described previously in this analysis. With better riparian standards and practices across the analysis area, trends in fish populations and aquatic habitat are predicted to be stable or improving over the life of this plan.

The responsible agency for managing all fish populations in the state is Montana Fish Wildlife and Parks (MTFWP). They will continue to set angling regulations such as harvest limits, fishing seasons, hoot-owl and gear restrictions. In addition, MTFWP has established boat check-in stations to prevent the spread of harmful exotic invasive aquatic species. No water bodies on BLM-managed lands receive stocked fish but MTFWP does stock waters in the analysis area. Any new water bodies to receive fish plantings will be subject to environmental analysis. Under MTFWP, fish populations should remain relatively stable, but may fluctuate based on seasonal and long-term weather patterns.

State land managed by MTDNR will continue to host various activities, including livestock grazing, timber harvest, and recreational fishing and hunting. Montana law requires that management on state owned school trust lands maximize income for the school trust, which may mean that impacts on these lands are greater than other lands managed by the state or federally. Impacts to fisheries on these lands could range from none to substantial to species in some stream sections.

Many activities occur on private land can have impacts as well. These activities include, but are not limited to irrigation, water diversion, angling, timber harvest, mining, housing and commercial development, livestock grazing, and stream channel manipulation. The majority of fish-bearing stream miles in the analysis area are on private land. The BLM has little influence on resource values and uses on private land. The influence of private land use activities are far greater, even when small parcels BLM land adjoin private sections of stream. These cumulative impacts, when combined with the existing conditions, (which includes natural environmental conditions, private land ownership and other private activities, and past activities on federal lands) could cause potential deleterious effects to aquatic species. Impacts to fish populations range minor to substantial in some areas, to increasing trends in others.

Introduction of disease and exotic invasive aquatic species, such as whirling disease and New Zealand mudsnails, have potential to impact on all lands within the cumulative effects analysis area. Boat check-in stations and educational signage can help prevent spread of these aquatic dangers. Effects can range from minor to extreme in habitats with favorable conditions to negligible in others.

The cumulative effects of various land use activities and potential impacts of aquatic nuisances on fisheries in the analysis area will be expressed in varying degrees of abundance in local fish populations, ranging from absence in some streams to healthy and abundant in others. Fish populations on BLM-managed lands are expected to increase and riparian conditions are expected to improve, providing there is no introduction of aquatic nuisance species. Management actions will not contribute to any irreversible or irretrievable loss of fisheries resources within the cumulative effects analysis area.

BLM Sensitive Aquatic Species. Land use activities, on federal, state, and privately managed lands, will have virtually the same impacts on TES Aquatic Species as listed in the cumulative effects to fisheries section, however, TES species are given additional benefits and protections which are analyzed here.

USFS Forest Plans and BLM RMPs within our analysis area have adopted riparian habitat standards based on INFISH. Various non-governmental organizations have completed or are planning several large-scale restoration projects removing mine waste and rehabilitating riparian habitat in the Upper Clark Fork River. In addition, conservation cooperatives between federal, state and private landowners in the Blackfoot River Basin are helping to improve bull trout habitats there. Cooperating landowners voluntarily reduce irrigation demands in periods of drought and hot temperatures to provide more streamflow and improved water temperatures in the Blackfoot River. Improving riparian and aquatic habitats along with sound management strategies across the cumulative analysis area should lead to positive increases in bull trout abundance over the life of this plan.

Negative trends in the analysis area related to habitat loss and degradation can be reversed or stabilized thru sound management practices and following INFISH guidelines on public lands and following BMPs on privately owned land. MTFWP has altered fishing regulations to decrease harvest and fishing mortality. In 2007, MTFWP developed the Memorandum of Understanding and Conservation Agreement for westslope cutthroat trout and Yellowstone Cutthroat Trout in Montana signed by 18 non-governmental organizations and government agencies, including the BLM, outlining conservation objectives and goals for westslope cutthroat trout management (Montana Fish Wildlife and Parks 2007). This agreement prioritizes protecting genetically pure populations first, followed by slightly introgressed populations. Depressed populations will be recovered through habitat restoration and removing non-native species. This agreement also emphasizes cooperation and communication between signees to achieve these goals. This conservation agreement in addition to managing waters for bull trout populations should lead to increases in westslope cutthroat trout populations and improvements to habitat conditions over the course of this RMP.

Western pearlshell mussel. Of the remaining 14 viable populations rated “excellent” in Montana, 2 populations occur on Missoula BLM-managed lands. The BLM manages only a small portion (less than 1 mile) of stream on Upper Willow Creek in the Rock Creek watershed. Habitat conditions for western pearlshell mussel will remain stable or improving on BLM portions of the stream, but will have relatively little influence overall as most of the stream occurs on private land where agriculture is the main land use. Stagliano (2015) verified the Wales Creek population in the Blackfoot watershed as the second largest A-viability rated western pearlshell mussel population in the state with an estimate of 50,000 individuals. The Wales Creek population occurs almost entirely within BLM boundaries and habitat conditions here can be expected to remain stable or improve over the life of this RMP.

In the short term, remaining western pearlshell mussel populations are in danger from stochastic events, such as massive flooding, that have the ability to eliminate small, localized populations. In the long term, western pearlshell mussel are at risk of losing host fish species needed to complete their reproductive cycles due to climate trends or habitat loss (Hastie et al. 2003). Despite sound management on BLM lands, the declining population trends currently facing western pearlshell mussel populations in western Montana are unlikely to change due to BLM efforts alone.

Western toad. Western toads are not a federally listed but are currently ranked an "S2" Species of Concern in Montana and is at risk because of very limited and potentially declining population numbers, range, and habitat, making it vulnerable in the state. The BLM and USFS have listed the species as sensitive. Seventy years ago, western toads were the most abundant amphibian in western Montana, and although the species is still encountered regularly, it is no longer common (Rodgers and Jellison 1942, Maxell 2000). Across the western United States, western toads have suffered dramatic population declines and

surveys from the early 1990s indicate the same trend in Montana. Little is known about the reasons for this decline, but Chytrid fungus and habitat degradation due to land use activities are likely contributors. There is currently no conservation strategy developed for western toad among federal agencies. However, the BLM protects toad breeding habitat by following riparian standards and timing allotment turn-out dates to occur outside of the period toads need to complete their reproductive cycle to avoid trampling of adults, eggs, larva, and metamorphs. However, due to the widespread declines in western toad populations across the region, conservation measures taken by the BLM will likely not have much effect on this downward trend.

Amphibians. Cumulative effects on amphibians within the analysis area are similar to the items mentioned in the section on cumulative impacts to fisheries.

The management actions detailed in the National Forest Plans and RMPs of the adjacent federal jurisdictions should improve stream and riparian conditions across the analysis area, benefitting the breeding and foraging habitats of amphibians. MTFWP is responsible for managing fish populations and will continue to stock lakes in 4- or 5-year rotations within the analysis area. Stocking of non-native fish could impact amphibian populations not adapted to fish presence reducing abundance in some populations. However, any new waters to receive stocked fish will undergo environmental analysis and potential impacts to amphibian populations examined.

Many management activities on state-managed school trust lands, such as timber harvest or fuels management, often involve shorter disturbance intervals and greater impacts than on federally managed or other state-owned lands. This can have a range of effects on local breeding amphibian populations from local extirpation or displacement to sometimes increasing abundance. In western toads for instance, breeding populations can increase drastically in the years following in areas affected by wildfire.

On private land, a variety of activities have potential to impact amphibian populations. These include livestock grazing, cash crop farming, irrigation, flood control, stream bank manipulation, weed control, mining and mine tailing cleanup, timber harvest, and housing and commercial development. Effects to amphibians range from loss of local populations to improving conditions in others.

There is potential for the spread of disease and invasive aquatic species within the analysis area. Chytrid fungus is present within the analysis area and has had very deleterious effects to populations of western toad and Columbia spotted frog populations across the Rocky Mountains. Spread of chytrid fungus through human or wildlife vectors is nearly impossible to prevent. American bullfrogs are not present in the analysis area, but are in the nearby Bitterroot Valley. Their potential spread into analysis area waters may be small due to lack suitable habitat.

Throughout the western United States, amphibian populations have been in general decline over the past several decades. Considering cumulative impacts of land use and environmental pathogens within the analysis area, this negative trend will likely remain. Amphibian populations within BLM boundaries are likely to remain relatively stable as riparian habitat conditions improve. Management actions on BLM-managed lands should not contribute to irretrievable or irreversible losses on amphibian resources within the cumulative effects analysis area.

Climate. The 2017 Montana Climate Assessment (Whitlock et al. 2017) findings predict reduced snowpack and an upshift in historical streamflow patterns due to rising temperatures. Higher spring temperatures will result in an earlier peak runoff and reduced snowpack at low to mid elevations. This, combined with declining overall snowpack, will result lower late summer water levels that will cause additional stress to aquatic species. In addition, multi-year and decadal-scale droughts are expected to continue to be a natural feature of Montana's climate, further stressing aquatic resources.

Climate variability has the potential to affect future management decisions regarding aquatic species. Impacts, such as those listed above, could have drastic impacts to aquatic resources in the cumulative impacts analysis area. Rising water temperatures could impact range from minor to substantial for species reliant on year-round cold water such as bull trout and cutthroat and create habitats more suitable for higher temperature tolerant species like brown trout. Climate variability could fragment the large, interconnected cold water habitats that bull trout rely on. Declining snowpack and prolonged drought can de-water perennial streams, leading to reductions in suitable habitat for fish and amphibian life cycle stages.

It is unknown how and the extent to which climate trends will affect the region over the life of this plan. Management direction including RMOs, BMPs, and stream restoration in fish key watersheds may help to cumulatively offset some of the impacts. Extensive monitoring can also help highlight areas of concern and detect biological responses that may lag behind environmental trends.

3.3.3 Soil, Water, Riparian Resources

Riparian-wetlands management is integrated with basin hydrology, surface and ground water, the physical integrity and function of streams, springs, wetlands, water quality, fish and wildlife habitat, and interaction with upland vegetation. Regulations and policy drive the general programmatic management of these resources.

- The 1976 Federal Lands Policy Management Act (FLPMA) defines part of the BLM's multiple-use management mission as watershed protection, which includes minimizing soil erosion, rehabilitating eroded areas, maintaining and enhancing watershed condition, and reducing nonpoint-source pollution from other activities such as livestock grazing and recreation (USDI 2001)
- The BLM soil-management policy is defined in Manual 7100 (USDI-BLM 2008). There are no regulations or guidelines regarding specific quantitative measures or standards for compliance, such as a standard for maximum permissible disturbance acreage.
- The BLM Land Use Planning Handbook (USDI-BLM 2005) directs: 1) identifying specific soils that may need special protection in regards to human health concerns, ecosystem health, or other public uses, and, 2) identifying site-specific soil best management practices and rehabilitation techniques.
- The BLM Land Health Standards (43 CFR 4180) address soil conditions. When activities are proposed, soils are subject to site-specific evaluation and environmental analysis to determine potential impacts and any design features or BMPs required to meet other soil policies and regulations. The BLM applies those soil conservation practices documented in the Montana Forestry BMPs (Montana DNRC 2015), many of which are applicable to non-forested areas, and the Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management (USDI-BLM 1997)
- The natural range of variability is an important consideration for watershed management. Vegetation, soils, climate, and resultant hydrologic characteristics of watersheds are managed within the NRV.
- Water quality is managed in support of State-designated beneficial uses and the federal Clean Water Act.
- Water quality is managed under a memorandum of understanding with Montana Department of Environmental Quality toward meeting State water quality standards.
- The BLM conducts periodic inventory and assessment of pollutant sources in support of the abovementioned memorandum of understanding, total maximum daily loads (TMDL), management of uses, and land health standards.

- Water quality protection focuses on design and application of best management practices to avoid or minimize impacts.
- Water quantity is managed in compliance with federal and state water rights direction for maintaining or securing water flows in support of State-designated beneficial uses.
- At a minimum, riparian-wetlands are required to meet, or make significant progress toward meeting, proper functioning condition, pursuant to 43CFR4180.

Indicators

The following table (Table 51) lists the indicators and potential impacts for soil, water, and riparian-wetland resources.

Table 51. Indicators and potential impacts for soil, water, and riparian resources

Indicator	Associated Potential Impacts
<ul style="list-style-type: none"> • Miles of streams on lands available for grazing • Miles of streams on lands unavailable for grazing • Miles of streams subject to high recreation use (trailing) • Stream miles in ROW exclusion areas 	Riparian-wetland vegetation loss or conversion, bank instability and erosion, stream channel destabilization, water storage loss, water quality.
<ul style="list-style-type: none"> • Miles of impaired waters on lands available for grazing • Miles of impaired waters on lands unavailable for grazing • Miles of impaired waters with grazing pollutant source 	Sedimentation, nutrients, temperature, State and Federal water quality standards.
<ul style="list-style-type: none"> • Miles of assessed streams in allotments with livestock use preventing PFC 	PFC attainment
<ul style="list-style-type: none"> • Hydrologic function benefit from treating vegetation with moderate to high departure from NRV • Stream miles in 1-mile WUI or FMZ1 fuels treatment area 	Soil erosion after fire, altered hydrology, riparian-wetland function, instream flows, water quality, soil productivity.

Analytical Methods and Assumptions

- Vegetation and soils within a natural range of variability across a watershed produces hydrologic functioning with a natural range of variability, provided there are no modifications to flow routing.
- Vegetation treatments in consideration of a natural range of vegetation and climate adaptation are the best assurance to retain cover and evapotranspiration for hydrologic function.
- Best management practices and project design features will be applied to potentially disturbing activities to avoid or minimize impacts. BMPs will continue to be reviewed and revised toward the greatest applicability and effectiveness.
- Riparian-wetland systems in remote areas away from potential impacts of historic or present uses are assumed to be meeting proper functioning condition.
- Purposefully built infrastructure such as roads, trails, campgrounds, day-use areas, and parking spots represent a conversion of soils from the purpose of productive growth medium for vegetation to other administrative needs. Practically, these features are considered permanent for the 20- to 30-year planning period. However, soil disturbances such temporary roads, landings, skid trails, and mineral exploration can have long-term productivity partially restored after use.

- Cultural resource management activities will have no discernable impact to soil, water, or riparian-wetland resources.
- Lands and Realty management actions such as rights-of-way are not predictable over the planning period. Such actions may have impacts, but are necessarily addressed at the project level.
- Riparian-wetland restoration and instream habitat improvement work will have short-term impacts to provide larger offsetting beneficial impacts.
- Land designations (such as ACECs, LWCs, BCAs, ERMAAs, and SRMAAs) are not directly impactful. Any anticipated change in recreational uses because of designation, and indirect impacts to soil, water, or riparian-wetlands are addressed.
- Fire management zones 2 and 3 have a low likelihood of affecting the hydrologic character of watersheds because they would be managed somewhat closer to NRV conditions. Fire management zone 1 and wildland-urban interface zones may be managed for lower fuel amounts and vegetation conditions more open than NRV, in some instances.

Affected Environment

Soils. Soil types vary greatly across the decision area. The NRCS Soil Survey (USDA 2018) provides important information on soil types, properties, and management limitations and is routinely referenced for project-level planning and analysis. Soil conditions and productivity are typically assessed during rangeland health assessments, ecosystem analyses, and project-level analyses. Maintaining productive soils is important for healthy vegetation for forage, habitat, nutrient cycling, timber production, hydrology, and carbon storage (Jackson et al. 2017).

Rangeland health assessments and other analyses conducted since 2001 indicated that typically no more than about 2 percent of the allotment and watershed acreages analyzed had soils with lowered productivity as a result of livestock grazing, recreation, or timber harvest activities. Compaction and displacement are the most common disturbances, while soil erosion problems were comparatively rare. There were some small allotments with much higher instance of soil impacts. The majority of BLM lands are in montane forested environments with soils that have good rock content are not inherently compactable or erodible. Soils with higher susceptibility to such impacts are identified at the project scale, and applicable BMPs or project design features applied as needed. Invasive weeds occur on approximately 37,244 acres (22 percent of total decision area lands) with varying levels of infestation, and the percentage is subject to change with successful treatments or new infestations. Severe infestations occur on about approximately 7,000 acres, predominantly adjacent to roads (see the noxious weeds discussion in section 3.2). Higher levels of infestation can reduce site productivity (USDI-BLM 2007).

The most significant causal factors that may impact soil productivity are livestock overgrazing and ground-based timber harvest operations. Recreational off-road vehicle use and concentrated livestock trailing may also impact soils. Depending on the level and duration of mining activities, soil impacts may be considered a long-term or permanent conversion of the resource, or in the case of short-term or exploratory operations, reclamation requirements can help restore long-term soil productivity. Past mining has impacted approximately 145 acres (combined placer, lode, and materials).

Riparian-wetlands. Functioning riparian-wetlands are important for clean water, aquatic and terrestrial habitat, floodwater retention, and groundwater recharge. Their functioning condition is regulated under 43CFR4180 and the Clean Water Act (U.S. Congress 1972).

The National Hydrographic Dataset (NHD) estimates that the decision area has 495 miles of streams, 374 miles of which are perennial and the remainder intermittent or ephemeral. Recent mapping by the

Montana Natural Heritage Program indicates there are 2,897 acres of riparian-wetlands (lotic and lentic) distributed as shown in Table 52. Lotic systems are flowing water such as streams and rivers with identifiable channels. Lentic systems are still or slowly flowing waters such as lakes, ponds, and palustrine meadows.

As of 2017, the BLM has inventoried 262 lotic miles and 86 lentic acres. The assessment status is shown in the table below.

Table 52. Riparian-wetland areas inventoried and assessed in the decision area

	Lentic (acres)	Lotic (miles)
Inventoried	86	262
Assessed	57	249
<i>Proper functioning condition</i>	48	154
<i>Functioning at risk</i>	9	82
<i>Nonfunctioning</i>	0	12

The lotic systems assessed as “nonfunctioning” will be reassessed for PFC applicability since they are mostly modified systems (for instance channelized, rip-rap, placered water systems) and the PFC methodology would not likely be applicable (USDI 2015).

The majority of the non-inventoried riparian areas occur as smaller seeps and un-channeled surface flow that are remote and hidden from aerial imagery by dense forest canopy. These areas are commonly assessed as PFC (or otherwise *healthy* where PFC assessment is not applicable) since they are well removed from potentially impacting uses. Smaller amounts of non-inventoried riparian areas occur in recently acquired lands.

The primary causal factor for riparian areas not meeting proper functioning condition is livestock use. Since the 1986 management plan, riparian areas meeting PFC have been increasing. This has been due to riparian exclosure fencing, implementing standards and guidelines for utilization and stream impacts, and reduced livestock use. Livestock impacts typically include overutilization of forage and browse which alters growth, vigor, and sustainability of riparian vegetation, which serves to stabilize riparian soils and streambanks. Trampling causes soil compaction and displacement, altering plant growth, and increasing erosion hazard. Trampling can also cause caving and shearing of streambanks (which widens stream channels), altered channel hydraulics, erosion and sediment transport, decreased water quality, and aquatic habitat issues.

Recreation-related impacts account for a much smaller amount of non-PFC riparian areas. Impacts typically include bank caving, trampling, trailing, and off-road vehicle use.

Long-term pervasive impacts such as beaver eradication has altered many riparian systems, removing important still-water characteristics and lentic functions such as spring runoff attenuation, water storage for base flows, and greater acreages of hydric soils and obligate wetland plant species. Fire suppression has altered basin hydrology where historic forests were of thinner density and lower evapotranspiration. Where evapotranspiration is higher than the natural range of variability, less water may be available for streamflow or groundwater. Streamside roads, riparian harvesting, channelization, and channel clearing were commonplace in the long past, but have declined greatly since forestry best management practices came into routine use by the 1980s. Placer mining had a historic and significant impact on riparian areas, in most cases permanently altering their form and function. Present mining activity is of far lower

magnitude and extent, affecting about 3 miles of decision area streams in the last 30 years. Under the 43CFR3809 regulations, mining is subject to BMPs and reclamation requirements that can help restore function and productivity over the long term.

Water Quality. The decision area lands intersect approximately 495 miles of surface water. Water quality is managed under a Memorandum of Understanding with the State of Montana Division of Environmental Quality (USDI 2010), and regulated under the Clean Water Act (U.S. Congress 1972). Maintaining good water quality is important for supporting beneficial uses such as aquatic biota, drinking water, and recreation.

The planning area occurs within the Western Montana Ranges groundwater region (Heath 1984). Thick valley-bottom alluvial deposits comprise the most common aquifers in the region. Aquifer recharge and depletion is strongly influenced by annual snowmelt. The surface waters of the planning area are within the upper Columbia River system, with the Clark Fork, Flathead, and Kootenai Rivers forming the main hydrologic basins.

Water resource management involves the influence of hydrology (watershed function and water quantity), vegetation, water quality, groundwater, riparian areas, floodplains, fish and wildlife habitat, and the physical, chemical, and biological integrity and function of streams, springs, and wetlands.

Livestock grazing, mining, timber harvest, prescribed fire, and recreation activities have potential to influence water quality and hydrology. Reclamation, mitigation, and avoidance design features are key management tools.

There are five source-water protection areas in the planning area: Missoula Sole Source Aquifer (three BLM parcels); Johnsrud Spill Response Area; Turah (well); Clinton/Rock Creek (well); and Noxon.

Ten additional source-water protection areas overlay BLM subsurface management at Trout Creek, Hamilton (2), Drummond, Troy (2), Libby (2), and Whitefish (2).

According to the Safe Drinking Water Act, Title XIV-Section 1428(h) (U.S. Congress, 1974), Federal Government agencies having jurisdiction over any potential source of contamination identified by a state wellhead protection program shall be subject to and comply with requirements of the state program. The Montana Department of Environmental Quality is responsible for completing delineation and assessments for public water supplies operated by the BLM. Federal agencies are encouraged, as public water supply operators, to establish source water protection plans (Montana DEQ 2018a).

There are 531.6 miles of impaired waters (Montana DEQ 2018b) listed in the three-county analysis area, of which 78.6-miles (14.8 percent) intersect public lands managed by the BLM. All but three of these waters have EPA-approved total maximum daily load levels, which outline needed reductions in pollutant loads, as well as BMPs for reducing pollution risk.

Appendix D summarizes the status of these impaired waters on BLM-managed lands. The impaired segments are divided into the following four categories for the purpose of proposed management direction common to all alternatives.

- *Maintain.* 40.46 miles (51.5 percent) do not have any BLM management or permitted uses contributing to the pollutant problem in the impaired segment.
- *Maintain: improve where needed.* 17.2 miles (21.9 percent) do not have any BLM management or permitted uses contributing to the pollutant problem, but if use characteristics continue, monitoring

and periodic improvements or management changes may be necessary later (grazing use is 4.08 miles and recreation use is 13.12 miles).

- *Improve.* 12.5 miles (15.9 percent) have some level of BLM management or permitted use that may be contributing total maximum daily load pollutants. The causal factors are related to livestock grazing (12.43 miles), recreation (0.03 mile), and metals from mine waste (0.04 mile)
- *Assess.* 8.43 miles (10.7 percent) need further assessment to determine whether BLM management or permitted uses are contributing total maximum daily load pollutants to the impaired segments.

Since the 1986 management plan, BMPs and numerous projects have been implemented to reduce nonpoint source pollution from BLM-managed lands, including:

- Cleanup of abandoned mine lands;
- Riparian enclosure fencing;
- Implementing standards and guidelines for grazing utilization and stream impacts;
- Reduced livestock use;
- Improved and maintained road drainage systems;
- Obliteration of abandoned roads;
- Removal or replacement of road culverts;
- Recreation site improvements; and,
- Active restoration (riparian plantings, seeding, and stream channel reconstruction).

The BLM has made determinations as to whether BLM management or permitted activities were contributing to impairment or pollutant delivery. These determinations are derived from various efforts including; Rangeland Health Assessments and the evaluation of Rangeland Health Standard 3 (Water Quality), pollutant source inventory and evaluation for TMDL development, watershed or landscape-level analyses, and project-level NEPA analyses.

Hydrology. Managing hydrologic function is important because it influences stream channel dynamics, aquatic habitat, riparian-wetland characteristics, water quality, water quantity, and water uses. The natural hydrologic character and function of a watershed can be altered when any of the key variables, including climate, are altered: vegetation (evapotranspiration and interception); soil properties (infiltration, storage, and runoff); and flow routing (drainage extension and diversion).

Aside from climatic aberrations, the primary causal factor for hydrologic alteration are:

- *Forested watersheds that were historically thinned or regenerated by fire.* These occur in the ponderosa pine/Douglas-fir and lodgepole pine forest types. These watersheds can have higher evapotranspiration and lower water yield for streamflow, groundwater, and riparian-wetlands. When unnaturally severe fire finally occurs, the dense vegetation may be consumed more than usual, soils may be sterilized or hydrophobic more than usual, and basin hydrology can become altered with flashy runoff, higher or earlier peaks, and lower low and base flows.
- *Shrubland-grasslands converted to non-native pasture grasses and grazed down during summer intense thunderstorm activity.* This produces a surface runoff response, rilling and pedestaling on some sites. Rangeland health assessments have shown this is not a widespread problem, and impacts

are localized in small areas (less than a few acres), and less than a few percent of larger allotments. Some very small “category C” allotments have higher instances of vegetation conversion.

Altered soil properties and flow routing problems were also found to be localized. Flow routing problems on roads are corrected with BMPs when found. Timber harvest is not considered a problem; the harvest areas are comparatively small and scattered, and the BLM has not practiced clearcutting of large acreages on the decision-area lands.

The current vegetation conditions are summarized in section 3.2. Areas considered a departure from the natural range of variability may also be affecting hydrology at the hillslope and basin level, with downslope and downstream impacts to riparian-wetland conditions and water quality as explained in the causal factors above.

The 2017 Montana Climate Assessment reports that the climate in the decision area is expected to warm over the planning period, with lower summer precipitation and greater precipitation from autumn through spring (Whitlock et al. 2017). The hydrologic implications are uncertain; however, managing basin vegetation for NRV conditions in consideration of shifting climate characteristics would likely provide the greatest chance of retaining NRV hydrologic character, water quality, and riparian-wetland function.

Water Rights. The BLM applies for water rights under the same regulations other appropriators. The BLM filed claims on existing water developments and natural sources occurring on BLM-managed lands for protecting multiple uses, including beneficial uses for livestock, fisheries, and wildlife.

Environmental Consequences

Management of paleontological, cave, karst, cultural, and heritage resources is not anticipated to be of concern for soil, water, or riparian-wetland resources because of the low likelihood of significant disturbances.

Designation or management of the Backcountry Byway, the National Winter Recreation Trail (Alternatives B and C), National Historic Trails and Corridors (Alternatives B and C). SRMAs, ERMAs, and BCAs are also unlikely to have negative impacts to soils, water, or riparian-wetland resources.

In the Garnet SRMA, negative impacts to soils, water, or riparian-wetland resources are unlikely due to the ridgetop location and developed and maintained trail system.

Impacts common to all alternatives.

Best Management Practices (Appendix P) are incorporated into project design for the purpose of reducing or avoiding negative impacts.

Riparian Habitat Conservation Areas. Delineation of site-specific Riparian Habitat Conservation Areas (RHCAs) at the appropriate level of NEPA analysis would manage for and ensure that riparian-dependent values receive primary emphasis. Riparian management objectives (RMOs) would be determined from site-specific or watershed-level analysis, and RHCA boundaries are defined that RMOs are supported. In the absence of a site-specific or watershed-level analysis of RMOs and RHCAs, interim RHCA widths applied following INFISH standards (see Appendix B). This is the current approach the BLM would likely continue to follow under Alternative A, although the Garnet RMP never was amended to incorporate INFISH, and would be mandatory under Alternatives B and C.

Livestock Grazing: Potential impacts from livestock grazing are much less than the potential impacts associated with placer mining, and could be more impactful than forest vegetation management depending upon site conditions and grazing practices. The difference between alternatives is based on the

acreage available to livestock grazing, as the general potential impacts are described below. Grazing availability does not however translate to actual use (*see Livestock Grazing section*). Some portions of the lands are not accessible or suitable for grazing due to lack of forage or steep, densely timbered terrain. Regardless of alternative or the particular BMPs applied, some measure of grazing impacts would occur.

- **Soils:** Overgrazing of grasses and concentrated livestock use around water tanks, salt stations, trailing, and denuded sites may lead to compaction, erosion, and denudation. When numbers exceed available forage and use is concentrated, soils may become compacted and denuded and subject to erosion, leading to reduced forage and productivity. Impacts may vary depending upon whether the particular soils are inherently sensitive to disturbances (streambank soils or highly erodible soils) or soil types that tend to be resilient or insensitive to management practices (coarser-textured soils with higher rock content are usually less prone to compaction, erosion, or displacement). When the timing, duration, intensity, and frequency of grazing is appropriately matched with available forage, topography, water resources, and sensitivity to disturbance; impacts to soils may be minimized. These potential impacts would be lessened or avoided through application of grazing BMPs and managing use to meet or make progress toward meeting rangeland health standards (Standard #2 Riparian, Wetland Health are in proper functioning condition, and Standard #3, water quality is meeting Montana state standards).
- **Water Quality.** The potential impacts to water quality could potentially result from livestock waste, altered channels, sedimentation, reduced shade. Under all alternatives, the Rangeland Health Assessments would assess listed waters, pollutants, sources, and causes to make a determination whether the rangeland health standards is being met, and the factor. These potential impacts would be lessened or avoided through application of grazing BMPs, SMZ, RMOs (Appendix B and P), and managing use to meet or make progress toward meeting rangeland health standards (Standard #3, water quality is meeting Montana state standards).
- **Riparian Resources.** Impacts to riparian function from livestock grazing potentially include increased invasive plants, compacted soils, channel alteration, altered composition, age class, and structure changes. Identification of riparian management objectives (RMOs) and delineation of riparian conservation areas would prioritize riparian health within the RHCA boundary, including from livestock grazing. Riparian protection and maintenance accomplished with SMZ, Land Health, and standards (PFC), BMPs, and RMOs. The application of these BMPs and livestock adjustments, particularly exclosures, have resulted and are expected to continue to result in improved riparian conditions. These potential impacts would be lessened or avoided through application of grazing BMPs, SMZ, RMOs (Appendix B and P), and managing use to meet or make progress toward meeting rangeland health standards (Standard #2, riparian and wetlands are meeting properly functioning condition).

Forest Vegetation Management: Vegetation management historically affected resources to a greater degree, but modern practices (1990s to present) have greatly reduced potential negative impacts and proper management can positively affect the resources. Vegetation treatments that reestablish or move toward NRV conditions are beneficial for restoring or maintaining hillslope and basin-scale hydrologic conditions under which stream and riparian systems developed. Vegetation treatments that involve potential soil disturbance (displacement and erosion) are subject to BMPs to avoid or lessen potential impacts to soils, riparian-wetlands, and water quality. The lands available for forest management differ minimally between alternatives, and the potential impacts under any alternative are subject to the same design features and BMPs (Appendix P).

- **Soils:** Forest vegetation treatments can influence soil productivity through plant succession, nutrient cycling, organic matter, and various biotic and abiotic soil formation processes. Vegetation treatments often include provisions for leaving enough organic material behind for nutrient cycling.

This positive aspect would continue. Forest vegetation treatments that reduce conifer-invaded grasslands may improve soils.

- *Water Quality:* Forest vegetation treatments have potential to influence water quality and hydrology. Forest vegetation moving toward the mid-range of natural range of variability would be beneficial for basin-scale hydrologic conditions under which stream and riparian systems are dependent. Roads are often necessary to conduct forest vegetation treatments, which can cause impacts to water quality from erosion. More recent forest management practices (1990s to present) construct roads and maintain existing roads to prevent or minimize water concentration, erosion, and sedimentation to streams. Water quality and riparian protection is accomplished with SMZ, Land Health standards (PFC), BMPs, and RMOs. The BLM must not take action to contribute to impairment of water quality.
- *Riparian Resources.* Modern forest management practices have reduced historic types of impacts to riparian areas, and may be a tool to improve riparian resource through restoration and reduction of wildfire severity potential. Identification of RMOs and delineation of riparian conservation areas would prioritize riparian health within the RHCA boundary, including from forest vegetation management activities. Riparian protection and maintenance accomplished with SMZ, Land Health standards (PFC), BMPs, and Riparian Management Objectives (Appendices B and P).

Minerals: There are 75.9 miles of stream in the Decision Area that are within Moderate (54.1) or High (21.8) Mineral Potential. Placer mining, if occurs, could have the greatest impact riparian health and water quality compared to livestock grazing or forest vegetation management because placer mining can be aimed at removing minerals from stream sediments and floodplains. When mining occurs within a streambed, it can release large quantities of sediment and pollutants. The impacts would be highly dependent on the type of activity and the proximity to waterbodies and riparian-wetland areas.

- *Soils:* Reclamation methods often include the stockpiling of soils removed from the mined area, which are later replaced and vegetated. However, the attendant loss in any physical, chemical, and biological soil characteristics often reduce site productivity. Improved reclamation methods and techniques have and would be anticipated to improve successes.
- *Water Quality.* Water quality may be influenced by vegetation or soil manipulation (altered hydrology or erosion rates), channel or wetland modification (altered hydrology or hydraulics), road drainage (interception, diversion, erosion), or more directly (or indirectly via resulting site, hillslope, or basin hydrology causal).
- *Riparian Resources.* Mining resulting in soil manipulation or decreased or modified vegetation can alter hydrology and erosion rates, and impact riparian resources. The riparian habitat conservation areas would be subject to an unnecessary and undue degradation standard (Appendix P).

Recreation: Areas of high-volume recreation can impact streams, although much lower compared to other potential activities (mining, livestock grazing, and forest management). Non-motorized recreation in the form of trailing, foot traffic on steep streambanks, occurs along the recreation sites along the Blackfoot River. Potential impacts resulting from non-motorized and motorized recreation may occur, but is quite low compared to the other potential activities (mining, livestock grazing, and forest management). Motorized recreation can have impacts to sediment delivery and water quality when there are crossings of riparian areas, nearby streambanks or shorelines, or warrant road construction near a riparian area. Identification of riparian management objectives at the site-specific level, and delineation of appropriate riparian habitat conservation areas would ensure that riparian-dependent values receive primary emphasis during travel and trail projects, along with implementation of other BMPs (Appendix P).

- *Soils*: Trailing along recreation sites may cause erosion of soils. Motorized recreation may cause increased sediment delivery and further disturbance of soils as well as vegetation along routes. The potential for noxious and invasive weeds increases with more vehicles, which may impair vegetation.
- *Water quality*: Trailing along recreation sites causes erosion of soils which, in turn, may impact water quality with sediment delivery to the streams. Motorized recreation may cause increased sediment delivery to streams potentially affecting water quality.
- *Riparian Resources*: Trailing along recreation sites may cause erosion of soils and trampling along riparian vegetation. Motorized recreation may cause increased sediment delivery from erosion, disturbance of riparian vegetation if motorized vehicles enter the riparian areas. The potential for noxious and invasive weeds increases with more vehicles, which may impair vegetation.

Table 53. Summary of soil, water, and riparian-wetland impacts

Indicator	Alternative A	Alternative B	Alternative C
Miles of streams on lands available for grazing	387.4	463.9	352.7
Miles of streams on lands unavailable for grazing	138.6	62.1	173.3
Miles of streams subject to high recreation use (trailing)	1.29	Increased risk on 1.29 miles	Increased risk on 1.29 miles
Miles of impaired waters on lands available for grazing	66.9	73.5	59.7
Miles of impaired waters on lands unavailable for grazing	12.7	6.1	19.9
Miles of impaired waters with grazing pollutant source	16.5	Increased risk on 8.38 miles	Decreased risk on 0.55 miles
Miles of assessed streams in allotments with livestock use preventing PFC	8.22 Move toward zero	Move toward zero	Move toward zero
Hydrologic function benefit from treating vegetation with moderate to high departure from NRV	n/a	15,000 acres/decade	10,000 acres/decade
Stream miles in 1-mile WUI or FMZ1 fuels treatment area	n/a	157.8	37.6
Stream miles in ROW exclusion areas	2.0	63.3	132

Impacts under alternative A

Livestock Grazing. The potential impacts are in *Impacts Common to all alternatives*. This potential applies to approximately 117,774 acres (6,053 acres of which are for prescriptive grazing only). The affected area includes 387.4 miles of stream that would be subject to grazing BMPs to lessen or avoid impacts from livestock. The stream mileage includes 16.5 miles of impaired waterbodies where grazing is a source of pollutants. There are 8.22 miles of streams that are not meeting Rangeland Health Standards due to riparian-wetland areas not meeting PFC. Grazing would be managed in these streams to move toward PFC.

Recreation. Recreation has much less potential impacts compared to mining, livestock grazing, and forest management. There are 1.29 miles of stream in the Decision Area where high recreational use in the form of trailing (foot traffic on steep streambanks) in the recreation sites along the Blackfoot River. The potential impacts to sediment delivery and water quality are relatively low compared to the natural sediment load in the Blackfoot River, but is given for a baseline comparison for alternatives B and C. These areas would be managed to prevent these sources from impairing water quality. The Chamberlain, Limestone Cliffs, and Ram Mountain SRMAs are unlikely to have any negative impacts to soils, water, or riparian-wetland resources since these are managed for walk-in or non-motorized recreation. The

approximately 25,562 acres closed to off-highway vehicle use will remove the risk of motorized vehicle impacts to soil, water, and riparian-wetland resources.

Forest Vegetation Management. Vegetation treatments that reestablish or move toward NRV conditions are beneficial for restoring or maintaining hillslope and basin-scale hydrologic conditions under which stream and riparian systems developed. Treatments that involve potential soil disturbance are subject to BMPs to avoid or lessen potential impacts to soils, riparian-wetlands, and water quality. There would be 105,020 acres available for forest management activities with 6,115 acres that would have riparian management restrictions associated with Management Areas 1 and 2.

Lands and Realty. There would be two miles of stream with a ROW exclusion that would exclude ROW activities and eliminate any potential impacts.

Impacts under alternative B

Livestock Grazing. The potential impacts are in *Impacts Common to all alternatives*. This potential applies to approximately 145,558 acres in the Decision Area (42,366 acres of which are for prescriptive grazing only). The affected area includes 463.9 miles of stream that would be subject to grazing BMPs to lessen or avoid impacts from livestock. The stream mileage includes 16.5 miles of impaired waterbodies where grazing is a source of pollutants, with an additional 8.38 miles where there is increased risk associated with the higher acreage available for grazing use. There are 8.22 miles of streams that are not meeting Rangeland Health Standards due to riparian areas not meeting PFC. Grazing would be managed in these streams to move toward PFC. Modification or relocation of grazing use that prevents attainment of desired habitat conditions would also benefit soils, riparian, and water quality since these are closely tied to aquatic habitat indicators.

Recreation. There are approximately 1.29 miles of stream in the Decision Area where high recreational use in the form of trailing (foot traffic on steep streambanks) in the recreation sites along the Blackfoot River. The potential impacts to sediment delivery and water quality are relatively low compared to the natural sediment load in the Blackfoot River, but the impacts may increase from higher visitation and more concentrated use. As with Alternative A, these areas would be managed to prevent these sources from impairing water quality. The Chamberlain, Limestone Cliffs, and Ram Mountain SRMAs are unlikely to have any negative impacts to soils, water, or riparian-wetland resources since these are managed for walk-in or non-motorized recreation. The approximately 28,844 acres closed to off-highway vehicle use will remove the risk of motorized vehicle impacts to soil, water, and riparian-wetland resources.

Forest Vegetation Management. Vegetation treatments that reestablish or move toward NRV conditions are beneficial for restoring or maintaining hillslope and basin-scale hydrologic conditions under which stream and riparian systems developed. Treatments that involve potential soil disturbance are subject to BMPs to avoid or lessen potential impacts to soils, riparian-wetlands, and water quality. There would be approximately 101,669 acres available for forest management activities with an additional approximately 13,264 acres that would have some management restrictions associated with riparian habitat conservation areas and Streamside Management Zones with objectives for shade retention, woody debris recruitment, and soil protection.

WUI and FMZI. Fuels management is generally beneficial by reducing risks of unnaturally high severity wildfire (altered soils and hydrology). High-severity wildfire can alter soils and hydrology. There would be approximately 157.8 miles of stream within the 1-mile WUI and FMZI. These areas would be subject to fuels treatments to reduce wildfire risks. The resultant vegetation may or may not be within NRV, and in some instances the fuels treatments may not align with Riparian Management Objectives for shade retention (water temperature) and large woody debris. There may be instances where these RMOs may be

adjusted to accommodate the need for WUI and FMZ1 goals and still retain adequate shading and debris recruitment. Reduced fuel load would reduce wildfire severity and post-fire erosion risks to adjacent streams. Negative impacts to soils or hydrology are unlikely with fuels treatments, and may benefit long-term conditions if the fire severity hazard is reduced.

Lands and Realty. There would be approximately 63.3 miles of stream with a ROW exclusion that would exclude ROW activities and eliminate any potential impacts.

Impacts of alternative C

Livestock Grazing. The potential impacts are stated in *Impacts Common to all alternatives*. This potential applies to approximately 107,341 acres in the Decision Area (5,832 acres of which are for prescriptive grazing only). The affected area includes approximately 352.7 miles of stream that would be subject to grazing BMPs to lessen or avoid impacts from livestock. The stream mileage includes 16.5 miles of impaired waterbodies where grazing is a source of pollutants, with an additional 0.55 mile where there is a decreased risk associated with the lower acreage available for grazing use. There are 8.22 miles of streams that are not meeting Rangeland Health Standards due to riparian areas not meeting PFC. Grazing would be managed in these streams to move toward PFC. Modification or relocation of grazing use that prevents attainment of desired habitat conditions would also benefit soils, riparian, and water quality since these are closely tied to aquatic habitat indicators.

Recreation. Impacts would be the same as Alternative B, except there would be approximately 30,918 acres closed to off-highway vehicle use will remove the risk of motorized vehicle impacts to soil, water, and riparian-wetland resources. Chamberlain, Ram Mountain, Hoodoos, and Marcum BCAs. Negative impacts to soils, water, or riparian-wetland resources are unlikely since these are managed for wildlife-dependent recreation and unlikely to have an increase in potentially impactful uses such as OHV traffic. The approximately 30,918 acres closed to off-highway vehicle use will remove the risk of those impacts to soil, water, and riparian-wetland resources.

Forest Vegetation Management. Vegetation treatments that reestablish or move toward NRV conditions are beneficial for restoring or maintaining hillslope and basin-scale hydrologic conditions under which stream and riparian systems developed. Treatments that involve potential soil disturbance are subject to BMPs to avoid or lessen potential impacts to soils, riparian-wetlands, and water quality. There would be approximately 100,465 acres available for forest management activities with as additional approximately 13,264 acres that would have some management restrictions associated with riparian habitat conservation areas and Streamside Management Zones with objectives for shade retention, woody debris recruitment, and soil protection.

WUI and FMZ1. There would be approximately 37.6 miles of stream within the 1-mile WUI zone. These areas would be subject to fuels treatments to reduce wildfire risks. The resultant vegetation may or may not be within NRV, and in some instances the fuels treatments may not align with Riparian Management Objectives for shade retention (water temperature) and large woody debris. There may be instances where these RMOs may be adjusted to accommodate the need for WUI and FMZ1 goals and still retain adequate shading and debris recruitment. Reduced fuel load would reduce wildfire severity and post-fire erosion risks to adjacent streams. Negative impacts to soils or hydrology are unlikely with fuels treatments, and may benefit long-term conditions if the fire severity hazard is reduced.

Lands and Realty. There would be approximately 132 miles of stream with a ROW exclusion that would exclude ROW activities and eliminate any potential impacts.

Riparian Restoration and PNC. Managing riparian areas above PFC and moving toward PNC would likely provide for greater structural complexity, vegetation diversity, older vegetation age classes, deeper

rooting, soil stabilization and development, and reduced peak flow velocity. More mature shrub and hardwood communities may be more appealing to beaver colonization and higher likelihood of beaver damming and riparian systems approaching historic conditions in some systems. Riparian restoration actions such as planting, bank stabilization, instream structure placement, and aquatic habitat enhancement would have similar beneficial effects. Although PNC conditions have not been inventoried in the Decision Area, such conditions are common in many of the systems that meet PFC and may be estimated as much as 70 miles. Future inventories and PFC assessments would identify PNC conditions. Restoration activities such as planting/revegetation, instream structures, and beaver reintroduction would have a beneficial effect to riparian areas and increase water storage.

Cumulative Impacts

The cumulative impact analysis area for soils is the same as the decision area since there is a low likelihood of offsite ground-disturbing impacts crossing property boundaries. The cumulative impact analysis area for water quality in TMDL streams extends outside the decision area to the whole TMDL segment. For riparian area function and general water quality, the cumulative impact analysis area includes any adjacent downstream reach where downstream impacts are likely or any change in delivery is likely.

Impaired waters. Of the approximately 78.6 miles of total maximum daily load waters in the decision area, BLM-related sources occur on 12.5 miles (12.43 miles of which is from grazing sources, 0.03 mile from recreation sources, and 0.04 mile from mining sources). The remainder are lands not managed by the BLM. Reasonably foreseeable future actions from these other lands are not predictable over the planning period. By managing BLM lands to reduce or eliminate pollutant delivery, meet PFC riparian standards (Alternative B), manage some riparian areas toward PNC (Alternative C) where the potential occurs, BLM would contribute to a cumulative reduction in pollutants.

Adjacent private land development and activities. This would likely increase recreational use and requests for rights-of-way on neighboring BLM lands in the alternatives. Rights-of-way could cause surface-disturbing activities such as road construction leading to soil erosion, impacts depend greatly on the site-specific information of the area and type of right-of-way. Combined with the ROW exclusions, there would be a lower risk for cumulative impacts in Alternative B on 63.3 miles of streams in ROW exclusion areas, and 132 miles of stream in Alternative C.

With increasing demand for public access, impacts to soil, water, and riparian-wetlands would depend on the type of uses that would increase. Off-highway vehicle use and activities along streambanks and shorelines are of highest concern; however, the management of these uses are subject to regulations and policy for meeting soils, water, and riparian-wetlands goals and subject to design features and BMPs for stream and riparian protection. With these measures in place, the risk for cumulative impacts would be greatly lessened or avoided.

Forest management. On other ownerships adjacent to BLM lands, forest management activities are unpredictable but likely to continue where such activities have occurred historically. There could be no cumulatively increased risk to soils, water, and riparian-wetlands in instances where cooperative management occurs, forestry BMPs are used, and/or where treatments move forest vegetation toward NRV, and any beneficial cumulative impact would extend to a larger area, thus benefitting larger watersheds, more riparian-wetland acreage, and more stream mileage.

Livestock grazing. Cumulative impacts on any BLM stream reach or riparian area from grazing-related reasonably foreseeable future actions are unlikely to increase. However, livestock grazing upstream of BLM stream reaches may impair water quality on the BLM reach, particularly where those upstream

areas are not within a BLM-managed allotment or pasture. Likewise, livestock grazing on BLM-managed stream reaches can impact water quality in downstream reaches on other ownerships. By using grazing BMPs to lessen or avoid water quality impacts on BLM reaches, the risk to downstream reaches is also lessened or avoided.

Riparian restoration. Treatments and maintenance of habitats for fish and wildlife, including road closures, weed reduction, and restoration of grassland, shrublands, riparian areas, and stream channels would likely have beneficial effects to soils, water, and riparian-wetlands. The beneficial cumulative impacts would be greater in Alternative C than in Alternative B. In Alternative C restoration activities would have higher emphasis in key watersheds and TMDL stream segments. Riparian areas currently meeting and maintaining PFC would be managed toward PNC conditions where the potential exists.

Roads and recreation sites. Ground disturbance from the construction and maintenance of roads, landings, and recreation sites would have the potential to impact soils and water quality via sediment delivery. These activities would be subject to the development and application of BMPs to minimize or avoid such impacts and are unlikely to vary between alternatives. Maintenance activities would reduce the net risk of sediment delivery, especially mass-failure. There is no difference in the cumulative impacts potential between alternatives. Decommissioning unneeded roads with higher erosion or sediment delivery hazards would further reduce the risk to water quality. Roads may potentially impact water quality when they present a deliverable source of sediment to nearby streams. These sources may either be chronic or pulse-type deliveries due to mass failure of the road prism and hillslope. Past road construction practices involved stream channelization, rerouting, and direct impingement into the active channel or floodplain. Roads management or condition of non-BLM roads, or those outside the Decision Area on private lands are typically not known.

Weed management would likely have a net benefit for soils, water quality, and riparian-wetlands by maintaining native vegetation communities, site productivity, and soil cover. The cumulative impact would not vary by alternative and would benefit long-term soil productivity on treated acres.

The Nature Conservancy lands. If these lands were acquired by the BLM, the soils, water, and riparian-wetland resources on these lands would be managed with the same goals and objectives as the adjacent BLM-managed lands, which is a Special Recreation Management Area. Direction for soil, water, and riparian-wetlands would apply to new acquisitions and the impacts would be the same for all alternatives.

Minerals reasonable foreseeable development in all alternatives. There is high mineral development potential on approximately 7.2 miles of the BLM portions of impaired (TMDL) streams, and 13.4 miles of moderate potential. Of the total stream miles in the Decision Area, there are 21.7 miles of high potential, and 54.1 miles of moderate potential. Of the mapped Montana Natural Heritage Database wetlands in the decision area, there are approximately 114 acres of high potential and 197 acres of moderate potential. Low potential mineral development areas are not considered. The potential impacts to soil, water, or riparian-wetland resources depends on the type, extent, and duration of development activities. Placer activities in riparian areas have the highest potential for resource impacts, while lode exploration activities such as drilling on sites well away from water or riparian areas typically only impact the soils and vegetation at the drill site.

Within the planning area, mineral development activities have a high potential for cumulative impacts to soils, water, and riparian function. In particular with placer projects that tend to be developed on deposits within riparian areas, surface disturbance and heavy equipment operation presents a higher risk of introducing sedimentation and other contaminants to surface water. Environmental consequences of these impacts include loss or degradation of riparian function and water quality impairment. As impacted water

flows downstream, contaminants have the potential to influence much larger areas than the relatively small, short-term footprint of the mining operation.

Climate and management actions. The projected temperature increase has implications for stream temperatures, water availability, and basin hydrology. The following management direction may help to cumulatively offset some of the impacts: (1) RMOs that address shade retention for streams in the alternatives; (2) managing riparian areas for PFC in all alternatives, and toward PNC for some streams in Alternative C; (3) restoration activities in Alternative C that would improve riparian water retention and base flows; and (4) managing basin vegetation for NRV conditions in Alternatives B and C to reduce risk of high-severity fires and promote natural hydrologic function (evapotranspiration, soil productivity, infiltration, surface water and groundwater contribution).

3.3.4 Cave and Karst Resources

Cave and karst resources are recognized as fragile due to their association with other resources such as groundwater systems, biological communities, fossils, cultural values, and mineral formations. An integral part of cave management on federal lands is the evaluation and designation of significant caves. A cave is considered significant if it meets one or more of the following six criteria: biota; cultural; geological, mineralogical, and paleontological; hydrological; recreational; and educational or scientific.

Analytical Methods and Assumptions

Recreational use and interest in exploring caves is assumed to increase. Recreational cavers constitute the majority of users while activity associate with scientific research is the other primary use.

BMPs will be applied to potentially disturbing activities to avoid or minimize impacts. BMPs will continue to be reviewed and revised toward greatest applicability and effectiveness.

Activity resulting in surface disturbance is not predictable over the planning period. Such actions may have impacts, but are necessarily addressed at the project level.

Affected Environment

Most of the caves and karst in Montana were developed in the Paleozoic carbonate rocks; the principal cave-forming rocks being the Mississippian Madison Group limestones and Devonian Jefferson Formation (Campbell 1978). The surface or near-surface occurrence of these units within the planning area is either in upturned belts along the thrust faults or flanking the intrusive igneous cores of the larger mountain masses.

Though no cave and karst resources inventory has been conducted within the planning area, there is known occurrences of caves on public lands. Of the known caves within the planning area, currently none have been evaluated for significance. Caves and karst are managed as significant until a significance evaluation is completed.

Environmental Consequences

Ground disturbance through federal actions have the potential of impacting cave and karst resources. Design features would be applied to surface-disturbing activities within areas of potential or known cave localities, but the types of design features or BMPs could vary on a case-by-case basis.

Minimization efforts applied to surface disturbance in areas known or suspected to contain significant cave and karst resources would result in the identification and evaluation of previously undiscovered resources. Scientific and education would occur upon discovered cave or karst resources in partnership with state and universities.

Impacts from recreational activity are difficult to assess, particularly since such activities may impact cave and karst resources that have yet to be identified and assessed. Indirect and inadvertent impacts to cave and karst resources may occur by attracting additional attention or visitation to certain areas such as special recreation management areas or advertisement through third-party groups.

3.3.5 Cultural and Heritage Resources

Under all alternatives, the BLM manages cultural resources through a series of laws and policies such as National Historic Preservation Act, Archaeological Resources Protection Act, BLM 8100 Manuals, The National Programmatic Agreement (2012) and the Montana State Protocol (2015). These set the framework for managing cultural resources on public lands managed by BLM.

Indicators

- Acres of land available and unavailable for forest management.
- Acres with land use allocations: SRMAs, ROW Exclusion and Avoidance Areas, land tenure categories; OHV Open or Limited Allocation; acres withdrawn to minerals; acres closed to non-energy leasables and mineral material sales; VRM Class I and Class II.
- Acres of corridor for the Lewis and Clark National Historic Trail and WSAs
- Acres protecting lands with wilderness characteristics

Analytical Methods and Assumptions

The BLM assumes that:

- Discoveries of cultural resources will continue throughout the planning area.
- A direct correlation exists between the number of sites that could be impacted by various actions and the degree, nature, and quantity of surface-disturbing activities within the planning area.
- Human use of an area and the potential for cultural resources to be affected are directly related.

The BLM would comply with the National Historic Preservation Act (in particular Section 106 surveys for cultural resources prior to surface-disturbing activities), Archaeological Resources Protection Act, BLM 8100 Manuals, The National Programmatic Agreement 2012 and the Montana State Protocol 2015 (Appendix P).

The regulations for Protection of Historic Properties (36 CFR §800) provide the criteria for assessing impacts that would occur at the project level analysis. The regulations state that an undertaking may have an effect when it may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR §800.5(a)(1)). The effects that may occur include:

- Physical destruction, damage, or alteration of all or part of the property;
- Property alteration that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR §68) and applicable guidelines;
- Removal of the property from its historic location; and,
- Disturbance of the visual setting of an historic property, such as in the case of a traditional cultural property.

Affected Environment

The history of human occupation in the Rocky Mountains, beginning approximately 10,000 BC through the arrival of Europeans, missionaries, and mining prospectors, to present day logging, ranching/farming, recreation, and tourism, is detailed in the Missoula BLM RMP Analysis of the Management Situation, pages 35-41, which is incorporated here by reference.

The three-county analysis area has 227,942 acres surveyed for cultural resources. A total of 73,711 acres have been surveyed in Granite County, 88,400 acres in Missoula County, and 65,831 acres in Powell County with 77,056 acres of BLM managed lands have been surveyed. Of those acres surveyed, 565 prehistoric sites and 2,139 historic sites have been recorded for 2,704 cultural resource sites. Prehistoric sites within the planning area may consist of one or more of the following: burial, cultural material scatter, lithic scatter, processing are, quarry, trail, rock art, rock feature, rock shelter/cave, scarred tree and/or stone ring. The common historic sites may consist of one or more of the following: agriculture, architecture, building foundation, burial, campsite, cultural material scatter, forestry, mining, and roads/trails. Notable sites in the planning area include Garnet Ghost Town, Coloma, Gold Creek Historic Mining District, Devil's Eyebrow, and the Cokalarishkit/Lewis and Clark National Historic Trail.

Updated BLM planning and Manual guidance stress the importance of meeting specified goals through the allocation of cultural properties in the planning area (whether already recorded or projected to occur) into defined "use categories," based on their nature and relative preservation value. The identified use categories include: A. Scientific Use: sites preserved until research potential is realized; B. Conservation for Future Use: sites preserved until conditions for use are met; C. Traditional Use: long-term preservation of sites; D. Public Use: long-term preservation, on site interpretation; E. Experimental Use: sites protected until used; and F. Discharged from Management: sites are removed from protective measures.

Many sites within or adjacent to BLM-managed lands were recommended to be protected in the Garnet Resource Management Plan (1986) because of historical and cultural significance. These include Garnet, Coloma, Reynold's City, Copper Cliff, Blackfoot City, Beartown, Bearmouth and other sites that are eligible for the National Register of Historic Places. Garnet Ghost Town is dated from the late 1800s through the 1940s. Historic buildings are stabilized to portray a state of arrested decay. The site is on the National Register, and a popular site in western Montana. Coloma ghost town is not receiving funding for building stabilization, but students have utilized features of Coloma for research. The intent of the research was to gather more information and history about Coloma.

Environmental Consequences

Impacts common to All Alternatives

The potential exists for disturbing cultural resources across all alternatives from casual, unauthorized activities (such as vandalism or use of unauthorized routes) and natural processes (natural decay, deterioration, or erosion). Under the alternatives, unquantified indirect impacts may occur. Management activities occurring within the planning area are not expected to affect cultural resources outside of the decision area.

Under all alternatives, the BLM would continue to mitigate impacts to cultural resources from authorized uses through project abandonment, redesign, and if necessary, data recovery investigations. However, cultural resources would continue to deteriorate through natural agents, unauthorized public use, and vandalism.

Cultural Resources. The proactive management of historic properties in the planning area would be a beneficial effect to cultural resources, as historic properties could receive funding for research and new discoveries could occur. However, research can include a systematic excavation of a cultural site, which can have beneficial research potential about the cultural site but removes the site forever. Cultural resources are a finite resource and therefore any type of removal is finite. The long-term preservation of the Devil's Eyebrow site, the Cokahlarishkit / Lewis and Clark National Historic Trail, Warm Springs site, and Garnet Ghost Town would continue. Other sites would be preserved as discoveries occurred.

Forest and Fire Management. Wildland fire and the suppression of wildland fires can damage or destroy cultural resources. Wildland fire may impact resources by burning up those resources such as buildings, culturally modified trees and other organic resources; scorching soils and causing erosion exposing artifacts making them susceptible to theft, and removing context. Context is important as it describes the story behind the artifacts, for example context can describe when, why, and how a site was created. Full suppression of wildfires often causes the most surface disturbance. Using heavy equipment operations over cultural sites can disrupt the soil disturbing the context of cultural sites. When responding to wildfire, standard protocols consider known cultural resources and implement measures (Appendix P) when possible. BMPs for wildfire suppression pertaining to historic properties (Appendix P) will reduce impacts to cultural resources by putting restrictions on suppression tactics.

Prescribed fire and mechanical fuels treatments would be utilized to promote a healthy landscape and reduce the potential for wildfire and thereby reducing impacts to cultural resources potentially caused by the wildfire or activities to suppress the wildfire. A healthy landscape would also reduce adverse effects to historic properties from wildfire and fire suppression activities. Project-level fuel treatments would have the potential to impact cultural resources through ground disturbance.

Fire rehabilitation efforts would generally increase the protection of cultural sites that may have remained unaffected from wildfire by preventing or reducing erosion and encouraging rapid revegetation of denuded surfaces.

Lands available for forest management have the potential to impact cultural resources. Treatments using heavy equipment have potential to disturb cultural sites and disrupt the soil disturbing the context of cultural sites. Impacts could include removal of soil and/or artifacts from heavy equipment, destruction or damage to historic features, for example driving through mining ditches with heavy equipment.

Livestock Grazing: Inappropriate placing of salt licks and water troughs can result in damage and/or destruction of cultural resources. Cattle congregate near salt licks and water sources and hoof trampling can damage soil context, therefore, potentially damaging or destroying cultural resources located there. Cattle rubbing on historic features can potentially weaken or knock over fragile standing structures.

Minerals: Surface-disturbing activities associated with locatable, leasable, and salable mineral exploration and development could result in mitigated impacts to cultural resources. These activities include construction of temporary roads, facilities, and equipment used to extract the resource. Additionally, the potential for impacts would increase proportionally to the amount of land available for mineral exploration and development. Mineral exploration could have a direct impact on cultural resources; impacts would be mitigated under standard avoidance or recovery procedures. Closing lands to minerals is a beneficial impact to cultural resources.

Abandoned Mine Lands: Abandoned mine land reclamation and remediation have a direct impact to historic mining features and properties that may be mitigated through additional data recovery, recordation, and photo documentation. However, the impacts of comprehensive reclamation and

remediation programs on historic mining districts and landscapes may be difficult to assess and more cumulative in nature.

Recreation: Impacts to cultural resources from recreation may include damage and/or destruction from vandalism and/or unauthorized uses such as digging. Sensitive cultural resources such as prehistoric sites (e.g., projectile points, rock art, etc.) are susceptible to vandalism such as rock art defacing/graffiti; unauthorized collecting of artifacts or damage/destruction from concentrated use. Heavy recreation is expected in the Lower Blackfoot River Corridor SRMA and Garnet Ghost Town RMZ. Garnet Ghost Town RMZ is specifically for tourists to visit a ghost town. The National Register-listed ghost town has recreation staff throughout the warmer months. In the colder months, the ghost town's buildings that house artifacts are locked. Providing public interpretation of cultural and historic resources may enhance appreciation and understanding of the fragile and finite nature of cultural resources. Similarly, promoting the adaptive reuse of historic buildings and structures for recreational purposes would help preserve and protect significant historic properties, helping fulfill the requirements of Section 110 of the National Historic Preservation Act.

Supplemental Rules for the DuPont area would provide a beneficial impact under the alternatives. Closing the area to motorized vehicles, overnight camping and building campfires reduces threats to cultural resources (i.e., vandalism, looting, and disturbance). Supplemental rules for Garnet Ghost Town are also beneficial to cultural resources. Threats to the buildings and artifacts are reduced through the rules.

Wilderness Study Areas: The BLM manages wilderness study areas (WSA) to preserve wilderness characteristics, so as not to impair the suitability of such areas until Congress makes a determination to either designate the areas as wilderness or release them to multiple uses. As such, there are beneficial impacts to cultural resources. If Congress releases the Wales Creek and Hoodoo Mountains WSAs, approximately 17,358 acres would no longer be protected from surface-disturbing activities, which means cultural resources may be impacted and 5,602 acres would be managed as the Wales Creek ACEC. Management direction of the Wales Creek ACEC would minimize or strictly limit ground-disturbing activities benefitting cultural resources.

OHV Allocations: Creation of trails and routes can impact cultural resources. In areas closed to OHVs, there would not be any creation of new motorized trails or routes for public use although roads may be constructed for administrative and authorized use if not restricted by the management direction of the area. In areas identified as Limited motorized travel, new trails or routes may be created. No areas are open to cross-country motorized travel in the decision area. Snowmobiles do not impact cultural resources because the ground is frozen and generally the snow is deep enough to keep the snowmobile from the ground surface, preventing surface disturbance.

Land Use Authorizations: Impacts to cultural resources may include damage to buried cultural sites from road building, powerline construction, etc. These impacts include removal of site context (removing the information of when, why and how a site was created), erosion to soil hence removal of context, from the use of heavy equipment.

Land Tenure: Retention of public lands is beneficial to cultural resources as they receive protection through federal laws (e.g., Archaeological Resources Protection Act). There are potential impacts to cultural resources from land tenure Category 2 (retention/limited disposal) and Category 3 (disposal). Land exchanges and sales may impact cultural resources because once out of federal ownership cultural resources would no longer receive federal protections.

Impacts under Alternative A,

Land Use Authorizations: Approximately 533 acres of ROW exclusion areas would provide a beneficial effect to cultural resources, because no surface-disturbing activity associated with ROW development would occur in these areas. The approximately 21,317 acres of ROW avoidance areas would likely avoid large-scale ROWs. Stipulations could limit or restrict the placement of ROWs, having an indirect beneficial impact to cultural resources. However, ground-disturbing activities would still occur, which could impact cultural resources.

Livestock Grazing: Under Alternative A, approximately 117,774 acres would be available and 44,810 acres would be unavailable for livestock grazing. Impacts to cultural resources are less under this alternative than Alternative B, as less acres are available for grazing. Impacts are slightly more under this alternative, as there are approximately 10,433 more acres available to grazing, compared to Alternative C.

OHV Allocations: Alternative A would continue to manage approximately 137,052 acres (84 percent) as limited to existing routes and 25,562 acres (16 percent) that are closed to motorized vehicles. The closed area includes the Lower Blackfoot Corridor and Ram Mountain SRMA. There could be impacts to cultural resources from road and trail building.

Lewis and Clark National Historic Trail: Protective corridors for the Lewis and Clark National Historic Trail were not identified in the Garnet RMP of 1986, but it was recommended to manage the area as a special recreation management area. Cultural resources associated with the Trail have been managed through the Section 106 process.

ACECs: BLM would continue to manage three ACECs. One ACEC is withdrawn from minerals and management direction for the other two ACECs proposes mineral withdrawal. Vegetation management and ROWs are allowed in the ACECs as long as the relevant and important values are protected. Through management direction impacts to cultural resources are lessened, but still possible.

Withdrawal: Under Alternative A, approximately 160 acres of cultural or historic sites are recommended for withdrawal (including Garnet Ghost Town), which is beneficial to cultural resources.

Impacts under Alternative B

Forest Management: Approximately 101,669 acres available for forest management, 13,264 acres available with management restrictions that may reduce harvest volumes, and 33,377 acres unavailable for management of commercial products. This alternative provides the highest harvest level per decade with 7.9 MMBF, and the most acres of potential treatments (15,000 acres of forest management per decade). As a result, this alternative is more likely to impact cultural resources from ground disturbance as compared to the other alternatives.

Land Use Authorization: ROW avoidance areas would increase under Alternative B to approximately 46,988 acres to include SRMAs, ACECs, and the Lewis and Clark National Historic Trail corridor. Management direction for these designations could limit or restrict the placement of ROWs, having an indirect beneficial impact to cultural resources. However, ground-disturbing activities would still occur, which could impact cultural resources.

Livestock Grazing: Approximately 145,558 acres would be available for livestock grazing and 17,027 acres would be unavailable for livestock grazing. Prescriptive grazing could mitigate adverse impacts to cultural resources from degraded resource conditions. There would be beneficial impacts to Garnet Ghost Town with the proposed exclosure to grazing.

OHV Allocations: The acres of limited to existing routes would be 133,770 acres and the acres closed to motorized vehicles to 28,844 acres. This reflects a shift in the Lower Blackfoot Corridor SRMA to

limited, and closing the WSAs to motorized vehicles. Given the high demand for recreation in the Lower Blackfoot Corridor SRMA, there is potential for impacts to cultural resources from travel management.

Lewis and Clark National Historic Trail: The BLM would designate a corridor that is one-half mile on either side of the centerline of the trail, which would encompass approximately 6,830 acres along the portions of the Lewis and Clark National Historic Trail that cross BLM-managed lands within the planning area. Management direction applied in the corridor, along with the Section 106 process will minimize impacts to cultural resources. Many activities must be compatible with preserving, restoring, and enhancing the key values of the trail. In addition, there may be more emphasis placed on interpreting cultural resources including the prehistoric features and interpretation about the Cokahlarishkit and other Tribes' experiences on and creation of the trail.

ACECs: Under Alternative B, one ACEC (640 acres) would be designated. Management direction allows for limited surface-disturbing activities, and any surface-disturbing activities would be subject to Section 106 process.

Withdrawal: Recommending a withdrawal of approximately 263 around Garnet Ghost Town is a benefit to cultural resources. The area contains numerous historic sites associated with Garnet Ghost Town. In addition, the area has a very high to high potential for mineral development which if occurred would disturb cultural resources both on the surface and below ground. Recommending a withdrawal reduces the impacts from mineral exploration and development.

Impacts under Alternative C

Forest Management: Under Alternative C, there are approximately 100,465 acres available for forest management, 13,264 acres available with management restrictions that may reduce harvest volumes, and 34,580 acres unavailable for management of commercial products. This alternative provides the least potential for adverse effects to cultural resources, as less land is available for forest management and more land is unavailable for commercial products. This alternative provides less acreage for lands with management restrictions that may reduce harvest volumes than Alternative A but the same as Alternative B. This alternative provides the lowest harvest level per decade with 6.6 MMBF. Alternative C would aim for 10,000 acres of treatments per decade.

Land Use Authorizations. ROW exclusion areas would increase under Alternative C to approximately 39,490 acres to include WSAs, Lewis and Clark National Historic Trail, and lands managed for wilderness characteristics. ROW avoidance areas would also increase under Alternative C to approximately 55,062 acres to include SRMAs and BCAs. Overall, there is more acreage with potential ground-disturbing restrictions under this alternative than the other alternatives. Reducing ground disturbance is a beneficial impact to cultural resources.

Livestock Grazing: Approximately 107,341 acres would be available for livestock grazing and approximately 55,244 acres would be unavailable for livestock grazing. This alternative provides the least potential for adverse effects to cultural resources because there is less acres available for grazing than Alternatives A and B. However, there is less prescriptive grazing available than Alternatives A and B.

OHV Allocations: Alternative C is slightly more beneficial to cultural resources as an additional approximately 2,523 acres is closed to OHVs. This reflects the same changes in Alternative B and includes closing the lands managed for wilderness characteristics to OHVs.

Lands with wilderness characteristics: Alternative C would protect approximately 2,523 acres of lands with wilderness characteristics, which is a beneficial impact to cultural resources. Wilderness

characteristics values are solitude, naturalness, and primitive recreation opportunities. Surface-disturbing activity is unlikely to occur in these areas. Thus, protecting these characteristics would also provide for cultural resources by reducing or eliminating the potential for surface-disturbing activities.

Lewis and Clark National Historic Trail. The BLM would designate a corridor that is 1 mile on either side of the centerline of the trail to encompass approximately 12,827 acres along portions of the Lewis and Clark National Historic Trail that cross BLM-managed lands within the planning area. Management direction applied in the corridor would encompass more acres as compared to the other alternatives. This would minimize impacts to cultural resources over a larger area. In addition, as part of the management direction the corridor is right-of-way exclusion area and is closed to mineral material sales, which reduces, ground disturbances. Section 106 process will continue to minimize impacts to cultural resources. There may be more emphasis placed on interpreting cultural resources including the prehistoric features, and interpretation about the Cokahlarishkit and other Tribes' experiences on and creation of the trail. There are more beneficial impacts to cultural resources under this alternative than the other two.

ACECs: Management direction for the Phil Wright Rock (640 acres) ACEC limits more ground disturbance under this alternative, indirectly benefitting cultural resources. Management direction includes recommending a mineral withdrawal and setting aside commercial timber land. Reducing ground disturbance reduces the potential for cultural resources to be disturbed. Cultural resources are beneficially impacted by the management direction.

Withdrawals: Under Alternative C, 355 acres are recommended for withdrawal around Garnet Ghost Town. Recommending a larger withdrawal reduces more impacts from mineral exploration and development on the many historic features and sites of the area. This is a beneficial impact to cultural resources.

Cumulative effects. Potential cumulative impacts to cultural resources would result primarily from surface-disturbing activities that cause erosion from vehicular traffic and/or machinery, soil compaction, and landscape alteration. Such activities could result in exposure, damage, and/or destruction of cultural resources. The policies associated with the cultural resource management program that require identification and mitigation of cultural resources prior to surface-disturbing activities would help to reduce potential impacts. Implementation of these requirements would also increase the potential for identification, recordation, and evaluation of cultural resources, although the potential would still exist for damage and/or destruction of previously unknown cultural resources discovered during construction. In addition, illegal OHV use, dispersed recreation, and other surface-disturbing activities not subject to a permitting process could result in exposure, damage, destruction, theft and/or vandalism of cultural resources.

3.3.6 Lands with Wilderness Characteristics

Section 201 of FLPMA requires BLM to maintain, on a continuing basis, an inventory of public lands, their resources, and other values. The BLM maintains current information to reflect changes in conditions and to identify new and emerging resource issues and other values. BLM Manuals 6310 and 6320 provide guidance in maintaining information regarding the presence or absence of wilderness characteristics, and to consider identified lands with wilderness characteristics in land use plans and when analyzing projects under NEPA.

Indicators

- Acres of land protecting wilderness characteristics over other multiple uses.
- Acres of land emphasizing multiple uses as a priority over protecting wilderness characteristics.

Analytical Methods and Assumptions

To be considered lands with wilderness characteristics, the following must apply:

- *Unit boundaries.* Wilderness identified roads, property lines, developed rights-of-way, or other substantially noticeable imprints of human activity normally form these boundaries.
- *Size.* Determinations of wilderness characteristics are based on roadless tracts of BLM-managed land of 5,000 acres or larger. Roadless areas can contain fewer than 5,000 acres where they are contiguous with lands that have been formally determined to have wilderness or potential wilderness values (naturalness, solitude, and primitive recreation), or any federal lands managed for the protection of wilderness characteristics.
- *Naturalness.* Lands with naturalness characteristics are affected primarily by the forces of nature, and are areas where the imprint of human activity is substantially unnoticeable.
- *Solitude.* Visitors may have outstanding opportunities for solitude when the sights, sounds, and evidence of other people are rare or infrequent; and where visitors can be isolated, alone, or secluded from others.
- *Primitive Recreation.* Outstanding opportunities for primitive and unconfined types of recreation are encountered where the use of the area is primarily through nonmotorized or nonmechanical means, and characterized by undeveloped types of recreational activities where developed recreational facilities are not required or present.

Very few acres on BLM-managed lands met the criteria for wilderness characteristics, usually due to the size requirement:

- BLM-managed lands in the decision area have few areas that are not roaded; finding 5,000 contiguous roadless acres was difficult. Most of the lands acquired have been heavily managed for industrial timber and contain roads.
- The lands that have wilderness characteristics are adjacent to a wilderness study area or recommended wilderness. If the Wales Creek WSA is released, or the Forest Service-managed Stoney Mountain Recommended Wilderness is no longer recommended as wilderness, the BLM lands with wilderness characteristics will no longer meet the size criteria and will no longer qualify as lands with wilderness characteristics.
- Adverse effects to wilderness characteristics would result from any management action that allows surface-disturbing activities that degrade naturalness.
- Effects to any of the wilderness characteristics criteria would affect the overall area's status as having wilderness characteristics.

Affected Environment

In 2014, decision area lands were assessed to determine if any lands had wilderness characteristics. This included lands that had been acquired since the last assessment was completed in 1978. As such, five units were initially reviewed: LBC Area Acquisition (2014-MTB01-01); Chamberlain Area Acquisition (2014-MTB01-04); Marcum Area Acquisition (2014-MTB01-05); and Bear Creek Flats Acquisition Area (2014-MTB01-06). These units have roads, and none consists of 5,000 acres of roadless and contiguous BLM-administered public land. As such, none of them warranted an intensive survey. However, there are parcels of land in the Chamberlain Area Acquisition that are adjacent to the Wales Creek WSA, that although they do not meet the size criterion on their own, have wilderness characteristics as tack-ons to the Wales Creek WSA.

In addition to the new review, the Field Office re-assessed the units from the initial, accelerated, and intensive assessments to identify any changes in conditions and new or emerging resource values. Below are these units: Wales/Garnets (MT-074-150); Hoodoos (MT-074-151A); Gallagher Creek (MT-074-151B); Nevada Mountain (MT-074-152); Silver King Tackons (MT-074-153); East Quigg Tackons (MT-074-154); West Quigg Tackon (MT-074-155); and Stoney Mountain Tackon (MT-074-156). Based on the updated information, Stoney Mountain Tackon was found to have wilderness characteristics as a tackon to the Stoney Mountain Recommended Wilderness.

Environmental Consequences

Impacts common to all alternatives. There are no impacts common to all alternatives.

Impacts under Alternative A. The 1986 Garnet RMP did not identify lands with wilderness characteristics outside of wilderness study areas. Thus, the no-action alternative would not protect any lands for their wilderness characteristics.

Impacts under Alternative B. Lands with wilderness characteristics would be impacted. Multiple uses are the priority over protecting approximately 2,523 acres of land with wilderness characteristics. Surface-disturbing activities, vegetation management, and casual use (such as recreation) would have the potential to alter the natural setting as well as reduce opportunities for solitude or primitive recreation. Although approximately 1,162 acres would be part of the Chamberlain SRMA, and 1,203 acres would be part of the Garnet SRMA, surface-disturbing activities would still occur.

Impacts under Alternative C. Impacts to wilderness characteristics are beneficial under this alternative. The BLM would protect approximately 2,523 acres of wilderness characteristics. Management direction provides guidance to preserve the wilderness characteristics by reducing or eliminating surface disturbance and large-scale infrastructure projects, closing the area to OHVs, and implementing MIST in case of wildfires, the naturalness of the area will be protected and visitors will be able to find solitude and primitive recreation opportunities. In addition, visual values are emphasized by allocating the areas to a VRM Class II. As such, there are beneficial impacts to naturalness, solitude, and primitive recreation.

If Congress were to release the Wales Creek WSA, the 2,365 acres would no longer meet the size criterion because they would no longer be contiguous to lands that have potential wilderness values. Approximately 1,444 acres would be managed as part of the Garnet Area SRMA, and 921 acres would be managed as part of the Chamberlain Area BCA. For those acres in the SRMA and BCA, impacts would be the same as in Alternative B. If the Stoney area no longer is recommended wilderness, 158 acres adjacent to the area would no longer be managed for wilderness characteristics, and impacts would be the same as Alternative B.

Cumulative effects. Federal agencies other than the BLM in the analysis area manage approximately 2,171,500 acres. There are seven wilderness areas (approximately 498,000 acres) and several other recommended wilderness areas located in the planning area on those lands. The BLM manages approximately 162,611 acres. The recently acquired lands were former industrial timberlands, resulting in few, if any, areas that meet the criterion for lands with wilderness characteristics.

3.3.7 Visual Resources

The BLM utilizes a visual resource management (VRM) system in accordance with BLM Manual 8400 to minimize visual impacts of surface-disturbing activities and maintain scenic values for the future. It involves inventorying scenic values, establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to ensure conformance with visual resource management objectives.

Analytical Methods and Assumptions

- The visual resource management system includes four visual resource classes. Class I is assigned to wilderness areas, wilderness study areas, wild sections of wild and scenic rivers, and other areas where the current management situation requires maintaining a natural environment that is essentially unaltered by humans. Classes II, III, and IV are assigned according to combinations of scenic quality, sensitivity levels, and distance zones.
- The visual resource inventory (VRI) involves identifying the visual resources of an area and assigning them to classes using the BLM visual resource inventory process (BLM Handbook 8410-1). The process involves rating the visual appeal of a tract of land (scenic quality), measuring public concern for scenic quality (sensitivity level), and determining whether tracts of land are visible from key travel routes or observation points (distance zones). The BLM-managed lands are placed into one of four visual resource classes based on the interrelationships among the three inventoried values.
- The four visual resource management classes are:
 - ◆ *Class I:* Preserve the existing character of the landscape (Wilderness and WSAs).
 - ◆ *Class II:* Allow for a low level of change that retains the existing character of the landscape.
 - ◆ *Class III:* Allow for a moderate level of change that partially retains the existing character of the landscape.
 - ◆ *Class IV:* Allow for major modification of the existing character of the landscape.
- Short-term effects on visual quality may occur for long-term resource benefit.
- An effect to the visual quality of the landscape occurs when a management activity creates noticeable surface disturbance that contrasts with the form, line, color, or texture in the landscape.
- Allowable uses and management actions that could affect visual resources include surface development and associated infrastructures such as vegetation management, mineral development, range improvement projects, or ROWs.
- Small-scale, dispersed development (such as range improvements), have a lesser impact due to the ability to fit these facilities into natural landscapes. Visual resources in areas with a high potential for mineral development are likely to have short-term impacts that bring about changes to the landscape. Vegetation management could affect the visual quality for the short term and long term, depending on the type and purpose of the treatment (such as fuel reductions in the wildland urban interface and fire management zone 1).
- Objectives for each VRM class would be maintained under the alternatives, and visual resource contrast ratings would be completed as part of any project. Potential impacts could occur under the alternatives, on a site-specific basis, from activities such as proposed mineral development, vegetation management, lands and realty actions, recreation, grazing, and fire suppression. However, by following BMPs and design features for specific projects, the degree or level of impacts to visual resources would be minimized.

Affected Environment

The visual resource inventory (VRI) involves identifying the visual resources of an area and assigning them to one of four visual resource classes using the BLM visual resource inventory process (BLM Handbook 8410-1). The visual resource inventory for the analysis area was completed in 2015. The visual resource inventory classes were geospatially mapped by overlaying scenic quality, sensitivity levels, and

distance zones. Because the GIS mapping process results in overlapping, slivering, and small anomalies, mapping areas of less than 200 acres were modified to fit with surrounding map units.

In the 1986 Garnet RMP, 133,811 acres were allocated to the visual resource management classes as follows:

- *Class I.* Approximately 23,480 acres of BLM-managed land (17 percent) was categorized as a VRM Class I. This class preserves the existing character of the landscape. It provides for natural ecological changes; however, it does not preclude limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- *Class II.* Approximately 3,702 acres of BLM-managed land (3 percent) was categorized as VRM Class II. This class retains the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- *Class III.* Approximately 28,785 acres of BLM-managed land (22 percent) was categorized as VRM Class III. This class partially retains the existing character of the landscape. The level of change to the characteristic landscape could be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- *Class IV.* Approximately 77,836 acres of BLM-managed land (58 percent) was categorized as VRM Class IV. This class provides for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance and repeating the basic elements.
- *Class V.* Approximately 325 acres of BLM-managed land was categorized as VRM Class V.

The updated VRI resulted in 23,480 acres categorized as VRI Class I. This acreage encompasses the 3 wilderness study areas in the planning area; 36,338 acres (22 percent) categorized as VRI Class II; 31,953 acres (20 percent) as VRI Class III; and, 70,840 acres (44 percent) as VRI Class IV.

Protection of visual values, resource management priorities, and desired outcomes were considered in relation to the VRI classes to determine the most appropriate VRM class designation. This process will result in new visual resource management classes (Class I – Class IV) for the decision area.

Environmental Consequences

Table 54. Summary of visual resource management classes by alternative

	Visual Resource Inventory ¹ Acres (percent)	Visual Resource Management Alternative A acres (percent)*	Visual Resource Management Alternative B acres (percent)	Visual Resource Management Alternative C acres (percent)
Class I	23,480 (14%)	23,480 (17%)	23,480 (14%)	23,480 (14%)
Class II	36,338 (22%)	3,702 (2%)	21,928 (13%)	26,586 (16%)
Class III	31,953 (20%)	28,785 (22%)	38,227 (24%)	63,782 (39%)
Class IV	70,840 (44%)	77,836 (58%)	78,976 (49%)	48,763 (30%)

	Visual Resource Inventory¹ Acres (percent)	Visual Resource Management Alternative A acres (percent)*	Visual Resource Management Alternative B acres (percent)	Visual Resource Management Alternative C acres (percent)
Class V	0	325 (<1%)	0	0

¹VRM was not done for the entire field office under Alternative A. Acreages and Percentages under Alternative A are based on a total acreage of 133,811.

Impacts under Alternative A. VRM classes do not cover the entire field office and differ the most from the recent VRI. Vegetation management, road building, utility corridor development and mineral development will continue to have short- and long-term impacts to the visual quality. Management of 7,850 acres as scenic corridors (Class II and III) will result in the maintenance of their scenic quality.

Impacts under Alternative B. Visual resource management changes from the visual resource inventory. Under this alternative, approximately 14,410 less acres are managed as a Class II as compared to the VRI. And, approximately 6,274 more acres as a Class III and 8,136 acres as a Class IV as compared to the VRI. Although there is a loss of acreage being managed as a Class II, there are more acres being managed as such as compared to Alternative A. In addition, more acres are being managed as a Class III as compared to Alternative A. As such, visual values are emphasized more under this alternative. Vegetation management, road building in support of projects, fuel reductions in the wildland urban interface and fire management zone 1, mineral development, range developments, rights-of-way, fire suppression, and recreation will have short- and long-term effects to visual quality by altering the landscape. There could be short-term effects from vegetation treatments that maintain or restore habitats. Overall, though, the treatment would improve the habitat and restore it to NRV, which improves the visual quality over the long term. Managing 6,830 acres for the Lewis and Clark National Historic Trail corridor as VRM Class II will result in maintaining the visual quality of the trail. Managing 23,480 acres of the WSAs as VRM Class I will result in maintaining the visual quality of those three WSAs.

Impacts under Alternative C. Under this Alternative, visual resources are the most emphasized, although there is a change from the Visual Resource Inventory. Approximately 9,752 less acres are managed as a Class II as compared to the VRI. Approximately 31,829 more acres are managed as a Class III and 22,077 fewer acres are managed as a Class IV as compared to the VRI. This means that more acres are being emphasized for visuals as compared to the VRI. In addition, more acres are in Class II and Class III as compared to Alternatives A and B. There are fewer acres in Class IV as compared to the other Alternatives. Vegetation management, road building in support of projects, fuel reductions in the wildland urban interface and fire management zone 1, mineral development, range developments, rights-of-way, fire suppression, and recreation will have short- and long-term effects to visual quality by altering the landscape. There could be short-term impacts from vegetation treatments that maintain or restore habitats. Overall, the treatments would improve the habitat and restore it to NRV, which improves the visual quality over the long term. Protection of approximately 2,523 acres for wilderness characteristics and designating approximately 12,827 acres for the Lewis and Clark National Historic Trail corridor as VRM Class II will result in maintaining the visual quality of those areas. Managing 23,480 acres of the WSAs as VRM Class I will result in maintaining the visual quality of the three WSAs.

Cumulative effects. The analysis area has experienced population growth and development and will continue to do so. Additionally, new lands will continue to be acquired. BLM-managed lands have seen an increase in outdoor recreation participation and tourism. Many rural communities rely on tourism to sustain their economies. As a result, management of scenic values on public lands continues to be an important aspect of natural resource management for the BLM.

3.3.8 Wildlife Habitat and Special Status Species

Bureau of Land Management (BLM) is responsible for managing wildlife habitat in partnership with Montana Fish, Wildlife, and Parks (MFWP), and U.S. Fish and Wildlife Service (USFWS). MFWP and USFWS manage fish and wildlife populations within the planning area, which includes licenses and permits for hunting and fishing. USFWS also provides regulatory oversight for species listed as threatened or endangered under the Endangered Species Act (ESA). Additional designations under the ESA include candidate species warranted, but precluded from listing; species proposed for listing; and critical habitat essential for the conservation and management of listed species. USFWS also administers the Bald and Golden Eagle Protection Act.

BLM would comply with the ESA, USFWS recovery plans and conservation strategies, and other guiding documents to manage Canada lynx (threatened) and grizzly bear (threatened). USFWS issued a Biological Opinion and Incidental Take Statement for the grizzly bear to the BLM in 2006, which was revised in 2012 (USFWS 2012); the final interagency Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy (NCDE GBCS); the Canada Lynx Conservation Assessment and Strategy (Interagency Canada Lynx Biology Team 2013), and the revised designation of Canada lynx critical habitat (USFWS 2014). Red knot (threatened) and yellow-billed cuckoo (threatened) have been recorded in Missoula County; they have not been recorded in Granite or Powell Counties. Habitat for these two species does not occur on Missoula Field Office lands. Therefore, red knot and yellow-billed cuckoo will not be further discussed in this document. Sensitive species management is to maintain or restore habitat, and to prevent listing under the ESA.

Indicators

Indicators reflect population levels, distribution, and quantity and quality of plant communities. This includes winter, spring, summer, and fall habitats, and travel corridors needed to support movement and genetic exchange. These indicators are necessary for species adaptability to future circumstances and conditions. Specific indicators include, but are not limited to:

- Acres of focal species habitat, moving toward, or maintaining mid-range natural range of variability (NRV).
- Acres of vegetation management treatments per decade.
- Ability to meet, or make progress toward, rangeland health standards 1 and 5.
- Ability to protect or improve habitat within riparian habitat conservation areas.
- Open road densities (mi/mi²) in NCDE zone 1 and big game winter range.
- Ability to implement conservation measures in USFWS conservation strategies or recovery plans for Canada lynx, Canada lynx critical habitat, and NCDE grizzly bear.
- Acres of big game winter, spring, summer, and fall habitat maintained and restored.
- Acres of moderate and high potential for mineral development within lynx habitat, NCDE GBCS zone 1, and big game winter range.
- Acres of right-of-way exclusion areas.

Geographic and Temporal scales

The analysis area for direct and indirect effects to wildlife species is BLM-managed lands within the Missoula Field Office, in Missoula, Granite, and Powell Counties. This includes zone 1 and 2 of the

NCDE Grizzly Bear Conservation Strategy; Canada lynx analysis units, and Canada lynx critical habitat; and winter, spring, summer, and fall habitat for special status species, birds and mammals, and big game within the three-county area.

The cumulative effects analysis area also includes lands within the three-county area. This includes the geographic scale for threatened and endangered species, bureau sensitive species, birds and small mammals, Montana species of concern, and big game. The anticipated life of the Plan is 20 to 30 years. However, because management actions have the potential to affect wildlife species and their habitats for many decades, the temporal analysis for modelled vegetation change and cumulative effects will discuss changes that may occur over the next 50 years, as conditions change and vegetation moves from one successional stage to another.

Analytical Methods and Assumptions

- *Threatened and Endangered Species.* Following USFWS recovery plans and conservation strategies would lead to the conservation and recovery of listed species' habitat.
- *Sensitive Species.* Following BLM Manual 6840: Special Status Species Management, and moving forest vegetation toward mid-range NRV, would maintain, restore, or enhance sensitive species habitat.
- *Habitat Association.* The BLM assumes that by maintaining ecological sustainability through achieving NRV, and managing for additional needs of key species, the BLM would be able to provide the habitat needs of diverse terrestrial wildlife species.
- *Natural Range of Variability.* Described in Section 3.2, NRV is optimal to provide habitat for a multitude of terrestrial wildlife species dependent on various plant communities. Managing vegetation according to NRV requires emulation of natural processes. The NRV is measured by species composition (tree size, class, and density), landscape pattern (patch size) and the risk of uncharacteristic disturbances.
- *Focal Species.* BLM identified key focal species to assess NRV for selected key ecosystem characteristics and to establish a context for whether these systems are functioning properly.
 - ◆ *Process to Identify Focal Species.* First, BLM identified the terrestrial wildlife species that are known to occur in the planning area by working with the Montana Natural Heritage Program, field-office data, and associated data (consideration of listing under the Endangered Species Act as a proposed or candidate species, or Montana State species of concern; whether native or accidental). Then BLM refined the list of key species that are known to occur in the planning area by collaborating with local biologists from the U.S. Forest Service; Montana Fish, Wildlife and Parks; and local birding and wildlife groups to gather scientific information on species, and to refine species' associations. Many of the individuals consulted have several decades of accumulated expertise on species and habitats of northwest Montana. BLM reviewed the Forest Plan Assessment for the Flathead National Forest and continued seeking information on local wildlife populations and habitat factors including abundance, distribution, stressors, trends in habitat, and responses to management.
 - ◆ *Selected Focal Species.* Habitats for seven specialized species (flamulated owl, black-backed woodpecker, northern goshawk, American marten, Canada lynx stand initiation habitat, Canada lynx multistory habitat, Brewer's sparrow, and fisher) and two generalists (grizzly bear and elk) were selected. These species are considered a good representation of the suite of potential species found in various habitat type groups. Rocky Mountain elk were included because recent research (Proffitt et al. 2015a) suggests that the availability of summer forage available within natural openings or following wildfires may be limiting elk populations as a result of long-term fire

suppression, or secondarily a decline in regeneration logging. In dense forest, openings may represent an increasingly rare habitat component.

- ◆ Focal species and associated habitat type group (HTG) include: flammulated owl (HTG 1 and 2), black-backed woodpecker (HTG 1, 2, 3, 4, 5, 6, and 7), northern goshawk (HTG 1, 2, 3, 4, 5 and 7), American marten (HTG 2, 3, 4, 5, 6, and 7), Canada lynx (HTG 3, 4, 5, and 7), grizzly bear (HTG 1, 2, 3, 4, 5, 6, 7, and 9), elk (HTG 1, 2, 3, 4, 5, 6, 7, and 9), Brewer's sparrow (HTG 9), and fisher (HTG 1, 2, 3, 4, 5, 6, and 7).
- ◆ BLM focuses on habitat-based management (characterized by habitat type groups) rather than species present. The availability of wildlife habitat is determined by the distribution, frequency, and intensity of disturbances, vegetation treatments and plant succession. Wildlife effects analyses performed at larger scales, the status of many wide-ranging species can be effectively analyzed by identifying suitable habitat based on a combination of vegetation characteristics using the assumption that "if the habitat is there, the species is there". Selected focal species above represent hundreds of terrestrial wildlife species utilizing similar habitat type groups (biophysical settings). This approach represents a small number of focal species to represent a large number of organisms. If focal species and their habitats are present, other organisms are assumed to be present. For example, flammulated owl would be a focal species for species inhabiting warm-dry habitat type groups, and an indicator for current conditions being within, or outside, NRV.
- ◆ Habitat type group associations utilized a SIMPPLLE data set developed specifically for BLM-managed lands to compare current habitat conditions within NRV. Description of the SIMPPLLE model and habitat type groups are described in section 3.2 and Appendix C.
- *Additional Need of Focal Species:* Birds and mammals utilize forest habitat in various stages of succession for nesting, denning, foraging, and migration. Fine filtered habitat components (standing dead and down wood, large live trees, species diversity, cover areas, security habitat, etc.) and habitat connectivity are important considerations particularly at the site-specific level.
- The 1997 Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana, North Dakota, and South Dakota (USDI-BLM 1997), particularly standards 1 (uplands) and 5 (wildlife habitat) would be used to provide a measurement of health for grassland/shrubland-dependent species.
- Riparian Habitat Conservation Areas (RHCA) management (section 3.3.2) has and would continue to provide habitat for wildlife species dependent upon riparian habitats.

Affected Environment

The planning area is within the Middle Rockies Ecoregion located mostly in southwest Montana, eastern Idaho, and northern Wyoming. Characteristic vegetation includes: Douglas-fir, lodgepole pine, quaking aspen, subalpine fir, Engelmann spruce, ponderosa pine, and western larch. Whitebark pine is present at higher elevation. Limber pine occurs on dry, rocky, calcareous soil formations. Foothills are wooded, or shrub and grass covered. Valleys are composed of sagebrush and grasslands. Approximately 285 bird, 77 mammal, 10 reptile, and 8 amphibian species inhabit the planning area. Wildlife resources include: game species (big game, upland game birds, waterfowl, web-less migratory birds, and furbearers) and nongame species (raptors, reptiles, amphibians, nongame mammals, resident birds and migratory birds), and their habitat. Wildlife species include: black and grizzly bear, gray wolf, bighorn sheep, moose, mountain lion, Canada lynx, mountain goat, mule and white-tailed deer, yellow-bellied marmot, northern flying squirrel, Cooper's hawk, bald and golden eagle, Steller's jay, trumpeter swan, mountain bluebird, ruffed grouse, Clark's nutcracker, brown creeper, western toad, and long-toed salamander.

The current conditions and trends for terrestrial wildlife were described in detail in the Analysis of the Management Situation (AMS), on pages 111-146 (USDI-BLM 2016), which is incorporated by reference. The information below is summarized from the AMS and other references. This section addresses special status species, big game, and migratory birds with an emphasis on focal species to provide context for the environmental consequences.

ESA-Listed Species. Grizzly bear and Canada lynx are listed threatened under the ESA. The BLM manages for the conservation and recovery of these species in partnership with the USFWS following the conservation measures associated with the applicable recovery plans and conservation strategies. Canada lynx critical habitat is designated. Both species are focal species, and discussed further below.

Bureau-Sensitive Species. Fifteen BLM-sensitive species are verified on BLM-managed lands in the planning area. These species are listed in Table 27 of the AMS, which is incorporated by reference. Bureau-sensitive species are those species designated by the Montana/Dakotas BLM State Director, in cooperation with Montana Fish, Wildlife and Parks and the Montana Natural Heritage Program. Species the BLM considers sensitive would change over the life of the RMP. This list is required to be reviewed a minimum of every five years per BLM Manual 6840 Direction. Sensitive species are rare species occurring on BLM-managed land where the agency has the capability to affect the conservation status of the species through management. Four sensitive species, flammulated owl, black-backed woodpecker, Brewer's sparrow, and fisher, are focal species discussed below.

Neotropical Migratory Birds. Over 55 species of migratory birds are known to inhabit BLM-managed lands in the planning area. The comprehensive list of species is located on table 28 of the AMS. The majority of Neotropical migratory birds are believed to be secure, and their habitat has been maintained by existing management, which addresses migratory birds at the site-specific level with appropriate project design features and BMPs (see appendix P). Kleinschmidt Lake is located in the Blackfoot Valley, Montana Important Bird Areas Program; and there is also a small piece of BLM land located in the Clark Fork/Grass Valley Montana Important Bird Areas Program (Montana Audubon 2008).

Big Game. Ten big game species occur on BLM-managed lands in the planning area: elk, mule deer, white-tailed deer, moose, pronghorn antelope, bighorn sheep, mountain goat, mountain lion, black bear, and gray wolf. The AMS describes these species in detail. BLM supports the MFWP's big game herd management objectives, which are based on herd units, to manage big game habitat. Boundaries of herd units are designated to encompass the seasonal ranges, habitats, or special life-function areas (such as calving and lambing areas) utilized by a more or less discreet population herd. Approximately 10 percent of the planning area is bighorn sheep habitat, with BLM-managed lands representing less than 1 percent, the majority of which is on Ram Mountain, west of Philipsburg. Elk is a Focal species described in detail below to represent this group.

Travel Corridors. Threatened, endangered, and candidate species; sensitive species, resident and migratory birds, small mammals, and elk and big game utilize BLM-managed lands for seasonal and daily use. Corridors are travel routes used by wildlife to disperse and to connect with other habitat. Corridors allow for seasonal movements between summer and winter range for species such as elk and deer and are important for movement of young animals dispersing from their place of birth to establish new territories and home ranges. This can be critical for territorial species such as mountain lions. Corridors may be used for daily movement from cover to foraging areas.

Connectivity to habitat providing forage and cover is crucial for the health of wildlife populations during all seasons. Connectivity provides travel corridors for dispersal and movement to spring, summer, fall, winter, and year-round habitat. Corridors are important for connecting movement and habitat for grizzly bears and Canada lynx. This provides for the exchange of genetic material between grizzly bear

populations, such as the Greater Yellowstone Ecosystem and the Northern Continental Divide Ecosystem, which strengthens conservation and recovery of threatened and endangered species.

Habitat fragmentation and isolation of populations, as a result of degradation or elimination of corridors, can result in small, vulnerable populations. Fragmentation of habitat is a concern within the planning area due to privately owned lands that have the potential to be developed. However, 70 percent of BLM-managed land within the planning area is contiguous with other federal and state lands, primarily National Forest and Montana DNRC-managed lands. BLM-managed lands contiguous with other federal and state lands are larger than 1,280 acres, and provide an opportunity for management of wildlife corridors and core habitat.

Focal Species and Habitat Associations. BLM tracked six forest habitat type groups (HTG) from three broad-level USFS vegetation groups or potential vegetation types (PVT) (Milburn et al. 2015). The three broad-level groups are Warm/Dry, Cool/Moist, and Cold. Appendix C and Section 3.2 of this document describe modeling, plant communities, and habitat type groups. The six HTGs consist of:

- Warm/Dry. Habitat type group 1: warm Douglas-fir (20 percent of BLM-managed lands)
- Warm/Dry. Habitat type group 2: cool Douglas-fir (50 percent of BLM-managed lands)
- Warm/Dry. Habitat type group 3: moist Douglas-fir (3 percent of BLM-managed lands)
- Cool/Moist. Habitat type group 4: moist subalpine fir (16 percent of BLM-managed lands)
- Cool/Moist. Habitat type group 5: cold subalpine fir (4 percent of BLM-managed lands)
- Cold. Habitat type group 6: very cold subalpine fir (7 percent of BLM-managed lands)
- Habitat type group 7: Riparian (1<percent of BLM-managed lands)
- Habitat type group 9: grassland/sagebrush (1<percent of BLM-managed lands)

BLM selected focal species to represent terrestrial wildlife species utilizing similar habitat type groups (biophysical settings). The nine focal species and their associated habitats consist of: forest habitat (American martin, flammulated owl, elk-summer forage habitat, black-backed woodpecker, northern goshawk, and Canada lynx (mature multistory and early-stand initiation); grassland/shrubland habitat (Brewer's sparrow); riparian habitat (fisher), and general habitat (grizzly bear). These species represent specialists and generalists, and are considered a good representation in the suite of represented species as described in the analytical assumptions above. Grizzly bear and elk are generalist; the American marten, flammulated owl, black-backed woodpecker, northern goshawk, Canada lynx, Brewer's sparrow, and fisher are specialists. The grizzly bear is included in this analysis due to its importance for conservation, recovery, and delisting. Vegetation treatments would be designed to enhance, maintain, and restore wildlife habitat within NRV. Focal species would be monitored to determine if the effects of vegetation management complements habitat management.

Habitat type groups are currently within NRV, although some are within the lower end of NRV. This suggests that BLM's vegetation management has been successful over the past decades in maintaining or achieving NRV, as further described below.

Focal Species: Grizzly Bear. This focal species is a habitat generalist utilizing forest, grassland/shrubland, and riparian habitats and not dependent upon a specific habitat type group. Grizzly bear prefers HTG 1, 2, 3, 4, 5, 6, 7, and 9.

USFWS listed the grizzly bear as a threatened species in 1975. Terms and conditions of a biological opinion and incidental take statement to the BLM apply to BLM-administered lands north of Interstate

90, where approximately 130,950 acres are considered occupied grizzly bear habitat. BLM-administered lands inhabited by grizzly bears are in the Northern Continental Divide Ecosystem Grizzly Bear Recovery Plan (USFWS 1982, 1993, and 2018a). Recovery goals have been met, and the proposal to delist the NCDE grizzly bear population is underway (USFWS 2013). In May 2018, the USFWS announced the availability of the final edition of the NCDE Grizzly Bear Conservation Strategy, located at <https://www.fws.gov/mountain-prairie/es/grizzlyBear.php>.

The conservation strategy provides objective, habitat-based criteria for the recovery of Northern Continental Divide Ecosystem grizzly bears, and builds upon the existing roadmap to grizzly bear recovery for the USFWS and our conservation partners. The conservation strategy would be the post-delisting management plan for the NCDE grizzly bear and their habitat. Under the strategy, there are approximately 112,461 acres of BLM-administered lands included in NCDE Zone 1 (69 percent of the BLM-managed lands in the planning area). The objective of Zone 1 is to support continued occupancy of grizzly bears. There are approximately 27,654 acres of BLM-administered land in NCDE Zone 2. The objective of this area is to maintain existing resource management and recreation opportunities, and allow agencies to respond to demonstrated conflicts (USFWS 2018a). Figure H-40 in Appendix H: Maps, shows Zones 1 and 2 across the planning area.

Grizzly bears require large, contiguous habitat that is remote and with limited human activity. Habitat is generally a mix of plant communities interspersed across the landscape. Habitat selection is typically influenced by the abundance and quality of food, gender-specific orientation to different nutrients, reproductive status of females, concerns about the security of dependent young, presence and identity of other bears, and presence of humans and prior contact with humans (Rowland et al. 2000). Grizzly bears are generalists, opportunistic omnivores, with common food sources being grasses, sedges, fruits, berries, nuts, rodents, insects, carrion, and young or disabled elk and deer. They typically choose low-elevation riparian areas and wet meadows during the spring, and retreat to higher elevation meadows, ridges, and open brush fields during the summer and fall (USFWS 1993). During fall, habitat types with abundant fruit and berry production become increasingly important. Grizzly bears dig dens on steep slopes where wind and topography cause an accumulation of deep snow, and where the snow is unlikely to melt during warm periods. Most dens in the planning area are located above 6,400 feet (USFWS 2018a).

Road construction can modify grizzly bear habitat. Research has indicated that grizzly bears underutilize habitat near open roads (Mace et al. 1996; McLellan and Shackleton 1989). Managing motorized access can aid in minimizing negative effects to bears from interactions with humans and provide for secure habitat. The USFWS issued a Biological Opinion and Incidental Take Statement to the Missoula Field Office in October 2006 regarding the effects of the 1986 Garnet RMP on grizzly bears north of Interstate 90 (USFWS 2006), which totals approximately 130,950 acres. BLM lands south of I-90 (25,600 acres) are also considered occupied grizzly bear habitat, but were not included in the 2006 Biological Opinion. Sows with cubs have been verified south of I-90 (Jamie Jonkel, personal communication 2018). In the terms and conditions section of the incidental take statement, the USFWS stated:

“At the end of a 5-year period commencing with the implementation of the biological opinion and incidental take statement, the USFWS will review the environmental baseline including annual monitoring reports described below to determine if conditions warrant modification or extension of the incidental take exemption.”

In the 2006 biological opinion, the USFWS reviewed direct, indirect, and cumulative effects analyses; new information on the status of the species; an updated baseline for BLM-managed lands; and monitoring reports and determined an extension of the incidental take exemption is reasonable and so warrants an amended incidental take statement for the 2006 proposed action. The amended incidental take

statement for the biological opinion on the effects of the Missoula RMP on grizzly bears was issued on October 11, 2012 (USFWS 2012).

The revised incidental take statement is based on the continued implementation of RMP management activities, as well as the updated baseline conditions and grizzly bear status information. In accordance with the reinitiation criteria, if the amount of incidental take anticipated in the amended statement is exceeded, reinitiation of formal consultation would be required if:

- The net increase in newly constructed permanent system roads in the action area exceeds a net increase of five miles post-2006 through 2022.
- The amount of temporary road construction exceeds 27 miles through 2022.
- More than one grizzly bear is removed from BLM-managed lands over the next ten years due to food or attractant storage issues, or as a result of livestock grazing conflicts.

Permanent and temporary roads have been constructed and/or decommissioned since 2006. Based on the miles of road construction and decommissioning, current road calculations indicate that as of 2018, 7.3 miles of new permanent-system roads and 23.2 miles of temporary roads could be constructed on BLM-managed lands north of Interstate 90. Road management amenable to grizzly bears would be key features and indicators essential for conservation and recovery of the species.

Considerable research has been conducted on wildlife corridors within the Northern Rocky Mountain Region. The modeling approaches for travel corridors typically rely on assumptions that migrating animals would select the path of least resistance for optimum travel. These paths would be areas where the animal would encounter fewer hazards, spend less time traveling, and would travel through habitat with a higher probability of containing food and concealment, increasing the chance for survival. Walker and Craighead (1997) identified potential corridors within Montana using geospatial data and “umbrella” species. One of the “umbrella” species they selected was the grizzly bear. They identified corridors that had the highest likelihood of successful movement of bears between the Greater Yellowstone Ecosystem and the NCDE. Many of these corridors occur within the planning area.

Similarly, Craighead et al. (2002) modeled wildlife corridors within the Northern Rocky Mountain Ecoregion, delineated core and sub-core habitat areas, and described corridors based on their habitat quality. Corridors were developed based on the habitat needs of grizzly bears. Core areas were described as areas large enough for wildlife to forage and reproduce, while sub-core areas were areas that could act as stepping-stones for wildlife as they move through the region. Corridors were described as areas of predicted movement between core and sub-core areas, where habitat quality is high, but not as high and contiguous as the core and sub-core areas. Corridors and security habitat would be key features and indicators for grizzly bear conservation and recovery. The three existing wilderness study areas, consisting of 23,480 acres, provides security habitat within the analysis area. Connectivity between the NCDE and the Bitterroot, Yellowstone, and Cabinet-Yaak ecosystems is essential for grizzly bear conservation and recovery.

Focal Species: Canada Lynx Mature Multistory and Stand Initiation Habitat. This focal species is a habitat specialist dependent upon certain habitat components, including mature multistory and stand initiation habitat. Canada lynx prefers HTG 3, 4, 5, and 7.

The USFWS listed the Canada lynx as threatened under the ESA in 2000 (USFWS 2015); the USFWS designated critical habitat in 2009, which was revised in 2014. Missoula BLM-managed lands are part of Unit 3, Northern Rocky Mountains Geographic Area. The southernmost lynx population in western Montana is currently located in the Garnet Range. Core lynx habitat is further divided into seven lynx

analysis units (LAUs); five LAUs in the Garnet Range and two LAUs in the Hoodoo Mountains. The seven LAUs encompass approximately 316,156 acres, of which approximately 100,123 acres are located on BLM-managed lands. The Garnet Range is considered occupied habitat, although Canada lynx have not been documented since 2010, and the latest monitoring effort in 2018 did not detect Canada lynx. Continued monitoring would determine if lynx have been extirpated in the Garnet Range. The Hoodoo Mountains are not considered occupied lynx habitat, but may be important for lynx recovery.

Canada lynx elevation range in the planning area is generally from 3,900 to 6,900 feet. Lynx occur in moist subalpine fir potential vegetation types, above the dry ponderosa pine and Douglas-fir potential vegetation types, and below the alpine zone. Lynx select mature multistory forests, with high horizontal cover, composed of mature Engelmann spruce and subalpine fir, with lesser components of lodgepole pine, Douglas-fir, and western larch. Lynx occupy similar areas year round; however, during summer, lynx shift toward more use of regenerating forests with stand initiation structure and abundant small diameter trees, with shrubs, and high horizontal cover. Lynx habitat in the decision area is characterized by moderate, rolling topography, with gentle to moderate slopes dissected by steep limestone canyons, mostly covered by coniferous forests (Interagency Canada Lynx Biology Team 2013).

Canada lynx are limited to cool-moist boreal forests supporting a minimum density of snowshoe hares (1 hare/5 acres) where winters are snowy. Two important human influences on snowshoe hare habitat are timber harvest and prescribed burning. Timber harvest and its related activities are a predominant land use affecting lynx habitat. Forestry practices can be beneficial when the resulting understory stem densities and structure meet the forage and cover needs of snowshoe hare (USFWS 2000). Stand initiation and mature multistory forest structure, with high horizontal cover, is optimal habitat for lynx and snowshoe hares. Winter is a limiting factor for Canada lynx persistence, and year-round habitat is essential for population viability (Interagency Canada Lynx Biology Team 2013). Wildfire maintains a mosaic of forest successional states in lynx habitat. Fire suppression has reduced stand initiation habitat.

Canada lynx Critical Habitat is located on BLM-managed lands north of Interstate 90 (108,426 acres). Under the ESA, the physical and biological features essential to the conservation of lynx focus on the features' primary constituent elements. Primary constituent elements are those specific elements of the physical or biological features that provide for a species' life history processes, and are essential to the conservation of lynx. Only one primary constituent element (1) is specific to lynx in the contiguous United States. Canada lynx need boreal forest landscapes supporting a mosaic of differing successional forest stages. Canada lynx also need the landscape to contain: (1a) presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs, or overhanging boughs that protrude above the snow, and mature multistory stands with conifer boughs touching the snow surface; (1b) winter conditions that provide and maintain deep fluffy snow for extended periods of time; (1c) sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and (1d) matrix habitat (such as hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range), such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range (USFWS 2014).

Focal Species: Canada Lynx Mature Multistory Habitat. Canada lynx are listed threatened under the ESA. Potential lynx habitat is generally described as moist, boreal-coniferous vegetation with cold, snowy winters that provide a prey base of snowshoe hares. Additionally, sites that typically have deep snow depths provide lynx, with their big feet, a competitive advantage over other mid-sized predators such as coyotes and bobcats (Koehler and Aubry 1994). Primary vegetation in the Northern Rockies that provides for snowshoe hares and lynx includes subalpine fir and Engelmann spruce forest types, as well as mesic lodgepole pine and aspen forests at mid to high elevations (Koehler and Aubry 1994).

Canada lynx mature multistory habitat includes older forest stands providing dense coniferous understories that maximize cover and browse for hares at varying snow depths throughout the winter. Only mature multistory stands, where tree limbs typically touch the snowline and where the understory is dense, provide winter habitat for snowshoe hares. Horizontal cover, found in mature multistory forest stands, is a major factor affecting winter hare densities.

During winter, lynx forage primarily within a narrow elevation band composed of mature, large-diameter trees greater than 11 inches d.b.h. with higher horizontal cover, more abundant hares, and deeper snow than is available elsewhere (Squires 2010). These preferred forests include spruce-fir in the overstory and midstory, forming a mature-multistory structure with high-horizontal cover from conifer boughs touching the snow surface. During winter, the primary component of horizontal cover is subalpine fir, followed by other sapling tree densities. Sapling and other tree densities in forests used by lynx during winter were about 1,000 stems per acre for saplings, and about 280 stems per acre for other trees (Squires 2010).

Squires et al. (2008) identified two relatively high-density reproducing lynx populations: one located in the Yaak drainage on the Kootenai National Forest, and one located in the Seeley-Swan area on the Flathead and Lolo National Forests. Within the analysis area, the Chamberlain and Murray-Douglas areas are extensions of the latter subpopulation. Both have substantial percentages of high elevation, moist spruce-fir lynx habitat. Scattered individuals have been located over much of the remainder of northwestern Montana west of the continental divide, but at much lower densities and with little or no evidence of successful reproduction.

Focal Species: Canada Lynx Stand Initiation Habitat. Stand initiation lynx habitat is made up of young, dense stands of conifer saplings and deciduous shrubs that have regenerated after a disturbance such as a timber harvest or stand-replacing wildfire. These stands provide adequate cover and browse for reproduction and survival of snowshoe hares. On average, forest stands begin to provide winter habitat for snowshoe hares 15 to 20 years after disturbance (Koehler and Aubry 1994), once trees and shrubs are tall enough to extend above the snow (Koehler and Brittell 1990), and will often continue to provide habitat for another 20 to 25 years, unless they are thinned (although a more recent study suggests a longer timeline depending upon geographic region and productivity). Denser stands appear to offer better habitat conditions for snowshoe hares; stands with less than 1,000 stems per acre are insufficiently dense to provide high quality habitat for hares (Griffin and Mills 2007).

Focal Species: Elk Summer Forage Habitat. This focal species is a habitat generalist exhibiting a wide-range of habitat tolerance and the availability of summer forage within natural openings or following wildfires is an increasingly important habitat component (Proffitt et al. 2015a). Elk prefer HTGs 1, 2, 3, 4, 5, 6, 7, and 9. This focal species covers big game species and habitats including, but not limited to, elk, mule deer, whitetail deer, moose, mountain lion, bighorn sheep, gray wolf, and black bear. These species are described in detail in the AMS on pages 115-116, which is incorporated by reference.

Elk are an important species for Montana. There are approximately 106,594 acres of elk summer and fall habitat on BLM-managed lands in the planning area. Elk are present on BLM-managed lands primarily during summer in the Hoodoos area, or winter in the Marcum Mountain area.

Adequate security habitat and forage availability are important to maintaining elk populations. Herd units dominated by dense forest and lack of natural disturbance and limited summer range forage may impact populations. Ongoing research (Proffitt et al. 2015a) in the Bitterroot National Forest suggests forage availability on summer range affects elk populations as much, if not more, than winter range. Important food plants including: serviceberry, Rocky Mountain maple, and grasses grow only in forest openings or forests with a more open canopy. Proffitt et al. (2015b) also studied the effects of elk calf survival from

predation. Although wolf populations in their study area were high, they found substantially greater predation from mountain lions.

Vegetation management, livestock grazing, mining, and recreation are the most prominent resource uses within elk habitat areas on BLM-lands. Vegetation management creating a mosaic of forest conditions can be especially beneficial by providing abundant food resources in close proximity to cover and designed to promote security habitat. Timber harvest and prescribed fire can improve elk habitat, because it improves the cover-to-forage ratio, which should not fall below 40:60 (Thomas 1979) respectively. Activities associated with timber harvest and prescribed fire may temporarily disturb elk. Livestock grazing conflicts have been managed at the site-specific level. Elk and cattle have dietary overlap and can compete for forage, which can become critical on winter range. Cattle and elk do not typically utilize the same areas during the winter season since livestock are usually concentrated on private land. Open road densities can influence elk habitat. BLM lands in the planning area provide some of the highest levels of hunting on public land and the highest level of bull elk harvest (MFWP 2005b).

Focal Species: Flammulated Owl Habitat. This focal species is a habitat specialist, is a Neotropical migratory bird, and is a BLM sensitive species. Flammulated owl prefers HTG 1 and 2, which represents 70 percent of BLM-managed lands. These habitats provide for many species including, but not limited to, pileated woodpecker, Clark's nutcracker, mountain bluebirds, bald eagles, and golden eagles, which are described in the AMS, which is incorporated by reference.

Flammulated owls inhabit montane forests, usually open conifer forests containing ponderosa pine and Douglas-fir, with large snags (Hays and Rodrick 2004, Hayward and Verner 1994, Samson 2006b). Flammulated owls show a strong preference for ponderosa pine and Jeffrey pine throughout its range (McCallum 1994b). Home ranges composed of at least 75 percent old ponderosa pine/Douglas-fir forests, were occupied more continuously than home ranges consisting of less than 75 percent in this forest type (Reynolds and Linkhart 1992, Linkhart et al. 1998). Within the analysis area, ponderosa pine-dominated forests are relatively abundant on the western portion (for instance the Lower Blackfoot corridor), but become uncommon in the central and eastern portions (like the Hoodoos and Philipsburg areas).

Flammulated owls prefer late-succession forests, with open canopies (less than 40 percent cover) (Samson 2006a), and avoid dense-young stands of Douglas-fir (Wright et al. 1997). They most often nest in an abandoned tree cavity made by pileated woodpecker, northern flicker, sapsucker or other large primary cavity nesting species (Reynolds et al. 1989). These nest sites may have pockets of dense Douglas-fir near the nest that are used for roosting (Wright 1996). Flammulated owls use dead, large-diameter ponderosa pine, Douglas-fir, or quaking aspen trees, and occasionally use a natural cavity or nest box. Flammulated owls nearly always nest in open conifer forest with large old trees, scattered thickets of shrubs and saplings, and clearings (McCallum 1994a). Flammulated owls also avoid clear-cuts and intensively cutover areas, but will use thinned or selectively logged stands. Research (Hayward and Verner 1994, Wright 2000) suggests that flammulated owls require open understories to successfully forage for moths and grasshoppers. Since few existing mature ponderosa pine stands are open (less than 40 percent crown closure) due to long-term fire exclusion, flammulated owls may be selecting dense stands simply because those remain in most front-country areas.

Habitat specialization and an unvarying reproductive rate, even in years of high food abundance, suggest the species is adapted to a stable environment. Suitable nesting habitat is limited to forested stands with an average DBH greater than 15 inches and crown closures of less than 40 percent. Based upon adjacent Forest Service FIA data, forests with an average DBH greater than 15 inches contain sufficient snags to provide habitat for the species that excavate nesting cavities used by flammulated owls.

Focal Species: Northern Goshawk Habitat. This focal species is a habitat specialist and a Neotropical migratory bird. Northern goshawks prefer HTG 1, 2, 3, 4, 5, and 7. The USFWS found that northern goshawks typically use mature forests and large trees for nesting habitat; however, they are considered a forest habitat generalist at larger spatial scales (USDI Fish and Wildlife Service 1998b). Northern goshawks typically select nest sites in mature coniferous forests with relatively closed canopies (50 to 90 percent) and open, multistory stands (Brewer et al. 2007, Kennedy 2003, Reynolds et al. 1992, Reynolds et al. 2008) of at least 30 acres or greater (Reynolds et al. 1994). However, northern goshawks are not limited to continuous mature stands (USDI Fish and Wildlife Service 1998a).

Greenwald et al. (2005) reviewed telemetry-based studies of northern goshawks across North America, including a wide range of habitats across the United States, and found that goshawks generally select stands based on structure, but that selection varied by forest type. For example, in lodgepole pine stands, canopy closure ranged from a mean of 34 to 80 percent and a size of 9- to 15-inch DBH, whereas trees up to 20 inches DBH were selected in mixed species stands. Northern goshawks are adept at finding dense, multistory microsites suitable for nesting within dry, cold lodgepole pine-dominated stands that otherwise do not appear suitable for nesting (Squires and Ruggiero 1996). Fledgling success in Montana was higher in landscapes that contained a mix of open and dense forested stands than in landscapes with only dense stands (Clough 2000). Northern goshawks use multiple cover types and age classes for foraging habitat (Kennedy 2003).

The data suggest that there is a preference for large (10 to 15-inch DBH and 15+-inch DBH), moderately dense (40 to 60 percent crown closure), and dense (60 percent plus crown closures) stands. Interestingly, a substantial percentage of nests occur in forest stands normally considered too small (less than 10-inch DBH) or in stands too open (less than 40 percent crown closure) for nesting northern goshawks. This phenomenon is typical for northern goshawk nest distribution, and explains why McGrath et al. (2003) had difficulty in predicting suitable nest locations from random sites in a blind sample test. McGrath et al. (2003) concluded from data collected at the nest that such small stands (0 to 5-inch DBH) or very open stands (10 to 40 percent crown closure) often contain micro-sites of large, dense trees (resulting from past mixed-severity wildfires) that are undetectable at the stand scale.

While research indicates the query design for northern goshawks could include stands as small as 10 inches DBH, trees in the 10 to 15-inch DBH class were ignored as possible habitat in this analysis, simply to generate a more conservative estimate of nesting habitat.

Focal Species: American Marten Habitat. This focal species is a habitat specialist and prefers habitat type groups 2, 3, 4, 5, 6, and 7. Habitat for martens also supports many large, dense forest-associated species such as wolverine and small mammals, and recognizes an increasing trend in habitat loss due to high severity wildfires exacerbated by long-term fire suppression and warming climate trends (ERG 2016).

American marten prefer moist, mid-to-late succession coniferous forests, with moderate-to-high canopy closure at mid-to-high elevations (Ruggiero et al. 1994). Martens are often labeled as an interior forest species, since they prefer large patches of late-succession coniferous forest (Ruggiero et al. 1994). Marten prefer high densities of snags and coarse woody debris as complex physical structures near the ground provide refuge sites, access to prey, and a protective thermal environment (Buskirk and Ruggerio 1994). Martens are subnivean foragers, and are well suited to deep snow conditions (Ruggiero et al. 1994).

In the analysis area, habitat groups, with the exception of warm-dry ponderosa pine/Douglas-fir, were included as potential marten habitat, consistent with locations of published research as well as numerous marten observations (Tomson 1999, Wasserman et al. 2010, Montana Natural Heritage Program 2013).

Focal Species: Black-Backed Woodpecker Habitat. This focal species is a habitat specialist and is a BLM sensitive species. Black-backed woodpecker prefers HTG 1, 2, 3, 4, 5, and 6. Habitat for black-backed woodpeckers, identified by post-burned stands, has undergone huge shifts in availability in the last several decades. In the 1990s, post-burned forests were presumed to be substantially below NRV and at further risk from fire salvage logging. By the mid-2010s, post-burn habitat was higher than NRV and at no risk from modest levels of fire salvage (ERG 2012, 2016). The habitat of black-backed woodpeckers and other disturbance-dependent species include, but is not limited to, American three-toed woodpecker, Lewis' woodpecker, and secondary cavity dependent species.

Black-backed woodpeckers are associated with boreal and montane coniferous forests that have experienced recent burns. Black-backed woodpeckers are known to use three types of forested habitat. Primary habitat according to Saab and Dudley (1998) are post-fire areas that have burned within one to six years². As a secondary habitat, Goggins et al. (1987) found that areas with extensive bark beetle outbreaks that had not burned, had high densities of nesting black-backed woodpeckers. Saab and Dudley, however, found no comparable high-density nesting use in Montana in similar situations. A third category of habitat may include areas of smaller disturbances scattered throughout the forest caused by wind throw, ice damage, or other occurrences that produce small patches of dead trees. The latter category habitat is more hypothetical than the previous categories. In the absence of wildfire, black-backed woodpeckers largely “disappear” and are rarely observed. Biologists suggest that small, endemic insect outbreaks may allow black-backed woodpeckers to survive with low reproductive success until the next wildfire. Regardless of the woodpecker's survival strategy during periods of low wildfire, the availability of periodic wildfire is essential to survival of the species (Hutto 1995).

Within post-burned habitats, black-backed woodpeckers select a diverse mixture of conifer species for feeding and nesting, none of which is by themselves essential to the species. These include ponderosa pine, spruce, western larch, mountain hemlock, Douglas-fir, and lodgepole pine (Dixon and Saab 2000). Black-backed woodpeckers nest in snags at high densities in burned areas and can colonize small, isolated burns (Hitchcox 1996). Saab and Dudley found black-backed woodpeckers in burns as small as 75 acres. Black-backed woodpeckers in the Northern Rockies have a high degree of relatedness and can colonize burns across a wide geographic range (Pierson 2009). Hoyt and Hannon (2002) concluded that black-backed woodpeckers colonize new burns up to 50 kilometers away.

High-severity stand-replacing wildfires may be particularly important for this species (Hutto 1995), though the woodpeckers may also select lower-intensity fires such as controlled burns (Russell et al. 2009). Black-backed woodpecker abundance was not correlated to burn size, but best correlated to the number of snags remaining after fire in the Northern Rockies (Hutto 1995). Forristal (2009) found that black-backed woodpeckers showed changing preferences for nest snag characteristics over time and recommended that the full range of snag species and diameters should be a component of maintaining black-backed nest habitat.

At the plot scale, snag density was the most important predictor of nest-site occurrence, with increasing snag numbers greater than 9 inches DBH associated with black-backed woodpecker nesting. In the Blue Mountains, located in northeastern Oregon, mean DBH of nest trees was 37 centimeters (14.6 inches) (n = 15), and trees were generally recently dead (less than 5 years) (Bull et al. 1986). Hejl et al. (2000) concluded that salvage logging eliminated black-backed woodpecker habitat, even when some unburned trees were left.

^{2 2} Decadal timesteps in SIMPPLLE modeling of NRV forced the habitat query to look back 10 years instead of six.

Forest-Dependent Focal Species: Natural Range of Variability (NRV). Current levels of habitat for black-backed woodpecker, elk summer forage habitat, flammulated owl, lynx mature multistory (MS), lynx stand initiation (SI), and marten habitat are compared against NRV for BLM lands in Figure 22. Goshawk is shown to be within NRV in Figure 23. Habitats analyzed are within their respective NRV, although varying between the low to upper range.

Figure 22. Comparison of Current Levels of Wildlife Habitats against NRV for BLM Lands

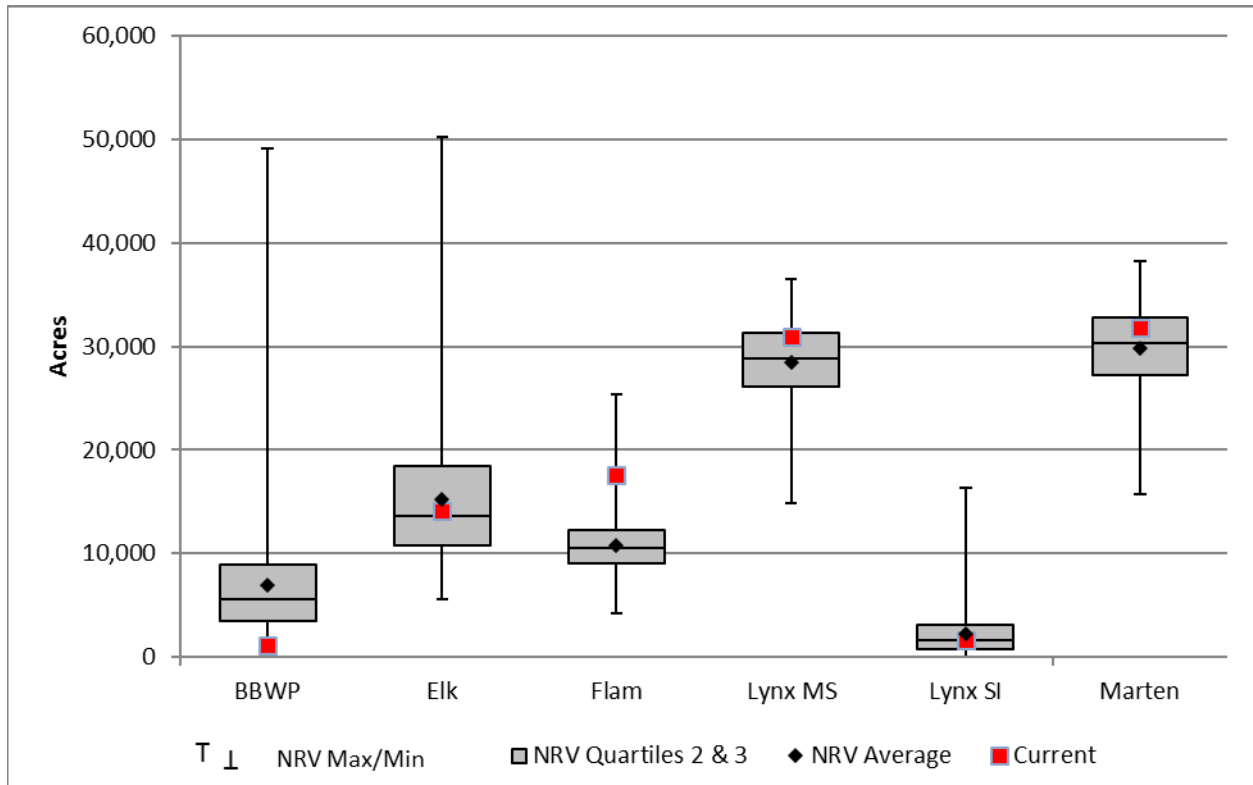
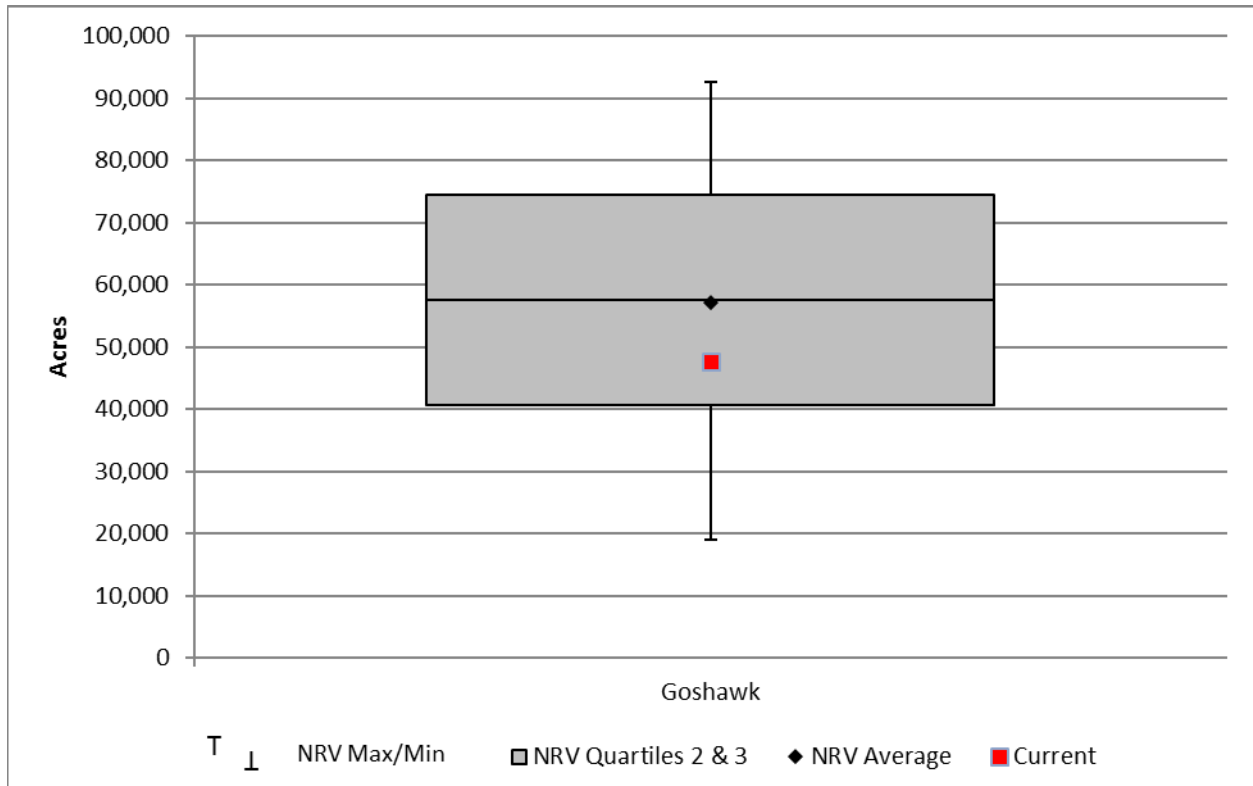


Figure 23. Comparison of Current Levels of Goshawk Habitat against NRV for BLM Lands

Focal Species: Brewer's Sparrow Habitat. This focal species is a grassland/shrubland habitat specialist and is a BLM sensitive species. Brewer's sparrow prefers HTG 9. Brewer's sparrow is a Neotropical migratory bird and has been recorded in the planning area in Flathead, Granite, Lake, Lincoln, Missoula, Powell, Ravalli, and Sanders Counties (Montana Bird Distribution Committee 2012). Brewer's sparrow has been recorded on BLM-managed land in the Blackfoot River Valley. It is strongly associated with sagebrush (sagebrush obligate) over most of its range and in areas with scattered shrubs and short grass. It can also be found, to a lesser extent, in mountain mahogany, rabbit brush, and bunchgrass, with bitterbrush, ceanothus, manzanita, and large openings in pinyon-juniper (Knopf et al. 1990). The average canopy height is usually less than 1.5 meters (Rotenberry et al. 1999). Positively correlated with shrub cover, above-average vegetation height, bare ground, and horizontal habitat heterogeneity (patchiness); negatively correlated with grass cover, spiny hopsage, and budsage (Wiens and Rotenberry 1981).

Brewer's sparrow prefers areas dominated by shrubs rather than grass, and sites with high shrub cover and large patch size, but thresholds for these values are not quantified (Knick and Rotenberry 1995). In Montana, preferred sagebrush sites average 13 percent sagebrush cover (Bock and Bock 1987). In eastern Washington, abundance significantly increased on sites as sagebrush cover approached historic 10 percent level (Dobler et al. 1996). Breeding habitat strongly associated throughout its range with high sagebrush vigor (Knopf et al. 1990). Direct cause of widespread decline on breeding grounds is uncertain, but possibly linked to widespread degradation of sagebrush habitats. Habitat loss, fragmentation, livestock grazing, invasive grasses, fire, brood parasitism, predators, and pesticides have been linked to Brewer's sparrow decline.

Focal Species: Fisher Habitat. This focal species is a habitat specialist and is a BLM sensitive species. Fisher prefer HTG 1, 2, 3, 4, and 7. Many species depend upon riparian habitat, including grizzly bears,

Canada lynx, migratory birds, and big game. Fisher is a good focal species to represent the habitat for riparian-dependent species because the range covers deciduous to coniferous forests spanning the entire range of a riparian system. Fisher has been recorded in the nine counties in the planning area (Foresman 2012). Fisher inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests. They occur primarily in dense coniferous or mixed forests, including early successional forests with dense overhead cover (Thomas et al. 1993).

Fisher commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter. They generally avoid areas with little forest cover or significant human disturbance and conversely prefer large areas of contiguous interior forest (USFWS 2004). Powell (1993) concluded that forest type is probably not as important to fishers as the vegetation and structural aspects that lead to abundant prey populations and reduced fisher vulnerability to predation, and that they may select forests that have low and closed canopies. Several studies have shown that fishers are associated with riparian areas (USFWS 2004), which are generally protected from logging and generally more productive, by having dense canopy closure, large trees, and general structural complexity associated with fisher habitat (Dark 1997). Riparian areas may be important to fishers because they provide important rest site elements, such as broken tops, snags, and coarse woody debris (Seglund 1995).

Fisher are regarded as habitat specialists in the western United States (Buskirk and Powell 1994), occurring only at mid to lower elevation in mature conifer and mixed conifer/hardwood forests characterized by dense canopies and abundant large trees, snags, and logs (Powell and Zielinski 1994). In the Rocky Mountains of north-central Idaho, certain all-conifer habitat types, which include grand fir and Engelmann spruce, appear to be important to and preferentially selected by fishers (Jones 1991).

Fisher are adapted for climbing, but are primarily terrestrial. When inactive, they occupy a den in a tree hollow, under a log, or in the ground or a rocky crevice, or they rest in branches of conifers during warmer months. Young are born in a den, in a tree hollow, or under a log or in a rocky crevice. Large snags (greater than 50 centimeters DBH) are important as maternal den sites (Thomas et al. 1993).

The fisher's range was reduced dramatically in the 1800s and early 1900s through over-trapping, predator and pest control, and alterations of forested habitats by logging, fire, and farming (Powell 1993, Powell and Zielinski 1994). Since the 1950s, fishers have recovered in some of the central and eastern portions of their historic range in the United States as a result of trapping closures, changes in forested habitats (e.g., forest regrowth in abandoned farmland), and reintroductions (Powell and Zielinski 1994).

Environmental Consequences

Proposed management of the following resource programs would have no anticipated impacts to wildlife: air quality, paleontology, cultural resources, visual resources, economics, and environmental justice.

Impacts Common to All Alternatives

Special Status Species. Federally listed and BLM-sensitive species and their habitats are priority species. BLM would comply with USFWS recovery plans and strategies, including amendments, to manage habitat and protect listed species including, but not limited to, the final NCDE Grizzly Bear Conservation Strategy, the Canada Lynx Conservation Assessment Strategy, and Canada lynx critical habitat. Grizzly bear food and attractant storage would be implemented in NCDE Zone 1 and Zone 2 of the NCDE Grizzly Bear Conservation Strategy. Open road densities would remain at 2011 baseline levels (1.70 mi/mi²) within NCDE zone 1 during the non-denning season. Conservation measures would be applied at the project level.

Other Priority Species. Other priority species and their habitats would include big game, species of concern, migratory birds, bats, and habitats such as caves cliffs, snags, bitterbrush, etc. Seasonal and year-round closures of caves and abandoned mines for bat species would limit disturbance. Townsend big-eared bat is a BLM sensitive species. White-nose syndrome is a biological disease reducing bat populations east of the Northern Great Plains spreading toward Montana and other western states. Protection of travel corridors would reduce isolation and improve gene flow and viability for special status species, big game, and migratory birds.

Programs would be designed and implemented to meet land health standards. Vegetation treatments would mimic natural disturbance to ensure stand composition, structure, and function for wildlife. Late succession forests would be maintained, enhanced, or restored for wildlife benefit. Restoration to achieve desired ecological conditions in grassland/shrublands would be conducted with action alternatives through prescribed fire and mechanical treatments. Mechanical and prescribed fire treatments would consider the principles of ecological forestry (Franklin et al. 2007) for wildlife benefit.

Vegetation Management. Vegetation management projects would be implemented to restore or enhance wildlife habitat for multiple species, with an emphasis on Canada lynx, NCDE grizzly bear, Bureau-sensitive species, and focal species.

Warm/dry Douglas-fir and ponderosa pine represent the most common forest habitat type group in the decision area. Restoration treatments of warm/dry forests would use prescribed fire and appropriate mechanical treatments such as thinning commercial and non-commercial trees, and chipping and grinding trees to mimic natural disturbances such as wildfire (Graham et al. 2004). The SIMPPLLE model suggests this habitat type group has been altered historically due to fire suppression. Wildfire would have maintained more open canopies and more diverse understories typical of warm/dry savannahs.

Vegetation restoration treatments would move this habitat type group toward the mid-range of NRV. Direct effects would occur when treatments are implemented and indirect effects would occur as stands recover from disturbance. Such treatments would have short-term impacts including removal of vegetation and temporary wildlife disturbance or displacement. Typically, it takes two growing seasons or longer before shrubs, trees, and other forbs to recolonize. Fire suppression activities such as clearing of firelines, road maintenance, and use of retardants may disturb and displace wildlife.

Prescribed fire would restore and enhance wildlife habitat for species dependent on post-fire habitats. Such treatments would have long-term benefits for wildlife dependent on warm/dry habitat type group. Treatments would improve the quantity and quality of habitat for wildlife dependent on a variety of size classes and densities, but especially those that depend on mature open stands of ponderosa pine and Douglas-fir forests. Management toward large-diameter trees would improve snag habitat for primary and secondary cavity users. Restoration and management of dry forests would increase habitat for a wide variety of resident and migratory birds as well as breeding, foraging, and hiding habitat for big game, large and small mammals, amphibians, and reptiles. Additional impacts would occur from road construction. Over the long term, these treatments would benefit wildlife utilizing these plant communities.

Cool/moist and cold forests are the least available habitat type group in the decision area. Vegetation treatments would ultimately improve the composition, structure, and function of this forest type, although short-term effects including temporary disturbance and displacement of wildlife may occur. Reduction in tree densities and restoration of forest habitats would move vegetation toward NRV and increase the quality and quantity of big game habitat as well as breeding, denning, foraging, and hiding habitat for a variety of wildlife species. Moving vegetation toward the mid-range of NRV would increase vegetation diversity and habitat for large and small mammals, and migratory and resident birds.

Long-term benefits to a wide variety of species from restoring plant communities would outweigh short-term negative effects. Uneven-aged management within cool/moist forests would focus on retention of stem density and creating small openings that would be beneficial to Canada lynx and to many wildlife species occurring in this plant community. Development of small openings would increase vegetation diversity (multistory and stand initiation) and available prey for species such as Canada lynx.

Under the forest habitat type groups, the timing of treatments would be considered during project planning and implementation during critical seasons of use such as migratory bird nesting and big game winter range (Appendix P). Snags and down woody debris retention would follow guidelines outlined in snag and down woody debris management. Snag and down woody debris provide breeding, foraging, and denning habitat for wildlife and special status species. Variable retention harvest and thinning (Franklin et al. 2007) methods would provide the greatest level of wildlife habitat, especially in sanitation/salvage proposals. Short-term impacts with long-term benefits to wildlife is expected.

Disturbances from climate change, wildfire, and insect and disease infestations can have long-term negative impacts to some wildlife species as described in detail in Section 3.2 (Vegetation Communities). Warmer, drier climates are anticipated in the future, contributing to higher levels of Douglas-fir and mountain pine beetle infestations. No obvious changes in tree growth, plant succession, wildfire, or vegetation conditions affecting wildlife habitats over the 20 - 30 year planning cycle were attributable to warmer, drier climatic conditions that were detectable from modeled SIMPLLE runs. Some species and their habitats may be negatively impacted from these disturbances, while other species and their habitats may benefit. Species dependent on snags and down woody debris may benefit from increased foraging and nesting habitat.

The field office currently has an abundance of snags, representing different species and sizes, due to mountain pine beetle, other insects, and disease. The development of snags would be done opportunistically through other projects, when possible. Down woody debris would be retained at levels unique to habitat type groups. Timber salvage may result in the loss of wildlife habitat for those species that depend on dead and dying forests. Maintaining patches of dead and dying forest would help to retain habitat features for these species but the affects to snag dependent species would vary greatly depending on the size of patches remaining after salvage. Timber salvage could have minor to major effects to those species that depend on dead and dying forest.

Travel corridors such as ridges, saddles, and riparian areas link landscapes and geographic areas for wildlife movement, especially Canada lynx and grizzly bears. Avoid, minimize, or mitigate impacts to sensitive species travel habitats, travel corridors and linkages. Consider opportunities to avoid, minimize, or mitigate negative impacts to Montana species of concern. Of the corridor habitat within the planning area, the majority of the corridors are either moderate or low quality. The BLM would maintain open road densities within the approximately 112,461 acres of NCDE grizzly bear zone 1 habitat.

Grassland/shrubland plant communities make up approximately 3 percent of the cover types in the decision area (with 10 percent canopy cover or less) and are experiencing decline in quality and quantity as a result of conifer encroachment. Grassland/shrubland treatments using prescribed fire and appropriate mechanical methods to reduce conifer encroachment may temporarily displace or disturb wildlife, but would reduce the density of conifers and restore habitat for species dependent on these vegetation communities. For example, the removal of conifers may reduce hiding and thermal cover for big game but would increase the amount of forage available for these species. Reducing the density of conifers could also reduce nesting and foraging habitat for forest bird species, but would increase nesting and foraging habitat for grassland/shrubland bird species. Grasses and forbs recover quickly after prescribed fire. Maintaining and restoring grassland/shrubland communities may provide long-term quality habitat for big

game winter range, forest and nesting habitat for resident and migratory grassland and sagebrush bird species such as the Brewer's sparrow.

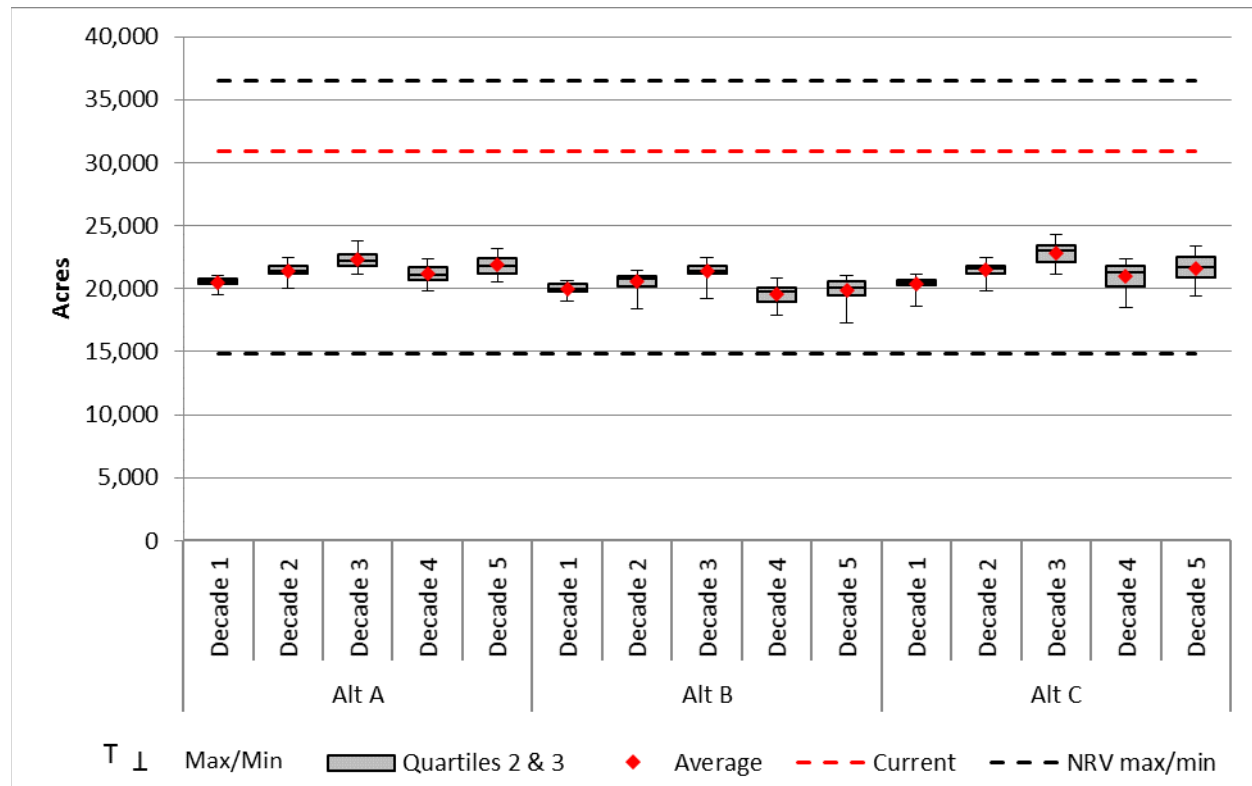
Noxious weed management would have minimal negative impacts to wildlife. Treatments would include herbicide, biological control, and mechanical applications.

Permanent and temporary road construction associated with vegetation management would affect wildlife by decreasing the quality and quantity of wildlife habitat, because of disturbance, displacement, and mortalities (Montana Fish, Wildlife, and Parks 2006). Public open road densities within the grizzly bear zone 1 must maintain 2011 baseline levels (1.70 mi/mi²). Road design and construction is subject to BMPs (Appendix P).

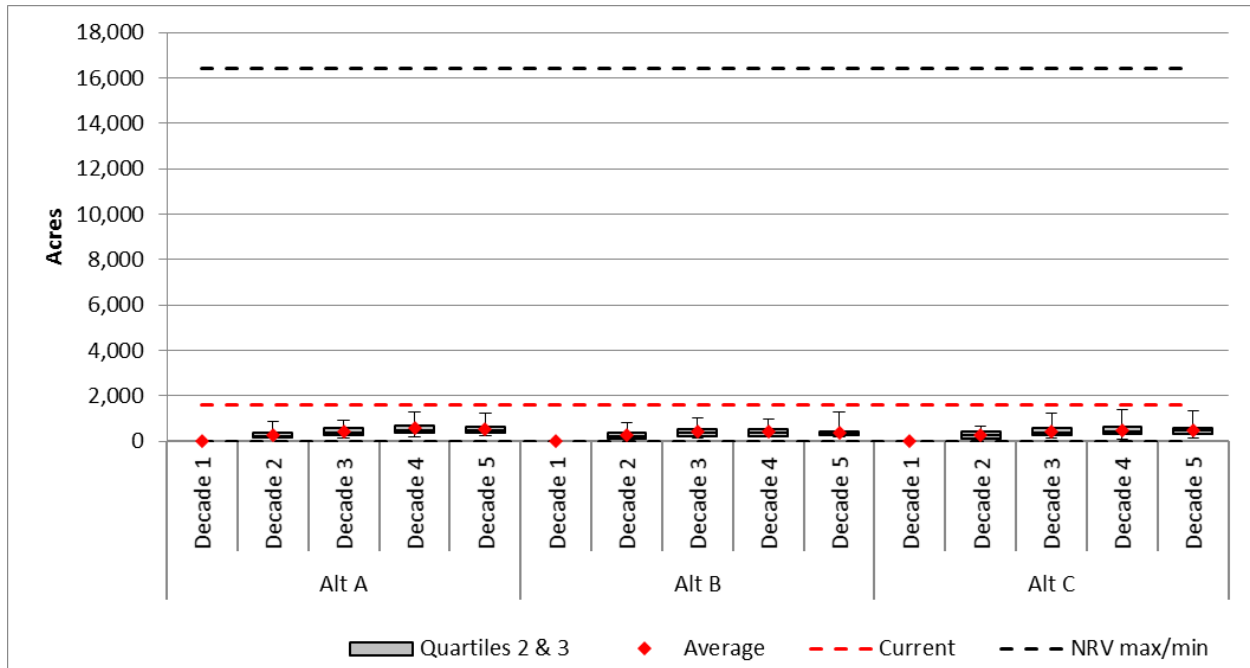
NRV and Focal Species. Appendix C contains a detailed description of the modeling of vegetation habitats, and selection of focal species. Specifically, section 3.5 describes the potential impacts to the habitat type groups and natural range of variability by alternatives. The descriptions below summarize the impacts from vegetation management to focal species.

Grizzly Bear Habitat. In addition to compliance with the conservation measures of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy, under all alternatives, BLM's vegetation management would provide sufficient habitat for grizzly bears and other similar wildlife species such as black bear and gray wolf. Forest, grassland/shrubland, and riparian habitat would be managed to provide early, mid, and late successional vegetation stages benefitting grizzly bears. Livestock allotments would be managed to reduce or eliminate livestock/grizzly bear conflicts to lessen impacts to grizzly bears. Food and attractant storage would be implemented to reduce human/grizzly bear conflicts. Modeled projections for grizzly bear habitat were not taken, however, the positive effects of vegetation management, road management, livestock management, and food and attractant storage, suggests that under all alternatives, grizzly bear habitat is at the mid-level to upper level NRV (wildlife biologist personal opinion).

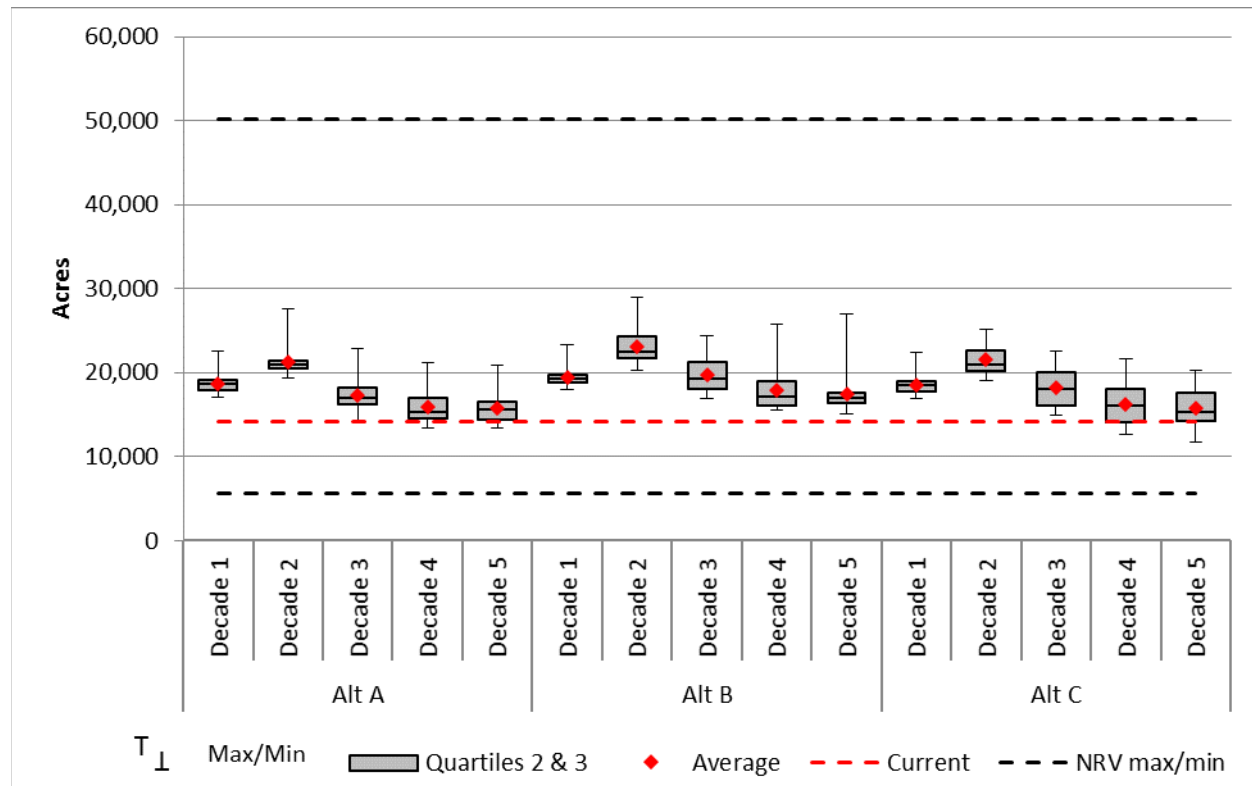
Canada Lynx Mature Multistory Habitat. In addition to following the LCAS since released in 2013, according to modeled projections, Canada lynx mature multistory habitat is at the low to mid-level range of NRV and habitat increases slightly over time regardless of alternative selected. This is beneficial because mature multistory habitat provides excellent foraging and denning habitat for lynx. This suggests that Canada lynx, its important prey species such as snowshoe hare, red squirrel, and other species associated with mature multistory habitat such as moose would slightly increase toward the mid-range of NRV.

Figure 24. Canada Lynx Mature Multistory Habitat for Five Decades across all Alternatives on BLM Lands

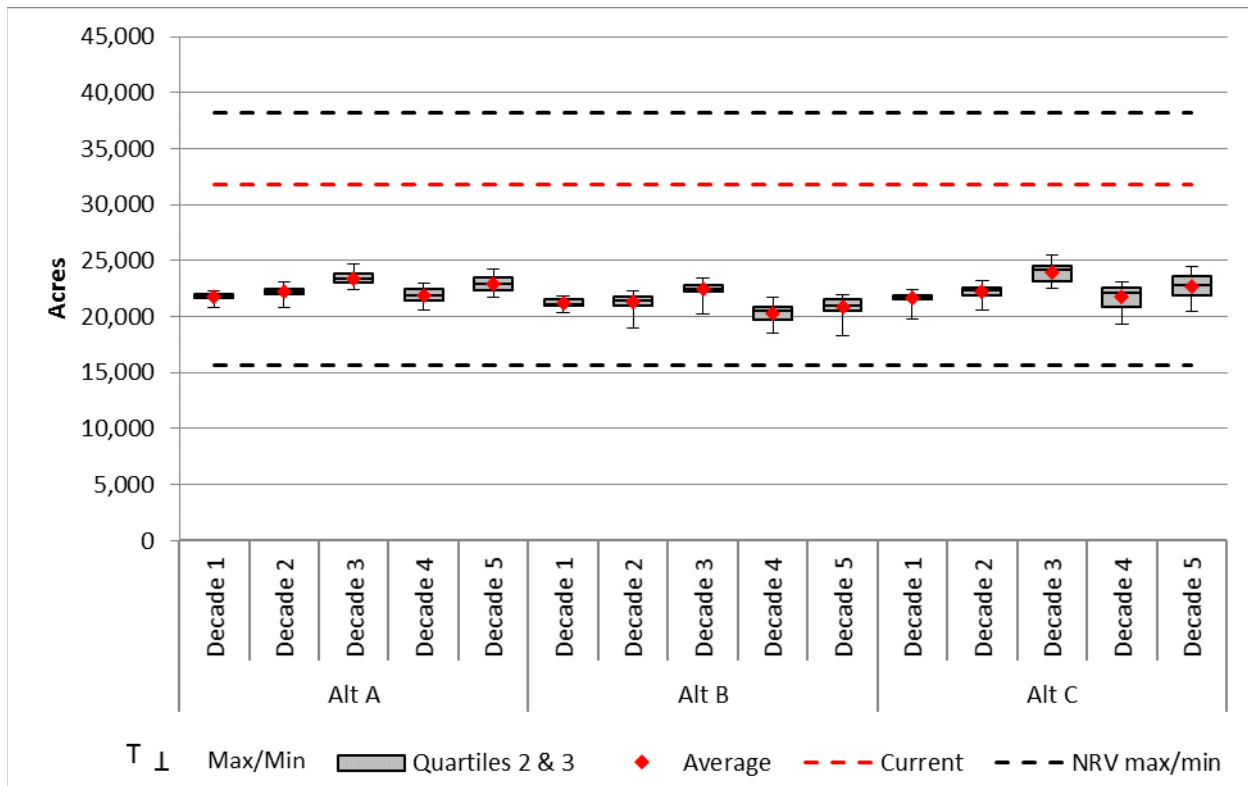
Canada Lynx Stand Initiation Habitat. Under all alternatives, modeled projections suggest Canada lynx stand initiation habitat is at the lower end of NRV and would remain at that level throughout the five-decade period. This is a function of limited past wildfire, continued full suppression of wildfires, and silviculture treatments. Stand initiation habitat provides excellent habitat for lynx and snowshoe hare. Depending on the stage of growth, stand initiation provides spring, summer, and fall habitat (early stand initiation) and spring, summer, fall, and winter habitat (stand initiation) when conifer boughs protrude above snowline. Stand initiation provides year-round foraging habitat for lynx and their primary prey the snowshoe hare. Under all alternatives, wildland fire and prescribed fire and mechanical treatments would provide stand initiation habitat for lynx and snowshoe hare and would continue to be important silviculture treatments now and in the future. This suggests that Canada lynx habitat and other species associated with this habitat type group such as grizzly bear and big game would meet the objective to remain within NRV even at the lower end.

Figure 25. Canada Lynx Stand Initiation Habitat for Five Decades across all Alternatives on BLM Lands

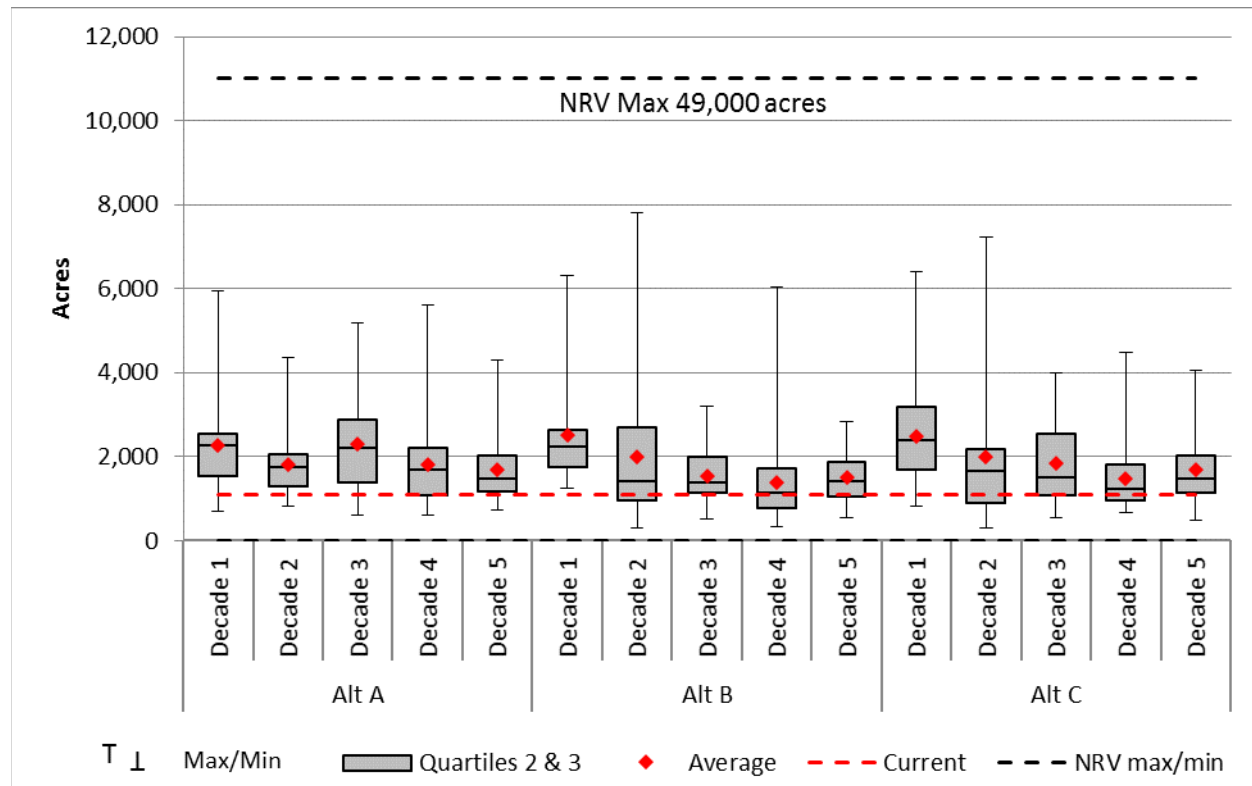
Elk Summer Forage Habitat. Under all alternatives, modeled projections for elk summer forage suggests habitat would remain at the low to mid-level of NRV. This is largely a function of past and future wildfire suppression. The amount of project logging and projected prescribed burning in the alternatives would maintain the habitat level above current conditions. This means that species within these warm/dry and cool/moist HTGs, including but not limited to black bear, mountain lion, bighorn sheep, and moose would remain in the NRV over the life of the plan. In addition to achieving NRV, vegetation treatments aimed at creating a mosaic of forest conditions can be beneficial by creating abundant food resources in close proximity to cover. Furthermore, Proffitt et al. (2015b) suggest that a lack of disturbance due to long-term wildfire suppression was largely responsible for population declines in some areas. Vegetation treatments to emulate natural disturbances may be beneficial.

Figure 26. Elk Habitat for Five Decades across all Alternatives for BLM Lands

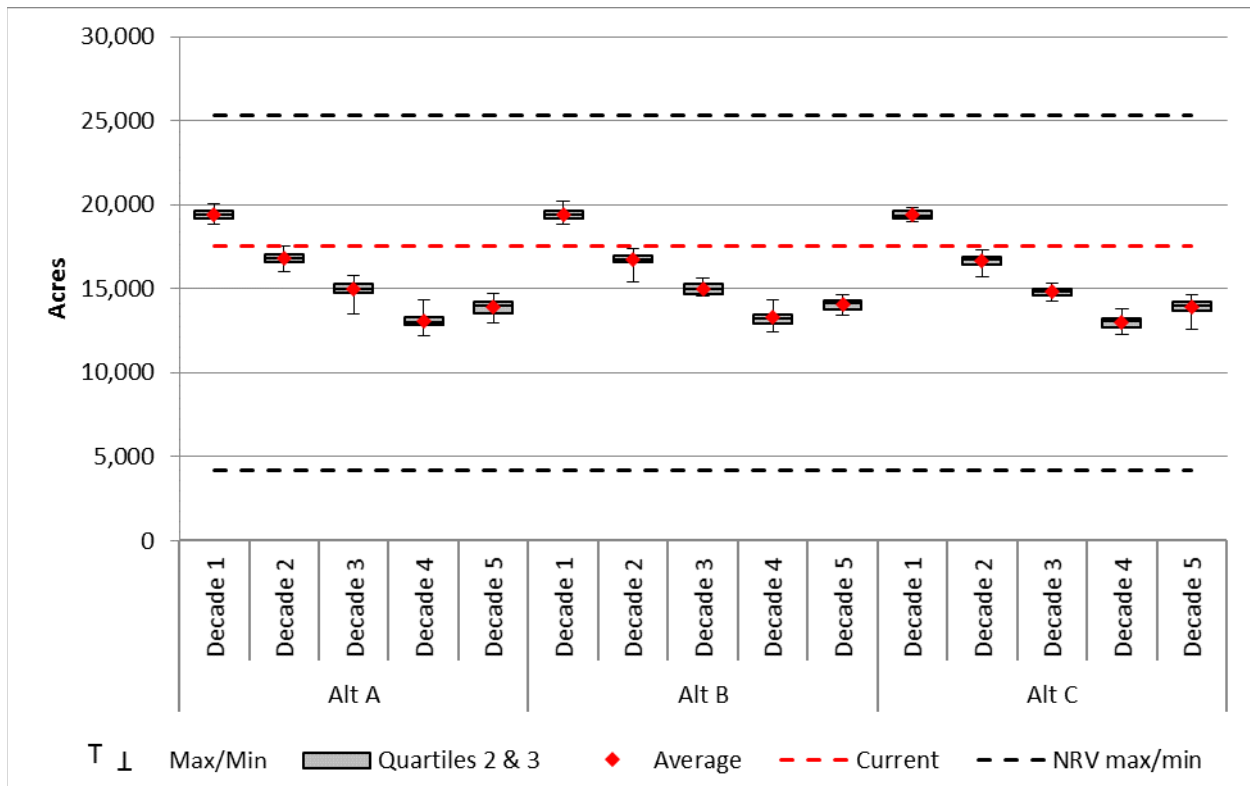
American Marten Habitat. Under all alternatives, modeled projections suggest American marten habitat, which is at the low to mid-level range of NRV, would increase slightly over time, regardless of alternative selected. High projected levels of Douglas-fir beetle may provide an additional benefit to martens. Repeated attacks of Douglas-fir bark beetle will result in a continual recruitment of large snags and coarse, woody debris, both of which are important habitat requirements for martens. This suggests that habitats for the American marten and other species associated with moist Douglas-fir and moist subalpine fir HTGs such as the great gray owl, Canada lynx, and gray wolf would meet the objective to remain within or move toward the mid-range of NRV.

Figure 27. American Marten Habitat for Five Decades across all Alternatives on BLM Land

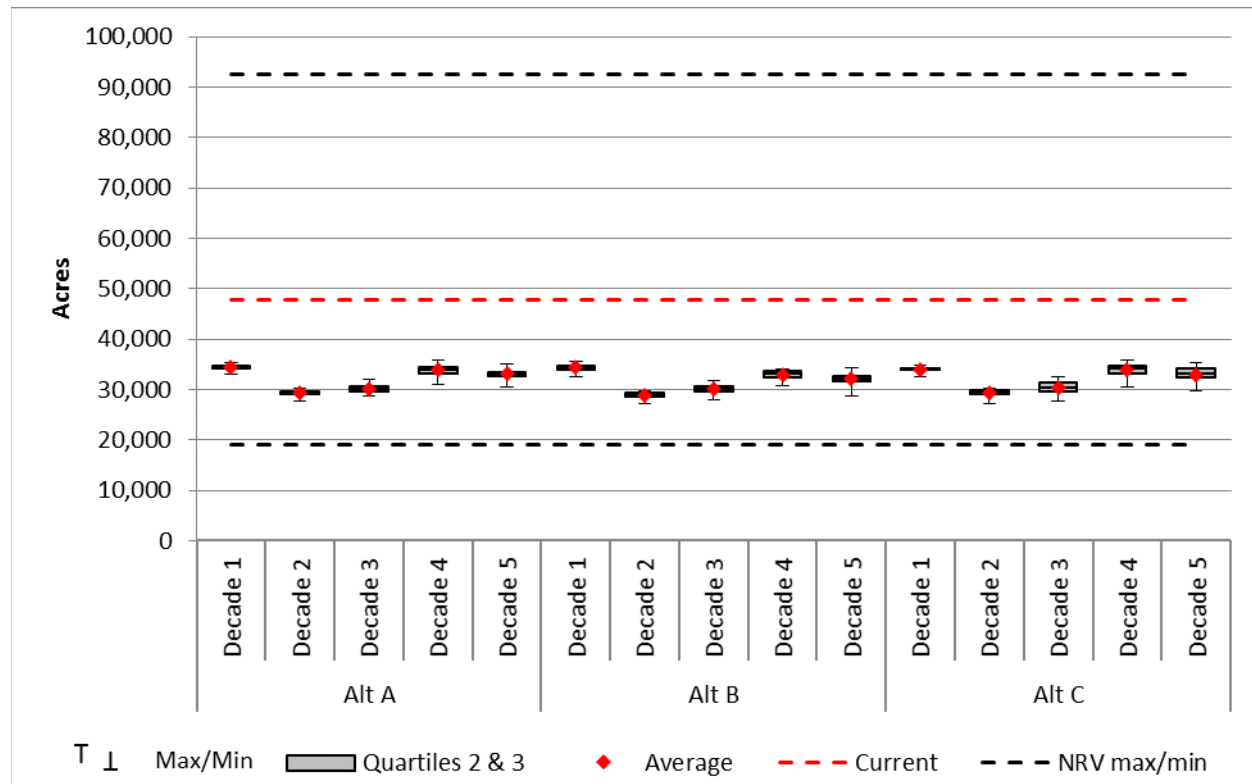
Black-Backed Woodpecker Habitat. Under all alternatives, modeled projections for black-backed woodpecker shows that habitat will remain within but near the low end of NRV. This is likely a result of past and future wildfire suppression. This is not unexpected because other modeled units (ERG 2012, 2015) indicate current black-backed woodpecker habitat is at or below the low end of NRV. This would not pose a risk to black-backed woodpecker viability at the Northern Rockies scale for several reasons—habitat generated by large fires since 1988 show high densities of nesting black-backed woodpeckers and wildfires are projected to increase on other units (contrary to projections for the planning area). Black-backed woodpeckers are highly mobile and exhibit a high level of relatedness across the Northern Rockies, suggesting that no areas within the Northern Rockies are genetically isolated. This suggests that habitats for the black-backed woodpecker and other species associated with the habitat type groups such as Lewis’ woodpecker, American three-toed woodpecker, and mountain bluebird would meet the objective to remain within NRV even though at the lower end.

Figure 28. Black Backed Woodpecker Habitat for Five Decades across all Alternatives on BLM Lands

Flammulated Owl Habitat. Under all alternatives, modeled projections suggest flammulated owl habitat is currently at the mid-range of NRV. Although ground-surveyed data suggests that current levels of habitat are closer to the low end of NRV and high quality habitat may be more limited in the analysis area than modeled. However, habitat improves under all alternatives due to activities that reduce stand stocking and promote the recruitment of large, open stands. This suggests that flammulated owl habitat and other species associated with this warm Douglas-fir and cool Douglas-fir HTG 1 and 2 such as Clark's nutcracker, grizzly bear, and bald eagle, would meet the objective to remain within NRV moving toward the mid-range. These habitat type groups encompass 70 percent of BLM-managed lands.

Figure 29. Flammulated Owl Habitat for Five Decades across all Alternatives on BLM Lands

Northern Goshawk Habitat. Under all alternative, modeled projections suggest northern goshawk nesting habitat is at the low to mid-level of NRV and that habitat increases over time, regardless of alternative selected. This suggests that northern goshawk and other species such as Cooper's hawk and sharp-shinned hawk would meet the objective to remain within the lower end of NRV.

Figure 30. Northern Goshawk Nesting Habitat for Five Decades across all Alternatives on BLM Lands

Brewer's Sparrow Habitat. Grassland/shrubland is important habitat for Brewer's sparrow, long-billed curlew, vesper sparrow, and other species. BLM would maintain or make progress toward achieving rangeland health standards including standards 1 (upland vegetation) and standard 5 (wildlife habitat). Of the seven allotments that did not meet rangeland health standard 5, causal factor livestock grazing, the BLM has taken action to make progress. Vegetation management would increase habitat by reducing conifer encroachment as described above in the common to all and in Section 3.2. (Vegetation Communities). Modeled projections for Brewer's sparrow habitat were not taken, however, given the level of conifer encroachment, sagebrush habitat, under all alternatives, is below or at the low-level of NRV (wildlife biologist personal opinion).

Fisher Habitat. Fisher is a specialist inhabiting riparian habitat, which is also occupied by red-backed vole, northern water shrew, and other species. Riparian habitat would be maintained to provide habitat for wildlife. Riparian habitat for terrestrial wildlife would benefit from aquatic resource direction by following Riparian Habitat Conservation Area (RHCA) and Aquatic Conservation Strategy direction (see Appendix B). Riparian habitat is important to migratory birds, mammals, and other wildlife. Fisher is the focal species for riparian habitat and would benefit from various conifer structural stages, down woody debris, and understory vegetation.

Proposed projects or activities that intersect RHCAs, Streamside Management Zones (SMZ), or riparian-wetland habitats, all of which are identified at the site-specific level, may require design features, alternate construction, or dropped from consideration unless the activity is able to enhance, restore, or maintain the physical and biological characteristics of the RHCA, meet the SMZ law, abide by the Water Quality MOU and Non-Point Source Management plan, and allow riparian-wetlands to meet (or make progress toward meeting) proper functioning condition. Management of RHCAs would benefit water

quality and riparian vegetation, which would benefit fisher and other terrestrial wildlife. Riparian habitat would be managed to maintain or enhance large woody debris and to provide habitat for fisher, small and large mammals, and birds. Modeled projections were not taken, however, the positive effects of RCHAs and SMZs suggests that under all alternative, fisher habitat is at the mid-level to upper level NRV (wildlife biologist personal opinion).

Wilderness Study Areas. Management of the Hoodoo Mountain, Wales Creek, and Quigg West Wilderness Study Areas (WSAs), which comprise of 23,480 acres (14 percent of BLM-managed lands), would provide large blocks of security habitat and migration travel corridors for big game, Canada lynx, grizzly bears, and other wildlife. New roads would not be constructed, no rights-of-ways would be allowed (ROW exclusion area), and the area is closed to non-energy leasable minerals. Activities must not impair wilderness characteristics and may or may not impede the ability to conduct vegetation treatments.

Livestock Grazing. Livestock grazing could reduce forage and cover available for big game, grizzly bears, and migratory and resident birds. The allocation of forage to determine animal unit months (AUMs) assumed 50/50 ratio for domestic livestock. The remaining forage is for wildlife and regrowth. Adjustments to AUMs would occur at site-specific level based on rangeland health standards, droughts, or other circumstances. Under each alternative, management would work to enhance or restore vegetation conditions and to reduce the negative effects of livestock grazing. Management would be required to make progress toward achieving rangeland health standards. Range improvements, adjustments to AUMs, season of use, removal of livestock from an area, water developments and fencing would enhance range conditions in the long-term. Adjustments to AUMs would maintain forage for wildlife, especially big game and grizzly bears, and would be adjusted after natural disturbances or if there is a failure to meet rangeland health standards. New and old fences would be designed or redesigned according to BMPs (Appendix P).

Livestock grazing can directly affect riparian habitat by browsing shrubs and mechanically damaging streambanks. Indirect effects of long-term negative impacts can impair riparian habitat. Livestock grazing can alter plant communities and impact riparian associated wildlife. Achieving or making progress toward rangeland health standards would minimize, reduce, or eliminate these impacts. Carcass removal within grizzly bear habitat would be a term and condition of leases. Active grazing allotments must meet standards or be making progress toward achieving standards. Nine allotments are not meeting standards, due to livestock grazing, but are making progress in achieving standards.

Prohibiting domestic sheep allotments would benefit bighorn sheep and grizzly bears. Domestic sheep may transmit diseases to wild sheep and domestic sheep are considered an attractant to grizzly bears. No new livestock allotments are allowed in grizzly bear zone 1 habitat. Prescriptive grazing would be permissible and evaluated case-by-case. Grazing systems, AUMs, and terms and conditions may change at the site-specific level depending upon possible conflict with grizzly bears and wolves.

Minerals. Under all alternatives, within big game winter range, there are 7,269 acres of high and 17,720 acres of moderate mineral potential. Locatable mineral exploration and extraction could be permitted at the site-specific level in special status species, migratory bird, and big game habitat, which would lead to potential impacts from road construction and habitat removal. Approximately 4,927 acres of big game habitat have high mineral potential for lode, and 1,515 acres of big game habitat have high mineral potential for placer mining, but development depends on exploration and market demands. Unnecessary and undue degradation of wildlife habitat would be the standard for locatable mineral development; design features and reclamation activities would be required (Appendix P).

These types of disturbances may include habitat removal or fragmentation from surface disturbance, from road construction and facilities, and is species-specific related to mineral operations. During mining

activity, road construction would be kept to a minimum and roads and facilities would be closed and rehabilitated when mining has been completed. Reclamation and restoration of abandoned mine sites would provide cover and forage for wildlife and would improve water quality. The 238 acres closed to mineral materials disposal would benefit wildlife by preventing surface disturbance and noise associated with mineral material activities.

Impacts Under Alternative A

Vegetation Management. Alternative A would restore acres of habitat for wildlife species dependent on mature and late succession forests with approximately 12,000 acres/decade of vegetation treatments. General effects from vegetation management described above would occur, with an emphasis on forest productivity and big game habitat. Vegetation treatments would occur in warm/dry and cool/moist forest HTGs, and grassland/shrubland plant communities. Habitat type groups would remain within NRV.

Fuels Management. Alternative A has little information regarding the use of fire for wildlife. In conformance with other resource uses, fire would be used as a tool for vegetation and fuels management. Prescribed fire will not be used on approximately 5,820 acres adjacent to stream channels and within developed and potential recreation sites. Special status species and other wildlife are considered in Alternative A.

Livestock Grazing. Alternative A has little information regarding livestock grazing and wildlife. Maintain or enhance site productivity on all public lands available for livestock grazing. A total of 117,774 acres of public land will remain available for livestock use. A total of 81,294 acres will be covered by allotment management plans. 6,245 AUMs of livestock forage will be offered for lease by 1996. 8,013 AUMs of livestock forage will be offered for lease by 2006.

Minerals. 820 acres would be recommended for withdrawal from mineral entry including 640 acres of Phil Wright Rock ACEC, 20 acres of Limestone Cliffs ACEC, and historic and cultural sites. If withdrawn, there would not be any wildlife habitat impacts associated with mineral development.

Lands and Realty. Acquisitions are in the public interest and generally positive for adding wildlife habitat to public lands. There are approximately 533 acres of ROW Exclusion Areas, which means no impacts to wildlife habitats associated with surface disturbance from construction of ROWs would occur. There are approximately 21,317 acres of ROW Avoidance Areas, which means large-scale infrastructure would likely not occur thereby likely not causing possible surface-disturbance and associated impacts from large-scale infrastructure.

Special Designations. Bear Creek Flats ACEC, approximately 565 acres, would continue to provide bald eagle foraging and nesting habitat along the Blackfoot River. Limestone Cliffs ACEC, approximately 20 acres, did not include relevant and important criteria for wildlife species, but conservation of the 20 acres would likely benefit wildlife habitat in the area for nesting raptors. Phil Wright Rock ACEC (640 acres) would continue to provide for the relevant and important values, including but not limited to, locally valuable bighorn sheep year-round habitat; important lambing area for Upper Rock Creek Bighorn Sheep Herd; locally valuable elk, deer, and bighorn sheep range; and excellent raptor nesting habitat on rock cliffs. The Phil Wright Rock ACEC is recommended for mineral withdrawal.

Recreation and Motorized/Non-Motorized Allocations. Special recreation management areas cover 52,393 acres (32 percent) across the BLM-managed lands. People recreating may experience effects such as disturbance and change in behavior to wildlife habitat, particularly in the Lower Blackfoot Corridor where the BLM experiences the highest volume of recreation with river-related, mountain biking, hiking, hunting, and fishing. Recreation resources may have direct and indirect effects to wildlife habitat

including disturbance and changes in behavior. The duration of the effects varies. MFWP determines if big game hunting season extensions are necessary to effectively manage big game populations; BLM may modify seasonal use restrictions on roads to allow access. Large blocks of forest are retained for security habitat for big game and grizzly bear. High priority lands for retention would include important wildlife habitat.

In Alternative A, approximately 25,562 acres are closed to motorized vehicles, which would reduce the potential for habitat fragmentation and wildlife disturbance. These acres include the Lower Blackfoot Corridor and Ram Mountain covering approximately 4,549 acres. The 137,052 acres of limited to existing/designated routes would allow for motorized routes at the travel management stage.

Open Motorized Road Density. Open motorized road density within the approximately 112,461 acres of grizzly bear zone 1 habitat (69 percent of the BLM-managed lands) would be managed at the 2011 baseline level (1.70 mi/mi²). No net increase in the roads open to the public would occur in these acres thereby benefitting grizzly bears, big game, and travel corridors.

Impacts Under Alternative B

Vegetation Management. Alternative B would restore the most acres of habitat for wildlife dependent on mature and late succession forests with approximately 15,000 acres/decade of vegetation treatments. Habitat type groups would remain within NRV as described above, with slight increases toward the mid-range.

Fuels Management: Approximately 5,897 acres of lynx habitat (9.2 percent of lynx habitat on BLM-managed lands) within FMZ1 and WUI 1-mile buffer would be managed to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure as a priority. Canada lynx would be a secondary consideration.

Livestock Grazing. Alternative B would have 42,366 acres for prescriptive grazing. The number of AUMs would be 6,660 animal unit months. As described above, the AUMs would be adjusted at the site-specific level upon new information and rangeland health standards. Active grazing allotments must meet standards or be making progress toward achieving standards.

Minerals. 283 acres would be recommended for withdrawal from mineral entry to conserve Garnet Ghost Town and Limestone Cliffs. If withdrawn, there would be no wildlife habitat impacts associated with mineral development on these acres.

Lands and Realty. Land acquisitions are in the public interest and generally positive for adding wildlife habitat to public management. There are approximately 23,480 acres of ROW Exclusion Areas. Alternative B increases the amount of ROW avoidance to approximately 46,988 acres (30 percent of BLM-managed lands) of ROW avoidance areas, which means less large-scale surface-disturbance to wildlife.

Special Designations. Bear Creek Flats ACEC approximately 565 acres would no longer require special management attention. Since the 1994 acquisition and designation of Bear Creek Flats ACEC, much has changed. Bull trout are now listed threatened under the Endangered Species Act. Bull trout critical habitat has also been designated. However, with this, comes many other protections that aim to preserve fish habitat and riparian areas. Additionally, the bald eagle is no longer listed threatened, and as with bull trout, many regulatory protections make an ACEC designation irrelevant. These protections include: BLM-sensitive species, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act. With many miles of the Blackfoot River now managed by the BLM, and by the presence of

management direction to protect fish habitat, riparian areas, and bald eagles, ACEC designation is no longer needed at Bear Creek Flats. Bald eagle foraging and nesting habitat would continue to be provided for, although not under the ACEC designation.

Limestone Cliffs ACEC (20 acres) would instead be managed as a 50-acre Special Recreation Management Area for environmental education and climbing consistent with current uses. Climbing levels are anticipated to continue with a potential increase over the next 20 years. Management direction would reduce any potential conflicts between peregrine falcon nesting habitat and climbing.

Phil Wright Rock ACEC (640 acres) would continue to be managed for the relevant and important values including but not limited to year-round bighorn sheep habitat; important lambing area for Upper Rock Creek Bighorn Sheep Herd; elk, deer, and bighorn sheep range; and excellent raptor nesting habitat on rock cliffs.

Recreation and Motorized/Non-Motorized Allocations. Special recreation management areas cover approximately 71,376 acres (44 percent) across BLM-managed lands. Recreation resources may have direct and indirect effects on wildlife including disturbance and changes in behavior. Such effects to wildlife may be short-term or long-term. This occurs in the Lower Blackfoot Corridor covering approximately 19,543 acres where the BLM experiences the highest volume of recreation with river-use, mountain biking, hiking, and hunting and fishing. The Ram Mountain SRMA covering approximately 4,549 acres and the Chamberlain SRMA covering approximately 19,307 acres emphasize managing for big game habitat including bighorn sheep and elk.

In Alternative B, acres closed to motorized travel would slightly increase to approximately 28,844 acres of thereby reducing the potential for habitat fragmentation and wildlife disturbance in those areas. These acres include Ram Mountain (approximately 4,549 acres) and wilderness study areas. Approximately 133,770 acres of “limited to existing/designated routes” would allow for motorized routes at the travel management level.

Open Motorized Road Density. Open motorized road density within approximately 112,461 acres of grizzly bear habitat in zone 1 (69 percent of the BLM-managed lands) would be managed at 2011 baseline levels (1.70 mi/mi²). No net increase in the roads open to the public would occur in these acres thereby benefitting grizzly bears, big game, and travel corridors for multiple species.

Impacts Under Alternative C

Alternative C emphasizes a greater degree of conservation for wildlife habitat. In addition to the impacts common to all alternatives, and impacts to focal species described above, the following impacts may occur:

Vegetation Management. Alternative C would restore the fewest acres of wildlife habitat for wildlife species dependent on mature and late succession forests with approximately 10,000 acres/decade of vegetation treatments. Vegetation treatments would prioritize habitat restoration to maintain, enhance, or restore riparian and terrestrial habitats.

Fuels Management: Approximately 644 acres of lynx habitat (1 percent of lynx habitat on BLM-managed lands) within the WUI 1-mile buffer would be managed to protect life, increase the safety of firefighters, and protect property, improvements, and infrastructure as a priority. Canada lynx would be a secondary consideration.

Livestock Grazing. Alternative C would decrease lands available for prescriptive grazing to approximately 107,341 acres. Of those available, approximately 5,832 would be available for prescriptive

grazing only. Alternative C has the most acres unavailable at approximately 55,244 acres (34 percent of the BLM-managed lands). The animal unit months would be the lowest at approximately 6,014 AUMS, and could be adjusted at the site-specific level based on rangeland health standards, droughts, or other disturbance. Active grazing allotments must meet standards or be making progress toward achieving standards.

Minerals. Approximately 995 acres are recommended for withdrawal to conserve Garnet Ghost Town and Phil Wright Rock ACEC.

Lands and Realty. Land acquisitions only occur if in the public interest and add wildlife habitat to public management. There are approximately 39,490 acres of ROW Exclusion Areas including the Wilderness Study Areas and the 2-mile corridor of the Lewis and Clark National Historic Trail. Alternative C would be approximately 55,062 acres (34 percent of the BLM-managed lands).

Special Designations: Bear Creek Flats ACEC (approximately 565 acres) would no longer require special management attention. Since the 1994 acquisition and designation of Bear Creek Flats ACEC, much has changed. Bull trout are now listed threatened under the Endangered Species Act. Bull trout critical habitat has also been designated. With this comes many other protections that aim to preserve fish habitat and riparian areas. Additionally, the bald eagle is no longer listed threatened, and as with bull trout, many regulatory protections make an ACEC designation irrelevant. These protections include: BLM-sensitive species management, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act. With many miles of the Blackfoot River now managed by the BLM, and by the presence of management direction to protect fish habitat, riparian areas, and bald eagles, ACEC designation is no longer needed at Bear Creek Flats. Bald eagle foraging and nesting habitat would continue to be provided for, although not under the ACEC designation.

Limestone Cliffs ACEC (approximately 20 acres) would continue to be managed as an ACEC conserving the environmental education values.

Phil Wright Rock ACEC (approximately 640 acres) would continue to be managed for relevant and important values including, but not limited to: bighorn sheep spring, summer, fall, and winter range; important lambing area for Upper Rock Creek Bighorn Sheep Herd; elk, deer, and bighorn sheep range; and excellent raptor nesting habitat on rock cliffs. The ACEC would be recommended for mineral withdrawal.

Recreation and Motorized/Non-Motorized Allocations: Special recreation management areas cover approximately 46,523 acres (29 percent) across BLM-managed lands may have direct and indirect effects to wildlife disturbance and change in behavior to wildlife habitat, particularly in the Lower Blackfoot Corridor covering approximately 19,543 acres where the BLM experiences the highest volume of recreation with river-use, mountain biking, hiking, snowmobiling, hiking, and hunting and fishing. Recreation resources may have direct and indirect effects to wildlife habitat including disturbance and changes in behavior.

Alternative C includes four Backcountry Conservation Areas (BCAs) with an objective to manage for wildlife dependent recreation (hunting, fishing, wildlife viewing). These 46,389 acres (29 percent) provide big game habitat management objectives for the BCAs. Primary emphasis of these areas would be wildlife dependent recreation and management of those lands.

In Alternative C, acres closed to motorized travel would slightly increase to 30,415 acres of closed to motorized vehicles would not allow motorized vehicles, reducing the potential for habitat fragmentation and wildlife disturbance in those areas. These acres include Ram Mountain (4,549); shifting the

22,997 acres of Wilderness Study Areas from Limited to Motorized to Closed to Motorized; and including lands with wilderness characteristics. The 132,199 acres of limited to existing/designated routes would allow for motorized routes at the travel management stage; however, within the 112,461 acres of grizzly bear habitat in zone 1 (69 percent of the BLM-managed lands), road densities would be managed at 2011 baseline levels (1.70 mi/mi²). No net increase in the roads open to the public would occur in these acres benefitting grizzly bears, big game, and travel corridors for multiple species.

Open Motorized Road Density. Open motorized road density within the 112,461 acres of grizzly bear zone 1 and 105,911 acres of big game winter range, totaling approximately 141,492 acres or 86 percent of BLM-managed lands would be managed at 2011 baseline levels (1.70 mi/mi²). No net increase in the roads open to the public would occur in these acres thus benefitting grizzly bears, big game, and wildlife movement corridors for multiple species.

Cumulative Effects. The cumulative effects analysis area is the approximately 162,611 acres of BLM lands and other ownership in the three county Decision Area. This represents the spatial scale and 50 years for vegetation recovery and the temporal scale of the cumulative effects boundary. Cumulative impacts on BLM lands, from past, present, and reasonably foreseeable future actions, are described in the context of the issues presented in Chapter 1. The effects of Alternative A, B, and C, when combined with past, present, and reasonably foreseeable future actions, may result in cumulative effects. Wildlife and wildlife habitat has been positively and negatively impacted to varying degrees in the past, present, and future by vegetation, wildland fire, livestock, minerals, recreation, and lands and reality management.

Proposed use of and construction of roads, impacts associated with timing of season of road use, acres of habitat impacted by road use, and acres of habitat disturbed by temporary road construction contribute to cumulative effects. Cumulative effects of climate change may be substantial to wildlife and wildlife habitat. Positive impacts such as restoring stand structure and forest conditions has been beneficial for forest species. Past, present, and reasonably foreseeable future actions have and may have positive and negative cumulative effects. Cumulative effects from good stewardship, partnerships, and collaboration achieves positive effects. Short-term impacts with long-term benefits is the goal for wildlife and wildlife habitat management.

In the vegetation analysis area, there are approximately 2.2 million acres of other federally managed lands (50 percent of the analysis area) which would tend to be managed in a similar manner to the BLM, which is managed for forest health and restoration with associated commodity outputs from restorative vegetation treatments. The BLM would comply with the conservation and recovery of ESA listed species including: the grizzly bear, Canada lynx, and Canada lynx critical habitat.

There are approximately 326,000 acres of state-managed lands (8 percent of the analysis area). State forests and woodlands would tend to be managed for timber products and commodities. 30,000 acres would be managed by the Lubrecht Experimental Forest for research in forestry, resource management, and science. Active forest management is implemented on the Experimental forest as part of these management objectives.

There are approximately 1.6 million acres of private lands (38 percent of the analysis area). Vegetation management would likely include loss of vegetation from road construction and residential development, effects of continued livestock grazing, forest fuel reduction in urban interface areas, and timber harvest for commercial uses. Of the private ownership, the Nature Conservancy owns approximately 150,000 acres of land intended to be transferred to public management (whether federal, state, county, or other). The Blackfoot Community Conservation Area is a community-owned forest of approximately 5,609 acres focused on cooperative management.

Activities on non-federal lands such as timber harvest, livestock grazing, residential development, mining, agriculture, and road construction, may negatively and positively impact special status species. Grizzly bears may be affected by new permanent and temporary roads, open motorized road density, livestock competition and depredation, food and attractant storage, and reduction of vegetation cover. Canada lynx, Canada lynx critical habitat, and American wolverine may be negatively and positively affected from vegetation management altering forage, denning, travel corridors, and vegetation cover. Canada lynx critical habitat is in juxtaposition with Lynx Analysis Units. Climate change may be the major risk factor for Canada lynx and wolverine populations.

Cumulative effects from resource activities would occur to BLM sensitive species. Forest bats may be impacted from vegetation management and abandoned mine and cave closure and/or exploration. Roosting and foraging habitat has been impacted in the past and present, and is expected to occur in the future. White-nosed syndrome is moving west across the continent and may become established in Montana. Cumulative effects from vegetation management may positively and negatively affect the fisher and gray wolf. Prey species for the wolf may benefit from vegetation management. Bald and Golden Eagle, peregrine falcon, flammulated owl, and great gray owl may be impacted from vegetation management, minerals management, and recreation management. Large trees for potential nest sites located along streams and in uplands may be impacted. Bald and golden eagles, and other large raptors nest, from January to August and may be negatively impacted from surface disturbing activities.

Black-backed and Lewis' woodpecker may be impacted by the direct and indirect effects of wildland fire and vegetation management. Cumulative effects would occur. Past, present, and reasonably foreseeable future actions planned for salvage sales of mountain pine beetle or wildfire killed trees may have negative and positive impacts on black-backs and Lewis' woodpeckers forage and nesting habitat. Short-term impacts may result in loss of forage habitat, adult displacement, and nest abandonment coinciding with harvest activities. This could lead to nestling mortality. Black terns and trumpeter swans are uncommon and may be impacted in the reasonably foreseeable future due to the effects of climate change; ponds and lakes may become dry. Brewer's sparrow may be directly and indirectly effected by conifer encroachment, wildland fire, and livestock grazing.

Direct and indirect effects may occur to big game such as elk, moose, mule deer, white-tailed deer, mountain lion, and black bear. Cumulative effects may occur. Hiding and thermal cover may diminish in the short-term, but recover in the long-term. Forage may be available in the short-term for elk, but may be available for deer and moose in the long-term. Road management may negatively affect big game, but open road densities are presently low (1.70 mi/mi²) and are expected to remain low in the future. This is primarily due to low road densities planned for Zone 1 in the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy (Interdisciplinary Team 2018). Predators considered big game, such as the mountain lion, black bear, and gray wolf are widespread across the Decision Area. Cumulative effects analysis for mountain lion parallels that for elk and deer. Vegetation treatments would provide forage for prey species such as elk and deer in the short-run, but lack of hiding and thermal cover for elk and other ungulates. Direct, indirect, and cumulative effect to black bears is similar to grizzly bears.

Direct, indirect, and cumulative effects would occur to Montana Bird Species of Concern such as Lewis' woodpecker, pileated woodpecker, Clark's nutcracker, brown creeper, Cassin's finch, and evening grosbeak. The proposed action would have additive adverse cumulative effects in that forage and nest habitat would be reduced under all alternatives. Temporary disturbance would occur, but potential nests sites may be protected during nesting season. If active nests are found, vegetation treatments would be evaluated and potentially deferred. Temporary disturbance may occur as nutcrackers are displaced from foraging areas during winter logging. Loss of late succession habitat has a negative effect on brown creepers. Past, present, and reasonably foreseeable future actions may negatively affect Cassin's finch

forage and nest habitat. Additive adverse cumulative effects may occur since forage and nest habitat would be reduced. Woodpeckers would benefit from wildfire and prescribed burning as long as salvage is minimal. Bird species of concern are not detected every year. Local breeding bird survey and Christmas bird survey information are summarized and indicate regional declines in the bird species of concern.

Cumulative effects on resources or resource uses may result from Alternatives A, B, and C. Many resource management actions are similar enough that cumulative effects would be the same. Vegetation management has the potential to affect wildlife and their habitat, including special status species. Many activities would occur within the Decision Area that would also affect wildlife and wildlife habitat including timber harvest, livestock grazing, prescribed and wildfire, road construction and use, mining, weed treatment, residential and commercial development, and recreation activities. Road construction can impact wildlife in a number of ways.

Roads can increase harassment, poaching, collisions, and displacement. Open roads may increase the level of recreation resulting in additional disturbance and displacement of wildlife. Timber harvest, and associated road construction, has declined across the Decision Area, which has resulted in reduced alteration of habitat and disturbance. Alternative C reduces the effects on wildlife associated with roads. Alternative B would result in restoring NRV. Livestock grazing may reduce the amount of forage for wildlife. Mining may affect wildlife by reducing the quality and quantity of habitat.

3.3.9 Paleontological Resources

Under all alternatives, paleontological resources are managed according to BLM 8270 Handbook, BLM Manual for the Management of Paleontological Resources, and any interim instruction memoranda and information bulletins.

Indicators

The primary indicator in the management of paleontological resources is known fossil localities. Locality data is developed through paleontological inventory or recorded discoveries and is used for identifying fossil sites within areas of potential impact from surface disturbing activity. In order to protect the paleontological resource from targeted theft or destruction, fossil locality data is not available to the public.

Another indicator is analyzing potential impacts to fossils based on what geologic formation is being disturbed. Rocks that are similar in character, usually due to how they formed, are organized into mappable units called formations. Generally, most fossils were deposited within the sediments of past environments, so most paleontological resources tend to be preserved in formations consisting of sedimentary rocks (shale, sandstone, and limestone). The other two categories of rocks, igneous and metamorphic, are far less likely to contain fossils.

Analytical Methods and Assumptions

The BLM's policy is to manage paleontological resources for scientific, educational, and recreational values and to protect or mitigate these resources from adverse impacts. To accomplish this, paleontological resources must be professionally identified and evaluated, and paleontological data must be considered as early as possible in the decision-making process in regards to surface-disturbing federal actions.

Given that the environment in which a formation is deposited will strongly influence its likelihood of preserving fossils, and not every formation is equally likely to have fossils, the BLM uses a coding system to rank a formation's probability of containing significant fossils. This system is the Potential Fossil Yield Classification, a numerical ranking from 1 (low potential) to 5 (very high potential). This

system allows land managers to predict where significant fossils will occur in order to make informed planning decisions with regard to fossil resources.

In its practical application, the potential fossil yield classification is intended to help land managers plan where to focus resources during the planning or execution of ground-disturbing activities. The system can also be used by researchers in helping them to focus attention on fossil-bearing rock units or, perhaps more importantly, to highlight formations whose fossil potential is little known, pointing toward gaps in our paleontological knowledge.

However, several important points should be kept in mind. Fossils are not evenly distributed throughout a formation, and so even highly ranked formations may produce only occasional fossils in a given location. Similarly, fossils can be found in unlikely places. For example, granite bedrock might be given the lowest potential rating, but have a crevice or cave structure that is rich in fossils. Indeed, the discovery of a fossil in a Class 1 rock unit might be the more important given its unexpected occurrence. The system is just designed to help in planning and cannot replace detailed analysis on a case-by-case basis by trained personnel.

It is assumed the number of paleontological resources that could be impacted by various activities is directly correlated with the degree, nature, and quantity of surface-disturbing activities within the planning area. Activity resulting in surface disturbance is not predictable over the planning period. Such actions may have impacts, but are addressed at the project-level.

Affected Environment

The majority of the surface geology within the planning area is dominated by the thick sequence known as the Precambrian Belt Supergroup. Because the Belt Supergroup was deposited before the earliest animal life, any fossils contained within these stratigraphic units are related to cyanobacteria or primitive plants such as algae.

Overlying the Precambrian rock, the Paleozoic and Mesozoic-aged geologic formations within the intact stratigraphic record have a greater potential of containing vertebrate and invertebrate fossils. Within the planning area, these layers are only exposed at the surface in upturned belts along thrust faults and surrounding the intrusive igneous cores of the larger mountain masses—so outcrop with any fossil potential is very limited to isolated areas of western Montana. Most of the scientifically significant fossils in the area occur in geologic units of the Cenozoic Era, the age of mammals (Eocene to Miocene Epochs, 54 million to 5.3 million years ago).

To date, the known localities on public lands only contain sporadically distributed and fragmentary remains of terrestrial vertebrates (Tetra Tech 2011). About 250-recorded localities occur within the planning area, but none is located on BLM-managed lands.

Environmental Consequences

Impacts common to all alternatives: Ground disturbance through federal action have the potential of affecting paleontological resources. Measures to reduce or minimize effects would be applied to surface-disturbing activities within areas of Class 3 to 5 formations under the Potential Fossil Yield Classification system, but the type of measures would vary on a case-by-case basis.

Measures to reduce or minimize effects from surface disturbance in areas known or suspected to contain significant paleontological resources could result in the identification and evaluation of previously undiscovered resources.

3.4 Resource Uses

3.4.1 Recreation and Visitor Services

BLM-managed lands in the planning area provide opportunities for a variety of outdoor recreation activities and related benefits. Many visitors use public lands to hunt, fish, camp, float, snowmobile, and view cultural and natural resources. This broad spectrum of uses and activities provide a diverse range of visitor needs and expectations along with the other federal, state, and county managed lands in Western Montana.

Indicators

- Acres of SRMAs, and BCAs

Analytical Methods and Assumptions

- Impacts to recreation result from user conflicts (internal and external), public safety, and from laws and regulations (such as wildlife, fisheries, and cultural resources).
- Open motorized road density restrictions will limit opportunities for motorized recreation and motorized access to some public lands.
- As population increases, recreation demands in the Lower Blackfoot Corridor will increase.
- Local towns are looking at recreation and tourism to boost their economies.
- With a travel network of intermixed private, county, and BLM-managed roads, without willing landowners providing easements to the public, recreation opportunities will decrease.

Affected Environment

BLM-managed lands in the planning area provide opportunities for a variety of outdoor recreation activities and related benefits. Visitors use public lands to hunt elk and other big game fish blue ribbon trout, camp, float along the nationally recognized Blackfoot River, mountain bike, snowmobile along winter trails in the Garnets, visit Garnet Ghost Town, hike along the Lewis and Clark National Historic Trail, and view cultural and natural resources. Hunting has been and continues to be an important activity as the BLM lands in the planning area. Members of the public have expressed a growing interest in connecting communities through non-motorized and motorized trails. This broad spectrum of uses and activities provide a diverse range of visitor needs and expectations. The BLM-managed lands are not the sole provider of recreational settings and opportunities, and many opportunities exist on other federal, state, county, and some private lands and facilities throughout the planning area.

Until recently, management of the BLM recreation program has provided a broad range of recreational activities. This activity-based management style was in response to the rapid growth in public lands recreation, and generally achieved the desires of the public and the goals of the agency. However, focusing on specific activities often caused the recreation program to function in isolation of other resources and interrelated functions. To counter this, the BLM transitioned recreation program management to an outcomes-focused management approach that focuses on outcomes to individuals, communities, economies, and the environment. Benefits-based management integrates the management of recreation settings with desired recreation opportunities and benefits to these sectors.

The primary focus of the recreation program has been Garnet Ghost Town, the Blackfoot River Corridor, Block Management Areas—especially the Blackfoot Block Management area— snowmobile trails, and dispersed recreation including walk-in hunting areas.

The 1986 Garnet RMP designated five special recreation management areas (Garnet National Winter Recreation Trail; Lewis and Clark Trail and Blackfoot River; Garnet Ghost Town; Blackfoot Special Management Area; and the Clark Fort River). Walk-in hunting opportunities were emphasized especially in the Ram Mountain, Marcum Mountain, and Hoodoos areas.

The Lewis and Clark Trail and Blackfoot River SRMA include lands along the trail and the Blackfoot River. Approximately 40,000 people visit this nationally recognized and extremely popular area for activities such as rafting, fishing, hunting, camping, mountain biking, and motorized uses. Through acquisitions, the Field Office acquired lands that contained segments of the trail, and as a result, now manages 12 miles of the trail. The lands acquired in the Lower Blackfoot Corridor also contain eight day-use sites, one campground, and a boat launch. The BLM and Montana Fish, Wildlife and Parks cooperatively manage the river recreation and campground through a MOU and Cooperative Agreement. In addition, the BLM is a landowner signatory in a Cooperative Agreement between private and public landowners and MFWP on the management of the Blackfoot River Recreation Corridor.

The Garnet Ghost Town SRMA is an abandoned gold mining town that contains over 25 intact historic buildings. Between 20,000 and 24,000 people visit each year to experience a glimpse of mining town life back in the 1890s to the 1940s. Visitors from around the world come to visit starting in May through October or November. Most visitors come in the late spring through fall. In the winter months, visitors have the opportunity to snowmobile or ski to the town, and can rent cabins.

The Garnet National Winter Recreation Trail SRMA at one time consisted of over 106 miles of snowmobile trail, 32 of which are the actual Garnet National Winter Recreation Trail. Because of private inholdings, the selling of private lands, and county road-based trails, the number of snowmobile trails has decreased in recent years to 91 miles. Of these, 48 miles are groomed through a partnership with a local snowmobile club. The trails offer a unique experience for all levels of riders, which compliments the more advanced snowmobiling that occurs in the surrounding area (Seeley Lake and Gold Creek).

The Blackfoot Special Management Area SRMA is a cooperatively managed road closure designed to improve the quality of elk hunting, protect soils and vegetation, and gain hunting privileges on private lands previously closed to the public. Other big game hunting in the area includes mountain lions and black bears. It is located within the one of the oldest Block Management Areas.

The Clark Fork River SRMA is consists of isolated tracts of land along the Clark Fork River.

In general, the Garnet Resource Area RMP allows permits for commercial use, competitive events, and group activities such as trail rides, bicycle tours, and off-road vehicle events. No outfitter and guide permits are allowed for hunting, except in conjunction with adjoining Forest Service permits.

Environmental Consequences

Impacts common to all alternatives

Aquatics. Riparian management direction could affect recreation. Some recreation opportunities are water based and in or near riparian habitat. As such, some recreation sites or opportunities may have to be moved or may not be allowed.

Cultural resources. Cultural resources could have impacts to recreation. Section 106 of the National Historic Preservation Act, as amended, will be followed prior to any recreation development. Impacts could occur by having to move or not allow recreation sites from being developed if significant cultural resources are present.

Land tenure. The majority of the lands in the planning area are within Category 1 and 2. Retaining public lands with high resource values, consolidating public lands, and acquiring lands with high resource values is a benefit to recreation.

Access. Lack of access impacts recreation. Easements that allow public use are a benefit to recreation. Easements that only allow administrative use affect recreation by decreasing public access to public lands.

Special recreation permits. Because BLM-managed lands in the decision area are not huge blocks of land, especially compared to the Forest Service, not allowing SRPs for guided and outfitted hunting unless in conjunction with the Forest Service benefits recreation. The public will have place to go hunting on public land without having commercial uses. In addition, it provides a unique opportunity that compliments the recreational opportunities on other Federal lands and State lands.

Livestock grazing. Impacts from grazing occur from conflicts between livestock and recreationists primarily at developed recreation sites. These impacts are reduced by not allowing livestock grazing at Garnet Ghost Town and within the Lewis and Clark National Historic Trail corridor along the Lower Blackfoot River Corridor area.

Minerals. Impacts from minerals is site specific. The majority of the lands in the planning area have very low or unknown potential. Within the SRMA boundaries, mineral potential ranges from very low to high depending on the location of SRMA. Where the potential is high, management direction, best management practices, and design features will reduce impacts to recreation sites and dispersed recreation.

ACECs. No developed recreation sites would be allowed in the 640 acres (alternative B) or 660 acres (alternative C) of ACECs. Recreation use and opportunities in the Phil Wright Rock ACEC would be oriented toward preserving and enjoying the relevant and important values, which would allow wildlife viewing, fishing, hunting, and sightseeing.

Impacts under Alternative A

Recreation. A broad range of recreation opportunities would continue. The Blackfoot River and Lewis and Clark Trail SRMA would not adequately follow policy as the trail is now its own designation with its own set of guidance to follow. In addition, SRMA guidance has changed since the five SRMAs were designated in 1986.

Forest management. Vegetation management and associated road building will have long-term impacts on dispersed recreation, causing a decrease in opportunities associated with undeveloped land. In the short term, vegetation management would displace dispersed recreation and possibly cause user conflicts while operations are on-going.

Minerals. Mineral development could cause short- and long-term effects by disturbing recreation sites. Impacts would be reduced through the various laws and regulations that guide mineral development.

ACECs. No developed recreation sites would be allowed in the 1,225 acres of ACECs. Recreation use and opportunities in the Bear Creek Flats and Phil Wright Rock ACECs (1,205 acres) would be oriented toward preserving and enjoying the relevant and important values, which would allow wildlife viewing, fishing, hunting, and sightseeing.

Travel Management. The BLM would continue to allocate 137,052 acres as limited to off-highway vehicle use, and 25,562 acres as closed. The limited designation provides opportunities for step-down,

site-specific motorized and non-motorized opportunities. The areas closed to off-highway vehicles provide opportunities for non-motorized recreation.

Impacts under Alternative B

Recreation. Recreation would be emphasized in the five SRMAs (71,632 acres), allowing for outcome focused recreation in the Lower Blackfoot Corridor, Limestone Cliffs, and Garnet, Chamberlain, Ram Mountain areas.. Lower Blackfoot Corridor, Garnet, and Chamberlain SRMAs would be similar to Alternative A. Ram Mountain SRMA would provide opportunities for continued bighorn sheep and elk hunting, as well as viewing of bighorn sheep lambing. Approximately 10 percent of the planning area is bighorn sheep habitat, with BLM-managed lands representing less than 1 percent, the majority of which is on Ram Mountain. Limestone Cliffs SRMA would be managed for rock climbing and education purposes.

The rest of the lands would be managed for dispersed recreation, public safety, and reducing user conflicts. Supplementary rules for the Limestone Cliffs SRMA will protect the limestone cliffs, especially since the area is not an ACEC in this alternative and they are an integral part of the SRMA. In addition, the rules provide for public safety. Supplementary rules in Bear Creek Flats are needed in order to be consistent with the other Supplementary Rules in the Lower Blackfoot Corridor and the Blackfoot River Recreation Corridor Landowners Agreement. Additional supplementary rules in the Lower Blackfoot Corridor SRMA will help to enforce time restrictions at the day use sites as well as help provide for safety of the public. The closure to human entry at the Sperry Grade area will be consistent with the rules of the Blackfoot-Clearwater Game Range. The purpose of the closure is to protect the elk and elk winter range. When the area was acquired, it was decided through and Environmental Assessment that it would be managed similar to the Game Range including closing it to human entry. However, a supplementary rule is needed in order to enforce the closure. Supplementary rules are needed at Garnet Ghost Town in order to protect the historic buildings from fire and vandalism, the artifacts below and above ground from looting, and to provide for public safety. Overall, the rules will have beneficial impacts to the recreational experience.

Forest vegetation. Vegetation management will have short-term impacts on recreation depending on where the activities occur, the disruptions to the recreational experience, and user conflicts (such as timber harvest occurring in hunting-related SRMAs or during high-use recreation seasons in the Lower Blackfoot River SRMA). Design features, including possible timing restrictions developed at the project level, should help minimize impacts.

Wildlife. The presence of migratory birds may result in best management practices, project design features, education, or other adjustments to recreation. Open motorized road density restrictions associated with zone 1 of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy will affect recreation by limiting the amount of motorized routes used for motorized recreation from April 1 through November 30 on approximately 112,461 acres or 69 percent of the public lands administered by the BLM.

Land Use Authorization. The SRMAs are rights-of-way avoidance areas. As such, design features to reduce impacts from large rights-of-way will be implemented. Because the majority of the decision area's rights-of-way are from local landowners wanting access for various reasons and longer time periods (such as access to residences or to conduct land management activities), user conflicts between the right-of-way holders and recreationists could occur. However, impacts can be reduced through stipulations.

National trails. National trails are a benefit to Recreation. The Garnet National Winter Recreation Trail is part of the Garnet SRMA and Garnet Trails Recreation Management Zone. The trail highlights and protects this recreation opportunity and experience. Within the Lewis and Clark National Historic Trail

Corridor (6,830 acres) recreation use and opportunities including, but not limited to, wildlife viewing, fishing, floating, camping, hunting, hiking, biking and sightseeing would continue.

Wilderness study areas. WSAs will continue to provide opportunities for primitive, non-motorized recreation. If Congress releases the Wales Creek WSA, 5,602 acres would provide for primitive, undeveloped, non-motorized recreation. The remaining acres would provide for more managed recreation (995 acres in the Chamberlain SRMA and 4,987 acres in the Garnet SRMA/Garnet Trails RMZ). If Congress releases the Hoodoo Mountain WSA, recreation would be allowed but not emphasized.

Lands with wilderness characteristics. Emphasizing multiple use as a priority over protecting wilderness characteristics on 2,523 acres would not impact recreation in general. Opportunities for primitive and unconfined recreation would be reduced. However, approximately 1,162 acres would be part of the Chamberlain SRMA, which is managed for walk-in hunting opportunities, and 1,203 acres would become part of the Garnet SRMA. Dispersed recreation would occur in the Stoney area (158 acres).

Travel and Transportation Management. The acreage of limited off-highway vehicle use would be approximately 133,770 acres compared to alternative A. The acreage of closed off-highway vehicle use would be approximately 28,844 acres. Changing the allocation in the Lower Blackfoot Corridor from closed, to limited, allows the BLM to address current demands and uses on the ground for nonmotorized and motorized recreation. At the site-specific level during travel management implementation, the BLM could identify motorized routes to connect communities and nonmotorized routes to offer mountain biking and other experiences in the area. Changing the off-highway vehicle use allocation in the Wales Creek and Hoodoo Mountains WSAs from limited, to closed, has a negligible impact on recreation—specifically snowmobile use. Current use of the WSAs by snowmobiles is low, and no designated snowmobile trails are located in the WSAs.

Withdrawals. The withdrawal of 283 acres in the Garnet Ghost Town Recreation Management Zone will benefit the recreational experience because no surface disturbing activity associated with mineral exploration or development would occur within the ghost town footprint if withdrawn.

Impacts under Alternative C

Recreation. Recreation would be emphasized in the two SRMAs (46,523 acres), allowing for outcome focused recreation in the Lower Blackfoot Corridor and Garnet Area SRMAs. Wildlife-dependent recreation and wildlife habitat would also be emphasized in four backcountry conservation areas (46,389 acres) in the Chamberlain, Ram Mountain, Hoodoos and Marcum areas. The rest of the lands would allow for dispersed recreation, managing for public safety and reducing user conflicts.

Forest vegetation. Vegetation management will have short-term impacts on recreation to a lesser extent in this alternative compared to alternative B because less acres are being proposed for treatment. However, impacts will still occur. Depending on location, disruptions to the recreation experience and user conflicts could occur (such as timber harvest operations in the backcountry conservation areas during hunting season, or during a high-use recreation season in the Lower Blackfoot Corridor SRMA). Design features, including possible timing restrictions developed at the project level, should help minimize impacts.

Wildlife. Including winter range big game habitat with the Zone 1 of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy, open motorized road density restriction will have a greater impact on recreation under this alternative. Approximately, 141,492 acres or 87 percent of the public lands managed by the BLM would fall under this restriction, which would limit more motorized routes that could be open to the public. This would reduce opportunities even more for motorized recreation..

Land use authorizations. The SRMAs and BCAs are right-of-way avoidance areas. As such, design features will reduce impacts from large rights-of-way. Because the majority of the decision area's rights-of-way are from local landowners wanting access for various reasons and longer time periods (such as access to residences or to conduct land management activities), user conflicts between the right-of-way holders and recreationists could occur. However, impacts can be reduced through stipulations.

National trails. The Garnet National Winter Recreation Trail is part of the Garnet Area SRMA/Garnet Trails RMZ. The trail highlights and protects this recreation opportunity and experience. Within the Lewis and Clark National Historic Trail Corridor, approximately 12,577 acres, recreation use and opportunities including, but not limited to, wildlife viewing, fishing, floating, camping, hunting, hiking, biking, and sightseeing would continue.

Wilderness study areas. WSAs will continue to provide opportunities for primitive, non-motorized recreation. If Congress releases the Wales Creek WSA from designation, 5,602 acres would provide for primitive, undeveloped, non-motorized recreation. The remaining acres would provide for more managed recreation (995 acres in the Chamberlain SRMA and 4,987 acres in the Garnet SRMA/Garnet Trails RMZ). If Congress releases the Hoodoo Mountain WSA, 10,883 acres would be added to the Hoodoos Backcountry Conservation Area, which would benefit recreation by emphasizing wildlife-dependent recreation including hunting, fishing, and wildlife viewing.

Lands with wilderness characteristics. Protecting wilderness characteristics will add 2,523 acres of primitive, non-motorized recreation.

Travel and Transportation Management. The acreage of limited off-highway vehicle use would 132,192 acres. The BLM would further increase the acreage of closed to off-highway vehicle use designation to 30,422 acres. The additional acres are being closed to motor vehicles to protect 2,523 acres of lands with wilderness characteristics. Closing additional acres will have a negligible impact to motorized recreation because motorized use is low as only one road exists within these acres and has been cherry-stemmed out, and no other motorized routes are present on these acres. Snowmobiles no longer can travel cross country on these acres—the use for that purpose is low.

Withdrawals. The withdrawal of 355 acres in the Garnet Ghost Town Recreation Management Zone will benefit the recreational experience because no surface-disturbing activity associated with mineral exploration or development would occur within the ghost town footprint if withdrawn.

Cumulative effects.

The BLM-managed lands in the planning area provide opportunities for a variety of outdoor recreation activities and related benefits on the 162,611 acres of public lands it manages.

Many recreation opportunities exist on other federal, state, county, and some private lands and facilities throughout the planning area. Some BLM-managed lands are located within an hour of large communities (Missoula and Helena) and larger rural communities (Deer Lodge and Philipsburg). BLM-managed lands are often intermixed or adjacent to other federal lands administered by the USFS, State lands administered by DNRC and MFWP, and private lands. Within the three-county analysis area, BLM-managed lands account for 1.2 percent of the lands in Missoula County, 3.5 percent of the lands in Granite County, and 6.3 percent of the lands in Powell County.

Other Federal Agencies in the three-county analysis area manage approximately 2,171,500 acres. The U.S. Forest Service is the dominant federal agency within the planning area, with the Beaverhead-Deer Lodge, Helena-Lewis and Clark, and Lolo National Forests having managing lands within the three-

county analysis area. Within the planning area, the Forest Service provides a wide array of recreational opportunities, including hiking, biking, and horseback riding in the Missoula area; camping, fishing, and rental cabins in the Rock Creek area; and snowmobiling, hiking, camping, fishing, and other water-based recreation in the Seeley Lake and Lincoln areas. Hunting is also a predominant recreational activity on National Forests. Not allowing outfitted and guided hunting SRPs on BLM-managed lands unless in conjunction with a Forest Service permit will continue to provide a recreational experience that is unique to the area and compliments the recreational opportunities on other federal lands

Montana Fish, Wildlife and Parks also offers several recreational opportunities within the three-county planning area. Aside from hunting, fishing, and overseeing block management areas; other opportunities include camping at developed sites around lakes and rivers, day use sites along rivers and tributaries, and river access. In addition, Montana Fish, Wildlife and Parks administers float-in campsites on private land in the Blackfoot River corridor. Several private landowners also allow river access and parking areas for the Blackfoot River on their lands, as part of the Blackfoot River Recreation Agreement and other agreements and leases with Montana Fish, Wildlife and Parks.

Private landowners in the three-county analysis area range from private individuals, industrial timber companies, to the Nature Conservancy. The Nature Conservancy allows different types of recreation on approximately 150,000 acres including hunting, dispersed camping, snowmobiling, hiking, and bike riding.

Industrial timber companies are starting to sell their lands within the planning area. Industrial timber companies allowed the public to use their private lands for hunting, fishing, and other recreation for the past few decades. However, as these lands change ownership, the public is no longer able to access many of these lands for recreation purposes. Some of these lands are intermixed with BLM-managed public lands, and some lands are being subdivided. New landowners want access into areas that are restricted from vehicle travel during the hunting season or winter and are limiting access to the public. In addition, the timber companies have allowed certain recreation activities on their lands, such as hunting, fishing, and camping. As a result, recreationists are losing some opportunities, and are having some of their recreational experiences diminished. Conversely, one timber company has sold most of their acres to The Nature Conservancy, and is working with the Missoula BLM to acquire their land in the Lower Blackfoot Corridor. As long as the BLM is supportive of acquisitions of this nature, recreation opportunities will increase. However, with increased recreation, it is imperative to work with partners, willing landowners, and to look at the BLM's contribution to landscape-wide recreation opportunities.

Garnet Ghost Town is one of many ghost towns in western Montana, and only a handful are managed for the public to visit. Each managed ghost town offers something different to the visiting public. Tourism in Montana is increasing, including visitation to Garnet. At some point, capacity will be reached.

The BLM-managed public lands compliment these other opportunities. With decreasing budgets and limited personnel, the BLM needs to continue existing partnerships and create new ones, as demand for recreation increases or as new lands are acquired.

3.4.2 Travel and Transportation Management

Restrictions and closures were established for specific roads, trails, or areas based on consideration of the following criteria: the need to promote user enjoyment and minimize use conflicts; the need to minimize damage to soil, watershed characteristics, vegetation, roadbeds, or other resource values; the need to minimize harassment of wildlife or significant degradation of wildlife habitat; the need to promote user safety; and the need to cooperate with adjoining landowners.

Indicators

- Acres of open, limited, and closed to off-highway vehicle allocations.
- Miles of open roads during the non-denning season (April 1 to November 30) in BLM-managed lands within zone 1 of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy.

Analytical Methods and Assumptions

- The BLM is deferring implementation-level travel management planning during this planning effort. Implementation-level travel management planning is the process of establishing a final travel and transportation network that includes route-specific designations within the broader land use planning level area designations.
- Any land acquired by the BLM over the life of the resource management plan will be managed similarly to the existing off-highway vehicle area designations of adjoining BLM-managed lands, or, as stated or implied in the transfer. Where clarification is absent, the BLM will manage acquired lands under the OHV limited area designation. The type of limitation will be set by implementation-level decisions; until these decisions are made, use may continue in the same manner and degree consistent with the purposes for which the acquisition was made.
- Open motorized road density (April 1 – November 30) would remain the same for BLM-managed lands in zone 1 of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy; acquired lands with motorized routes would not count against the the 2011 baseline (1.70 mi/mi²).
- In the limited designation, motorized vehicle use (except snowmobiles) is limited to open roads and trails. Off-road snowmobile use is allowed unless specifically restricted.
- Visitor use and demand is likely to continue to increase for both motorized and nonmotorized users.
- Demand for adequate public and agency access to public lands will remain high in the future.
- Changes to off-highway vehicle and snowmobile design and technology will continue, enabling off-highway vehicle users to travel into areas that were once thought of as inaccessible due to terrain, water, or soil features.
- The BLM assumes that areas designated as open to off-highway vehicle use would be more susceptible to have new introductions of invasive plant species and infestation spread than areas designated as limited or closed. The BLM assumes that closures would be respected, and areas closed to off-highway vehicle use would not be susceptible to new introductions and the spread of invasive plant species.
- Road, Bridge, and trail construction would follow project design features, BMPs, and BLM Manual Sections 9112, 9113, 9115 and associated handbooks.

Affected Environment

Travel and transportation management involves a comprehensive approach to on-the-ground management and administration of travel and transportation networks for various means of motorized and nonmotorized travel. These networks include roads, primitive roads, and trails.

The following are the travel and transportation-management route types:

- *Road.* A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

- *Primitive Road.* A linear route managed for four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM-managed road design standard.
- *Trail.* A linear route managed for human-powered, stock, or off-highway vehicle forms of transportation or for historical values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Regulations in 43 CFR 8342.1, require the BLM to establish motorized travel designations for BLM-managed lands to promote public safety, protect resources, and minimize conflicts between multiple-use groups. In accordance with BLM regulations, areas must be classified as open, limited, or closed to motorized travel during the RMP planning process.

The Missoula Field Office currently manages 0 acres of open, 137,052 acres of limited to existing and primitive roads, and 25,562 acres of closed designations. The closed areas are the Lower Blackfoot Corridor, the Ram Mountain area, and the Quigg West WSA. Motorized vehicle use, except snowmobiles, is limited to open roads and trails. Off-road snowmobile use is allowed unless specifically restricted.

The Field Office publishes a travel plan map. This map is updated as needed, and shows designated roads, trails, or areas, and outlines the purpose of the restrictions. These maps are available for the public to purchase. In order to enforce many of the restrictions, gates are installed on roads, and are opened or closed per the designated periods.

Environmental Consequences

Travel management is in response to competing demands for resource uses or protection. There are impacts to other resources or resource uses from Travel Management, but there are no impacts to travel management.

3.4.3 Livestock Grazing

The BLM manages 73 livestock grazing allotments following the Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management (USDI-BLM 1997), which address resource conditions for soils, riparian systems, upland vegetation, wildlife habitat, threatened and endangered species, and air and water quality. Under all alternatives, the BLM must achieve or make progress toward achieving these standards of rangeland health. These standards pertain to rangeland impacts associated with livestock grazing and other administered activities.

Indicators

- Acres available and unavailable for livestock grazing.
- Allotments achieving rangeland health standards and not achieving causal factor livestock grazing.
- Riparian habitat conservation area management.
- Acres of Lewis and Clark National Historic Trail Corridor along the Lower Blackfoot River.
- Acres of Garnet Ghost Town Recreation Management Zone.

Analytical Methods and Assumptions

- The 1997 Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Montana, North Dakota, and South Dakota (USDI-BLM 1997) will be used to provide a measurement of rangeland health.
- Current management direction is to complete rangeland health assessments on the allotments. Eighty-nine percent of the 73 established allotments within the decision area have been assessed.

Forty-six allotments, approximately 51,487 acres (48 percent), are meeting all standards. Seven allotments, approximately 7,766 acres (7 percent), were not meeting standards due to livestock, and action has been taken to facilitate improvement. Five allotments, or approximately 5,648 acres (5 percent) were not meeting standards due to combined livestock and other factors, and action has been taken. Four allotments, approximately 3,599 acres (4 percent), were not meeting standards due to other factors and not livestock. Eight allotments, approximately 26,582 acres (25 percent), have been assessed, but no determination has been made. Three allotments, approximately 11,963 acres (11 percent) have not been assessed. See the Missoula BLM RMP Analysis of the Management Situation for assessment findings specific to each established allotment.

- Management opportunities to achieve desired conditions will be limited in those areas where rangelands may not have the capability to meet rangeland health standards or make significant progress toward meeting the standards due to causes other than livestock grazing.
- Where allotments are not meeting rangeland health standards and livestock grazing is a causal factor, changes in grazing practices and range improvement projects may result in the allotment meeting rangeland health standards or making significant progress toward meeting the standards.

Affected Environment

Approximately 66 percent (approximately 107,045 acres) of BLM-managed lands within the planning area are located within established grazing allotment boundaries. There are some isolated parcels located outside of existing allotment boundaries that are not currently leased for domestic livestock use. Under the existing RMP, there are approximately 44,810 acres closed to livestock grazing.

The 1934 Taylor Grazing Act classifies grazing allotments in the planning area as “Section 15” lands (leases). Section 15 lands are lands that occurred outside of established grazing districts at the time of the act. Domestic livestock that graze in the decision area are primarily cattle; only a few allotments include horse use. There are no sheep grazing leases. The relative numbers of these livestock classes have not varied much over the last decade.

There are 73 grazing allotments in the decision area. The Elk Creek allotment is listed as inactive, and to be used only for prescription grazing. In addition to public land, some allotments may contain other land ownerships (such as Forest Service, state, and private). Although the 1986 RMP had 5,930 AUMs, there are currently, 5,908 animal unit months (AUM) are permitted within established allotment boundaries. Total permitted numbers may change on an annual basis due to conversions of livestock class, changes in the base property, land acquisition, or livestock management including deferred rotation, herd sizes, failure to meet rangeland health standards, etc.

The existing 1986 Garnet RMP evaluated the management situation for each allotment, and placed them in one of three categories: Improve Management (I), Maintenance Management (M), or Custodial Management (C). Management category descriptions are listed below.

- *Improve allotments (I)*. Changes needed. Vegetative or watershed conditions are not satisfactory; the allotment has a high to moderate potential for production, but is producing below its potential; there are substantive conflicts with other resources; the allotment’s size and physical characteristics make management changes and range improvements cost effective.
- *Maintain allotments (M)*. Changes not needed. Vegetative or watershed conditions are satisfactory; allotment is covered by and AMP; the allotment has the potential for high resource production and is producing near its potential; the allotment’s size and physical characteristics would make management and range improvements cost effective.

- *Custodial allotments (C)*. Changes are not feasible. The biological potential for response to a change in management is low; management of the allotment would not be cost effective due to its size or potential productivity; the cost of the range improvements that would be needed to change grazing management exceeds the expected benefits; little conflict, if any, exist in resource area; overall resource values are relatively low.

See Table 55 below for a summary of allotments, by category, under the existing RMP.

Table 55. Classification of livestock grazing allotments under the 1986 Garnet RMP

Category	Number of Allotments	BLM Acres	BLM AUMs
I	11	47,589	1,373
M	23	51,295	3,553
C	50	11,385	1,004
Total	84	110,269	5,930

The BLM-administrated lands help maintain the integrity of ranch operations, and support the culture, lifestyle, and livelihood of the grazing lessees. In many cases, if ranchers lost their BLM grazing lease(s), the viability of their ranch operation would be seriously affected, thereby making it difficult for them to stay in the livestock business. The socioeconomics section (section 3.7) provides a deeper context to this issue.

Trends in livestock grazing reflect changes in livestock classes, lessees and their perspectives, permitted use or season-of-use, the number and types of range improvements, and grazing systems. Instances of new base property ownership has increased, as has the number of lessees that do not rely on livestock grazing for their primary source of income. Changes in the types of lessees that run livestock in the planning area have resulted in a diversification of perspectives. Changes in permitted use or season-of-use are in response to changes in rangeland condition, socioeconomics, and other factors. The condition of the land is due to a variety of factors, such as climate, wildlife, livestock, mining, recreational use, and increased population. Increased development and recreational demands are competing for resources that could limit livestock grazing.

If rangeland condition deteriorates, the BLM has the ability to reduce the number of AUMs, to manage plant communities that provide forage and browse through vegetation treatments, change the season-of-use, require deferment and pasture rotations, and to install range improvements (such as fences, water pipelines, spring developments, and reservoirs). These range improvements often enable more intensive grazing systems, and encourage better livestock distribution and grazing utilization, but they also require more management on the part of the grazing lessee. Range improvements and lessee involvement may become more crucial to sustain future resource demands. The BLM's traditional goal in managing livestock grazing has been to provide sustainable habitat for livestock and wildlife. This is likely to remain the primary focus of the BLM's management of livestock grazing.

Urbanization of rural areas in the planning area has also caused conflicts with livestock grazing. New landowners are often unfamiliar with state livestock laws and associated fencing requirements. Conflicts develop when livestock authorized on public land drift onto private land. This is largely the result of public and private land boundaries that are not fenced or are poorly fenced. It is BLM policy not to fence, or be responsible for fence maintenance, on boundaries between private and public land. In most instances, the BLM has determined that it is not in the public interest to construct these fences largely because it would not be practical or economical. Rural-urban interface conflicts may force livestock operators to seek other areas for grazing.

In addition to the urbanization of rural areas, there appears to be a growing trend where base property is not being traditionally handed down to the next generation. In some cases, portions of base properties are sold or broken-up, to the extent where significant livestock operations are not effective. If base properties are divided into several small parcels, this may result in dividing a larger allotment into two or more smaller allotments, which, on that scale, increases the difficulty of managing public land. If the base property is sold as a whole and the allotment is transferred to the qualified applicant, normally livestock operations are able to continue.

The Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management (USDI-BLM 1997) addresses resource conditions for soils, riparian systems, upland vegetation, wildlife habitat, threatened and endangers species, and air and water quality. The standards and guidelines are implemented through land health assessments, standards conformance review determination documents, environmental analysis, lease renewals, and other lease changes. These standards not only address livestock grazing effects, but other rangeland effects from activities such as recreation, wildlife grazing, logging, and mining. Sustainable livestock grazing and desired rangeland conditions require the collective management of forage, water, soil, and livestock by the BLM and livestock owners and operators. An interdisciplinary approach ensures effective management of the multiple resource values and uses in the planning area. Of the BLM's 73 allotments, there were 9 allotments not meeting standards causal factor livestock grazing; 6 allotments where livestock grazing was one of multiple causal factors; and 5 allotments not meeting standards causal factor not livestock.

Management practices for livestock grazing have been focused on achieving land health standards and meeting objectives for other resources (for example vegetation and soils) in the allotments. This has been accomplished by conformance with the guidelines for livestock management, such as changing the duration of grazing use, season-of-use, adjusting animal units, and improving grazing distribution. Adjusting the duration of grazing use and improving livestock distribution are generally the keys to meeting rangeland objectives, particularly those associated with riparian areas. Grazing management is improved by a variety of actions, such as

- Adjustments in grazing permits (including the addition of terms and conditions designed to maintain or improve riparian zones and wetlands, utilization and trampling limits, herding and riding requirements, and placing salt away from riparian zones);
- Construction of water developments and pasture fencing; and,
- Ensuring maintenance of range improvements and compliance of grazing permits.

Terms and conditions of leases are specific requirements determined to be appropriate to achieve management and resource condition objectives, or to ensure conformance with the rangeland health standards. They are determined by an interdisciplinary team in consultation with lessees and the interested public for each individual allotment. Terms and conditions are a tool to achieve resource conditions or conform to rangeland health standards on public lands. They may be modified if monitoring data shows those terms and conditions are not achieving desired results or lack of conformance with the grazing lessee.

Environmental Consequences

Impacts common to all alternatives

Impacts to livestock grazing activities are generally the result of activities that affect forage levels, land use restrictions that affect the ability to construct range improvements, and human disturbance or interference with livestock within grazing allotments. Activities that result in surface disturbance, such as mineral development, right-of-way construction, and recreation would impact livestock grazing by

altering forage levels, although design features or BMPs that limit the amount of surface disturbance (due to fish and wildlife habitat, water resources) may eliminate or reduce the amount of lost forage. Fire management, mechanical treatments, chemical treatments, and forest woodland products would affect livestock grazing by either preserving or increasing available forage for livestock over the long term.

Rangeland Improvements and Health Standards: Livestock grazing would continue to occur within the majority of the planning area under all alternatives; however, acres available for grazing do vary between alternatives. Since the Taylor Grazing Act of 1934 and various other acts, overall rangeland conditions have improved. These improvements are mainly due to improved grazing management practices, development of range improvement projects, and in some cases, the reduction in quantity and type of livestock. The Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management would apply to all alternatives. Adjustments to terms and conditions of grazing leases will occur within one year upon determination of rangeland health standards where livestock grazing is the causal factor for not meeting standards. These adjustments may include, but are not limited to, changes to season of use, rest rotations, removal of livestock or constructing range improvements. Adjustments to the AUMs may also occur at the site-specific level through a watershed planning process or an individual allotment. Any potential changes to AUM allocations would be based on the amount of available forage in an allotment as determined by monitoring, data collection, or other resource concerns. The number of AUMs allocated in any allotment may be adjusted permanently, or placed into suspended use for short or long term. Changes in AUM allocations may have an impact on individual allotments and lessees.

Range improvement projects, such as fencing and water developments, may occur under all alternatives. Impacts associated with fencing and water developments are generally considered short-term, and typically regeneration occurs within a couple growing seasons. However, the some indirect impacts of these actions can be long-term. The construction of new fences and water developments are expected to change livestock grazing patterns and distribution within an allotment. Additionally, congregation of livestock and wildlife around the water source and trailing patterns are expected to change as a result of constructing these facilities. Generally, the long-term impacts from these facilities are anticipated to be a beneficial improvement of rangeland health. Range improvement projects allow livestock managers to implement improved grazing management practices and manage the distribution and movement of livestock within allotments. Maintaining or restoring the health and integrity of grasslands and shrublands could change the amount of livestock grazing, or alter timing and utilization.

Allotments that are voluntarily relinquished may remain available or could be used for other resource management objectives depending upon the site-specific information. Similarly, allotments that are within new or growing subdivisions that have not been active for over five years may be used for other resource management objective for the remainder of the plan. The BLM has taken actions to make progress toward or meet standards for the 9 allotments not meeting standards causal factor livestock grazing; these improvements include removal of livestock grazing from the riparian area, changing the season of use, fencing, etc. The BLM has taken actions to make progress toward or meet standards for the 6 allotments where livestock grazing was one of multiple causal factors; these improvements. This is documented in the AMS' Appendix B (BLM 2017), which is incorporated by reference here.

Riparian habitat conservation areas: Management actions to restore and improve riparian areas may require adjustments in grazing management such as adjusting livestock numbers, rest, deferment, or maintaining existing livestock exclosures along streams, wetlands, and riparian areas in order to meet proper functioning condition goals and the Western Montana Standards for Rangeland Health.

Fire Management. Wildfire and prescribed fire can have both beneficial and adverse impacts to livestock grazing. In the short term, fire burns forage that livestock depend on, and can damage range improvements such as fences. This damage can have an adverse economic effect on grazing operations,

by requiring leasing of additional pasture, feeding livestock for longer periods of time, repairing or building more fences, and reducing herd size. In the long term, fire may improve the quality and quantity of forage, resulting in improving flexibility in livestock management.

Wildfire and prescribed fire can increase the potential for the establishment or spread of invasive non-native plant species within an allotment. The extent of the potential threat depends on the proximity of the seed source, the type of vegetation community burned, and fire severity. Prescribed fire can benefit livestock grazing by improving the quality, quantity, and availability of livestock forage. Prescribed fire can also help meet specific management objectives, such as improving distribution of livestock or removing dense stands of brush.

Fire suppression activities can limit the loss of livestock, short-term loss of forage, and in some cases, the long-term damage to vegetation caused by wildfire, but can increase the potential for the introduction or spread of invasive non-native plant species. The long-term impact of repeated fire suppression is the buildup of hazardous fuels and the increased risk of severe or high severity wildfire. In addition, long-term impacts of fire suppression can lead to the decline in rangeland health, particularly in ecosystems that evolved under a naturally occurring frequent fire return interval.

Vegetative treatment projects designed to benefit rangeland health are also expected to continue under all alternatives. Prescribed burning is anticipated to be a higher priority than it has been in the past.

Noxious weeds. Noxious weeds and non-native invasive species compete and displace native vegetation, and are usually unpalatable to livestock and wildlife. These species can affect livestock grazing by reducing quality and quantity of native forage. Invasion of some weed species (like cheatgrass) can alter the fire regime of an area and cause long-term adverse effects to livestock grazing.

Wildlife. Management for plant and wildlife species designated as threatened or endangered under the Endangered Species Act, or considered a BLM-sensitive species, can affect livestock grazing in allotments where these special status species occur. Restrictions can vary depending on type, location, or time period the activity is allowed, and could limit livestock management options in allotments. Special status species management can increase the cost to livestock grazing operations by requiring additional surveys and design changes to projects, or may include additional terms and conditions on the lease specific to the allotment. Livestock management adjustments would be conducted on a project-level basis following guidelines or requirements specific to the species.

Allotments located in zone 1 and zone 2 of the Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy would be subject to terms and conditions related to carcass removal and other minor adjustments. No new sheep allotments would be allowed on zone 1 lands, but no requests are pending or are reasonably foreseeable in this area. No new livestock grazing leases would be allowed in zone 1, except for potentially future land acquisitions. Future land acquisitions within zone 1 may allow cattle grazing if such grazing occurred at the time of the acquisition.

At the project level, the BLM would delineate riparian habitat conservation areas in response to potential issues for aquatic species and habitat. Site-specific riparian management objectives would give primary emphasis to riparian-dependent resources. This may result in adjustments to the terms and conditions of livestock grazing leases or temporary removal of livestock grazing in these riparian areas to provide for riparian-dependent resources.

Cultural resources. Management of cultural resources can restrict the location and design of range improvement projects and grazing systems. Avoidance of cultural resource sites, limitations, and activities affecting the historic landscape may limit the ability to construct range improvement projects in an

allotment intended for improved management of livestock. Cultural resource management can delay construction of range improvements by requiring additional surveys and changes in project designs to avoid cultural sites.

Minerals. Mining activities on BLM land can result in the direct removal of forage available to livestock. Rangeland health and forage production can be indirectly affected by mining activities through the introduction and spread of noxious weeds or non-native invasive species. The direct and indirect impacts of mining are associated with surface disturbance caused by drilling, road construction, and other associated infrastructure. The degree of impact and potential loss of AUMs would be dependent on the size of area disturbed, length of activity, and how quickly the area is reclaimed. Exploration activities generally result in small areas of disturbance and usually does not require AUM reductions.

Lands and realty. Land tenure actions are expected to continue throughout the planning area. Realty actions can include exchanges, purchases, donations, and sales. Realty actions involving an allotment may result in private ownership, and grazing fees would no longer be collected for these areas. However, grazing fees would be collected for newly acquired lands designated available for grazing. The results of realty actions and the overall affect to AUMs in the decision area cannot be predicted due to the difference in forage production between various sites. Realty actions can have a greater impact on specific allotments than on the total number of AUMs in the planning area.

Subdivision of privately owned base properties for housing developments adjacent to BLM-managed lands is reasonably foreseeable, especially in the Mulkey and Rattler area. Subdividing base property would primarily affect individual allotments, and could result in dividing the allotment into smaller units or cancelling the grazing lease. Subdivisions and structures generally result in additional roads, fences, power lines, and other facilities, which can fragment habitat and increase the potential for the spread or introduction of noxious weeds and non-native invasive plants. Subdivisions generally result in more people recreating and frequenting the area causing additional conflicts with livestock. The long-term effects on adjacent BLM-managed lands could result in the loss of AUMs, degraded rangeland health, or closing the area to term leases for livestock grazing.

Areas of critical environmental concern. Management to protect relevant and important values could place minor restrictions in ACECs where livestock grazing is allowed that would trigger a need to slightly adjust grazing leases.

Recreation. Livestock grazing would be excluded from the river corridor of the Lower Blackfoot River SRMA, which is located on either side of the Blackfoot River or McNamara Road. Livestock grazing would be excluded from the Garnet Ghost Town Recreation Management Area, which is approximately 424 acres, but may expand depending upon topography and manageability.

Impacts under Alternative A

Approximately 117,774 acres, or 72 percent, of BLM-managed lands are available for livestock grazing, while the remaining 44,810 acres (28 percent) are unavailable. Acres available for term leases is 111,721 acres (96 percent) with 6,179 AUMs, and 6,053 acres (4 percent) with 113 AUMs for prescriptive grazing. Up to 96 percent of available lands are subject to livestock grazing impacts. The remaining 4 percent is for prescription grazing only, and would receive temporary short-term grazing impacts. The economic impacts associated with this are described in Section 3.7.

Impacts under Alternative B

Approximately 145,558 acres (90 percent) of BLM-managed lands are available for livestock grazing, while the remaining 17,027 acres (10 percent) are unavailable. Acres available for term leases are 103,192 acres (71 percent) with 5,954 AUMs, and 42,366 acres (29 percent) with 706 AUMs for prescriptive grazing. The BLM would have more management flexibility under this alternative to use livestock grazing for a resource benefit where appropriate across more acres of the field office. The economic impacts associated with this are described in Section 3.7.

Impacts under Alternative C

Approximately 107,341 acres (66 percent) of BLM-managed lands are available for livestock grazing, while the remaining 55,244 acres (34 percent) are unavailable. Acres available for term leases are 101,509 acres (95 percent) with 5,892 AUMs, and 5,832 acres (5 percent) with 122 AUMs for prescriptive grazing. The economic impacts associated with this are described in Section 3.7.

Cumulative effects. Potential cumulative impacts on livestock grazing would occur from a combination of a management activities and land uses within the three-county analysis area. Such impacts would result primarily from surface-disturbing activities such as road construction, mining operations, and possibly some vegetation treatments that reduce the quantity of available forage. These activities result in livestock displacement and direct removal and indirect degradation of forage, regardless of land ownership.

More people will recreate on public lands in the analysis area over the life of the plan. Recreational activities occurring during the livestock season of use would result in increased human and livestock contact and livestock displacement.

Based on observed trends in the analysis area, the trend of subdivision and residential development of rangeland on private lands will continue and thus reduce the amount of livestock grazing. Subdividing would primarily affect individual grazing allotments and could result in breaking an allotment into smaller units or in resting the allotment for the life of the plan.

Future land-tenure actions have the potential to increase AUMs within the planning area. It is impossible to predict how these AUMs will change because of the difference in forage production within various plant communities.

3.4.4 Energy and Minerals

The Bureau of Land Management recognizes that public lands are an important source of the nation's energy and mineral resources. It is BLM policy to make public lands available for orderly and efficient development of these resources in an environmentally sound manner under the principles of multiple use management and sustainable development.

Indicators

The most readily available measurement of impacts to energy and minerals are lands available or closed to mineral entry (exploration, development, and extraction). For the leasable and salable mineral programs, this reduction in open lands is brought about by discretionary closures to protect other resources and values requiring special management. BLM authority is much more limited for locatable mineral closures and requires pursuing a formal withdrawal process where the final decision is made by the Secretary of the Interior; therefore, proposed withdrawals are "recommended" through this land use plan.

Analytical Methods and Assumptions

The reasonable foreseeable development scenario for locatable minerals (Appendix E) identifies areas of moderate- and high-development potential for locatable minerals, including a discussion of future trends and assumptions. Withdrawals impacting these areas will also be quantified by alternative as a measurement of impacts. Lands where a resource or value has been prioritized higher through special management such as backcountry conservation areas, areas of critical environmental concern, wilderness study areas, and special recreation management areas have also been similarly quantified to determine impacts to areas of moderate and high potential for locatable mineral development. Powersite Reservations and Federal Energy Regulatory Commission withdrawals under the authority of the Federal Power Act review is not at the discretion of the BLM and is outside the scope of this RMP. These withdrawals are considered

Impacts to both non-energy leasable minerals and salable minerals are quantified by acres closed.

Affected Environment

The Missoula Field Office manages total of 267,594 acres of federal mineral estate within the planning area. Table 2 in chapter 1 provides a detailed summary of the estate.

Locatable minerals. The reasonable foreseeable development scenario for locatable minerals is contained in Appendix E. The reasonable foreseeable development describes the extent of exploration and mine development within the foreseeable future, and broken into specific geographic areas with moderate- to high-development potential by alternative. Areas of moderate and high development potential are anticipated to surface disturbing activities.

The existing condition of locatable mineral resource use is primarily determined through mineral development potential. Development potential is dependent on three components: geologic occurrence, areas of past and current mineral activity, and areas of active or abandoned mining claims. Areas identified for potential development of locatable mineral resources will contain one or more of these three components.

Geologic occurrence is tied closest to the mineral resource itself. To varying degrees of potential and certainty, this type of occurrence is based on geologic structure, deposition, and mineralization. High and moderate development potential is associated with the presence of favorable geologic occurrence:

- Most of the metalliferous ore deposits within the planning area, including porphyry copper, are associated with the intrusive granitic cores of the larger mountain masses of the southern portion of the planning area. (EMI 2011)
- For the Belt Supergroup layers, the most significant mineralization is present within the Revett Formation of the Ravalli Groups as stratabound disseminated sulfide copper-silver deposits of the Cabinet Mountains and Lincoln and Sanders Counties.
- Mississippian-aged Madison limestone is the most distinguishable stratigraphic group of the Mesozoic-Paleozoic sedimentary layers of western Montana. In some areas, this limestone may contain high enough percentage of calcium carbonate to be potentially economic and considered for exploration.

Except for areas withdrawn or otherwise segregated from mineral entry, BLM-managed mineral estate under public domain remains open to exploration and development for locatable minerals. Any existing mining claims within withdrawal segregation is subject to the valid existing rights; however, no new mining claims can be located in a withdrawn or segregated area.

Currently there are 20 acres withdrawn within the decision area. Additionally, approximately 20,315 acres of federal mineral estate are subject to interminable “temporary” segregations due to having undergone conveyance under section 206 of FLPMA prior to November 21, 2000.

Acquired lands and mineral estate (those purchased, donated, or received in exchange for purchased or donated lands) are not subject to location, but still may be available through mineral lease or sale if not closed.

Leasable minerals. Most of the mining of solid leasable minerals within the planning area came from phosphate production in Powell County. Historic production of phosphate was associated with the Retort member of the Permian aged Phosphoria formation. As with the other formations of the Paleozoic Era, most near-surface potential in the planning area occurs in the upturned stratigraphy along thrust faults and surrounding the igneous cores of the larger mountain masses.

Salable minerals. Sand and gravel, as construction aggregate, is an extremely important resource. Most surface rock and gravel deposits can be used for aggregate, construction material, or landscaping on small-scale projects. Aggregate sources include alluvial, colluvial, and glacial deposits or can be crushed from strongly consolidated rock. Construction material can also be derived from alluvial and colluvial sources for gravel surfacing, while siliceous limestone (likely source from the Madison Group) can be used for riprap. Clay and silt derived from eroded shale is commonly used for fill in road construction projects. The metamorphosed sedimentary rock of the Belt Supergroup that is most abundant in the planning area can be used for decorative stone if the rock tends to break in tabular form and have other desired ornamental characteristics. Despite the wide availability of potential mineral material sources, demand for the resource had been low. Since the mid-1980s, the field office has only seen the development of three mineral material pits greater than five acres of surface disturbance. Other sales and disposals were of small surface disturbance and in support of various construction projects

Environmental Consequences

Impacts Common to all alternatives. The planning area contains three wilderness study areas (WSA): Hoodoo Mountain WSA (11,380 acres), Wales Creek WSA (11,580 acres), and Quigg West WSA (520 acres). Lands under wilderness review are open to locatable mineral entry, but subject to the 43 CFR 3802 regulations to help decrease impairment of the wilderness values. If Congress were to designate these areas as part of the National Wilderness Preservation System, the lands would be closed to mineral entry by means of Congressional withdrawal (subject to valid existing rights).

Lands within a wilderness study area are not available to mineral leasing (43 CFR 3503.10(b)). Under all alternatives, 23,480 acres within the three WSAs are closed to mineral leasing.

There are a total of 1,213 acres of existing Powersite Reservations and Federal Energy Regulatory Commission withdrawals under the authority of the Federal Power Act. Review for potential revocation of these types of withdrawal is not at the discretion of the BLM and is outside the scope of this RMP.

Impacts under Alternative A. In this no-action alternative, the BLM recommends 820 acres for withdrawal. These include the Limestone Cliffs ACEC (20 acres), Phil Wright Rock ACEC (640 acres), and cultural and historic sites including the ghost towns of Coloma, Garnet, Blackfoot City, and Reynolds City (up to 160 acres total). Of these recommendations, the Limestone Cliffs ACEC is the only area to be withdrawn, leaving 800 acres recommended for withdrawal. Table 56 summarizes the acres of moderate- and high-development potential that are withdrawn and recommended for withdrawal under this alternative.

Table 56. Alternative A: withdrawal of development potential

Dev. Potential	Recommend Withdrawal	Existing Withdrawal	Restricted
High (acres)	80	0	5,745
Moderate (acres)	80	20	8,679

Acres identified as restricted are lands open to location under the mining laws but subject to special management or Powersite Reservation under Section 24 of the Federal Power Act, so it could be anticipated that design features, BMPs (Appendix P), reclamation objectives, coordinated review with other federal agencies, etc. would be determined applicable at the project level.

The 1986 Garnet RMP also identified Management Areas 1, 2, and 10 as “generally closed” to mineral material permits in order to protect other resources. Because the management action does not expressly close these areas, these lands are assumed open at the planning level while the approval of a potential mineral material permit remains at the discretion of the Field Manager at the project level.

Of the total 20,315 acres of mineral estate subject to interminable “temporary” segregation within the planning area, 640 acres will be recommended for withdrawal (Phil Wright Rock ACEC). The remaining 19,675 acres are recommended restored and open to entry under the mining laws.

Impacts under Alternative B. Under this alternative, the BLM recommends a total of 283 acres for withdrawal. These areas of withdrawal include the Limestone Cliffs (20 ac, existing) and Garnet Ghost Town (263 ac). Table 57 summarizes the acres of moderate and high development potential that are withdrawn and recommended for withdrawal under this alternative.

Table 57. Alternative B: withdrawal of development potential

Development Potential	Recommend Withdrawal	Existing Withdrawal	Restricted
High (acres)	263	0	8,402
Moderate (acres)	0	20	13,625

Acres identified as restricted are lands open to location under the mining laws but subject to special management or Powersite Reservation under Section 24 of the Federal Power Act, so it could be

anticipated that design features, BMPs (Appendix P), reclamation objectives, coordinated review with other federal agencies, etc. would be determined applicable at the project level.

Of the 20,315 total acres of mineral estate subject to interminable “temporary” segregation within the decision area, about 88 acres will be recommended for withdrawal (Garnet Ghost Town) under this alternative. The remaining 20,211 acres are to be restored and recommended open to entry under the mining laws.

In addition to the 283 acres of withdrawal areas (existing and recommended), 161 acres within the Garnet Ghost Town Recreation Management Zone (424 acres total) and 30 additional acres within the Limestone Cliffs SRMA (50 acres total) will also be closed to leasable and salable minerals. To manage for resource values within the Lewis and Clark National Historic Trail (1-mile corridor), any activities within the 4,698 acres of the Lower Blackfoot portion of the corridor would be required to not impair the trail values. This includes activities such as non-energy leasable and mineral material sales.

Impacts under Alternative C. Under alternative C, the BLM recommends a total of 1,015 acres be withdrawn from location. These areas of withdrawal include Limestone Cliffs ACEC (20 ac), Garnet Ghost Town (355 ac), and Phil Wright Rock ACEC (640 ac). Table 58 summarizes the acres of moderate and high development potential that are withdrawn and recommended for withdrawal under this alternative.

Table 58. Alternative C: withdrawal of development potential

Development Potential	Recommend Withdrawal	Withdrawn	Restricted
High (acres)	324	0	8,561
Moderate (acres)	50	20	10,911

Acres identified as restricted are lands open to location under the mining laws but subject to special management or Powersite Reservation under Section 24 of the Federal Power Act, so it could be anticipated that design features, BMPs (Appendix P), reclamation objectives, coordinated review with other federal agencies, etc. would be determined applicable at the project level.

Of the 20,315 total acres of mineral estate subject to interminable “temporary” segregation within the planning area, a total of 733 acres will be recommended for withdrawal (Garnet Ghost Town, 93 acres; Phil Wright Rock ACEC, 640 acres) under alternative C. The remaining 19,531 acres are to be restored and recommended open to entry under the mining laws.

In addition to the 1,015 acres of withdrawal areas (existing and recommended), 69 acres within the Garnet Ghost Town Recreation Management Zone (424 acres total) will also be closed to leasable and salable minerals. Under this alternative, 12,827 acres would also be closed to leasable and salable minerals to manage for resource values within the Lewis and Clark National Historic Trail (2-mile corridor). Of these 12,827 acres, 122 acres overlap into the DuPont conservation easement that is closed to salable and leasable minerals under all alternatives.

If the Wales Creek WSA is released, this alternative also proposes the designation of an area of critical environmental concern over portions of the Wales Creek watershed. If this alternative is selected, 5,602 acres of the Wales Creek ACEC would be closed to leasable and salable minerals. 4,850 acres would be recommended for withdrawal from mineral entry under the mining laws.

3.4.5 Forest Products

The BLM contributes a small but meaningful amount of forest products to the economy. Under all alternatives, the BLM provides a probable harvest level per decade.

Indicators

- Acres available for harvest.
- Harvest level per decade (in millions of board feet).
- Acres of vegetation treatments per decade.

Analytical Methods and Assumptions

The BLM conducted a GIS analysis to identify areas as available, restricted, and unavailable for forest management using criteria including roads, streams and riparian areas, and non-forested acres. Appendix K details the information and assessment of these lands.

The BLM determined the decadal probable sale quantity (PSQ) for Alternatives B and C. A probable sale quantity (PSQ) should be determined, if possible, for those areas determined to be available for harvest. The PSQ is the allowable harvest level that can be maintained without decline over the long term if the schedule of harvests and regeneration are followed. PSQ recognizes a level of uncertainty in meeting the determined level; this uncertainty is typically based on other environmental factors that preclude harvesting at a particular time (for example, because of watershed or habitat concerns). A PSQ is not a commitment to offer for sale a specific level of timber volume every year.

The BLM determined the PSQ for Alternatives B and C by assessing the biological capacity (annual growth rates) of the available acres then estimating the amount of the growth rates that would be harvested for each alternative based upon the objectives and management direction in each alternative. The BLM assumed that an average of 65 percent of the biological capacity would be removed during timber harvest activities under Alternative B, and that an average of 55 percent of the biological capacity would be removed during timber harvest activities under Alternative C. The BLM relied on the Forest Vegetation Simulator (FVS) growth and yield model for this calculation, which is a nationally recognized model widely used by several federal, state, and private forest managers. This model includes variants developed specifically for Montana forests. The Sustained Yield Calculation (SYC) works by first determining an area's biological capacity (BC), then applying various constraints. A constraint is a reduction in harvest such as but not limited to seeds trees, snags, riparian habitat management objectives, or others. The BLM used the SYC to determine the area's biological capacity and then applied constraints applicable to BLM-managed lands. Appendix K details the description of these assumptions and calculations. Commercial forest products include saw logs and non-saw logs (such as firewood, posts and poles, Christmas trees, mushrooms, huckleberries, etc.).

Affected Environment

Under the 1986 Garnet RMP, the allowable sale quantity was set at 7.3 MMBF per year on 105,020 acres available for harvest (64,720 acres available for harvest with restrictions and 40,300 acres available for harvest without restrictions). Actual harvest levels have fluctuated since the RMP was signed. The 28-year average from 1986 to 2013 is approximately 3.7 MMBF. From 1986 to 1995, the average was 5.2 MMBF, falling to 1.5 MMBF between 1996 and 2005, and rising to 4.5 MMBF between 2006 and 2013. Harvest levels were relatively constant through the mid-1990s, and represented a well-established timber program regulated to produce a steady supply of wood to the timber industry. In the late 1990s, the Field Office shifted its planning emphasis to a watershed restoration-based approach. With this, timber production

generally moved to a byproduct of forest health and restoration projects. This shift caused timber production to occur in pulses. As watersheds were analyzed and treated, a lag was created between treatments to analyze the next watershed. Additionally, large spikes occurred in response to insect outbreaks and associated salvage. Past forest vegetation treatment types, quantities, and acreages are discussed in the section 3.2.

Local and regional demand for forest products. There are 15 large capacity (greater than one million board foot per year processing ability) sawmills in Montana. There are three mills with a hauling distance of less than 100 miles from the decision area. The 15 large mills in Montana require approximately 450 million board feet to operate at full capacity. Montana's wood product industry in 2013 employed approximately 7,000 people, and was the number one contributor to manufacturing jobs in the State. Labor income for the same period was estimated at approximately \$296 million from the forest industry (Montana Wood Products Association 2015). The uneven and declining timber supply from federal lands is one of the factors threatening the longevity of Montana's milling infrastructure.

Personal use firewood permits sold for the decision area have resulted in an average annual harvest of about 183-thousand board feet (or 365 cords) of dead trees from 1999 to 2017. Christmas tree permits have averaged about 160 per year from 1998 to 2018, with closer to 200 permits being sold per year from 2008 to 2018. Local demand for small amounts house logs, posts and poles or other vegetative permits has been minimal from 1998 to 2018.

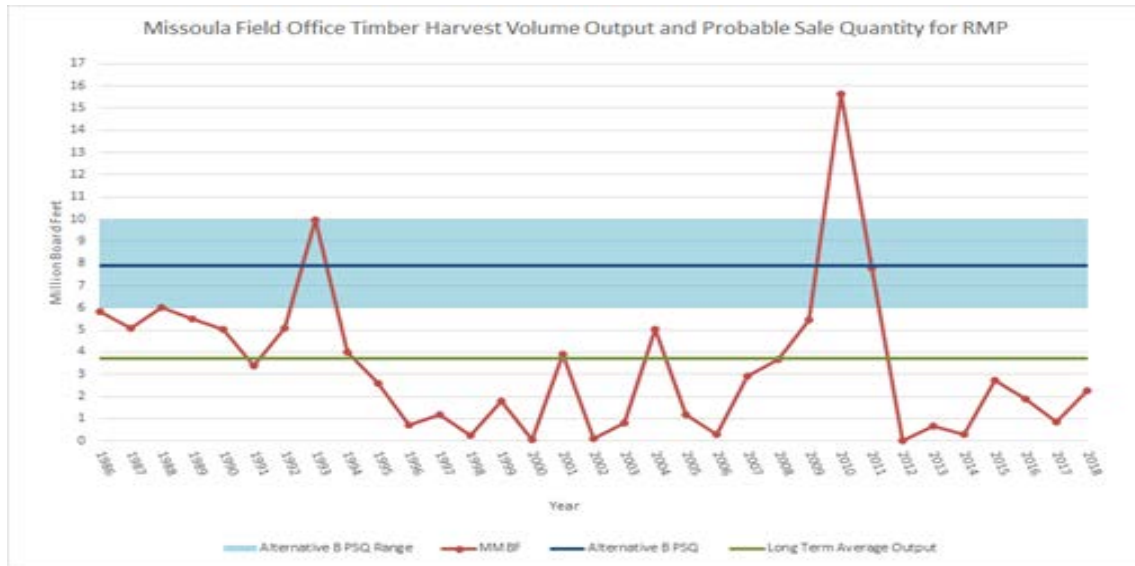
Environmental Consequences

Alternative B meets the goal of providing a sustainable flow of timber to support local economies the greatest between alternatives, followed by alternative A, and then C. Alternative A has the least amount of available acres for timber production of all the alternatives. Of the action alternatives, alternative B identifies slightly more acres available for timber production than alternative C. Managing more area for wilderness characteristics in alternative C than in other alternatives would make 2,523 acres of lands unavailable for commercial timber harvest.

Impacts common to all

Probable Sale Quantity. A probable sale quantity was determined for alternatives B and C by assessing the biological capacity (annual growth rates) of the available acres in both alternatives, then estimating the amount of the growth rates that would be harvested for each alternative based upon the objectives and management direction in each alternative. More details and calculations for this process can be viewed in Appendix K.

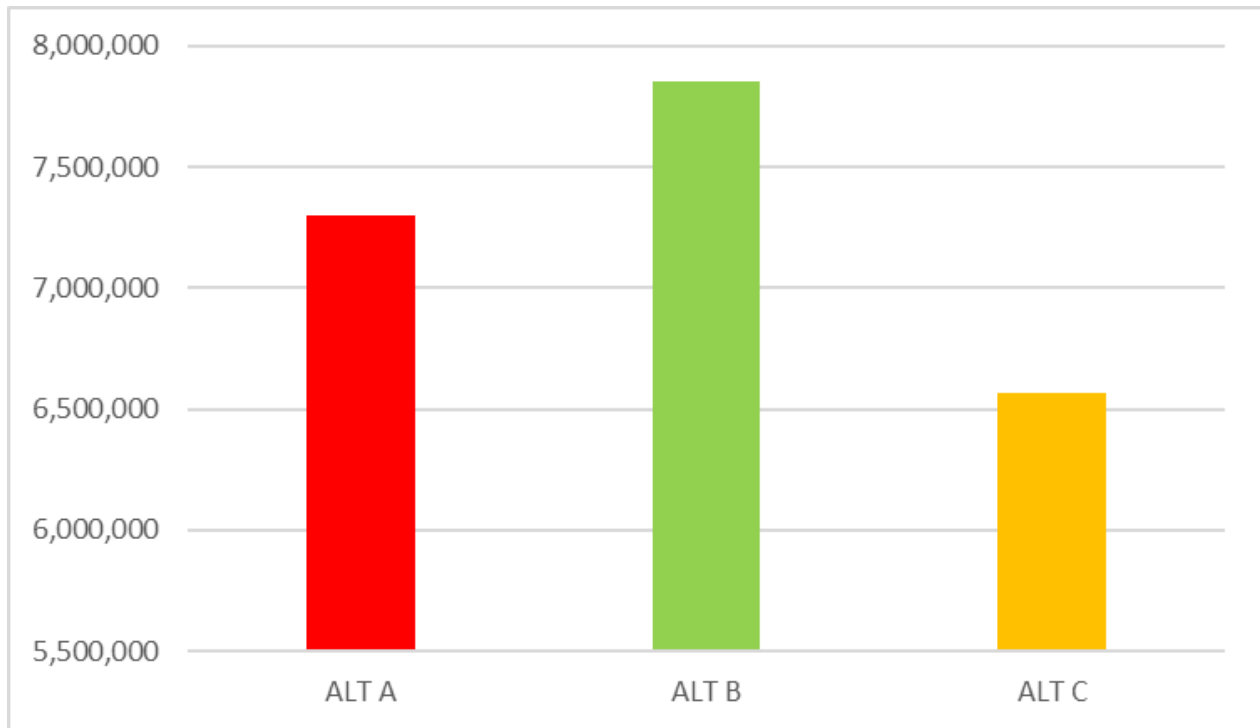
The figure below indicates that long-term average output for forest products in the Missoula Field Office since 1986 is approximately 3.6 MMbf per year. Although in a given year the actual quantities have greatly varied from less than the average of 3.6 MMbf to almost 16 MMbf. Annual quantities will continue to vary depending on fluctuations in timber market conditions, insect and disease epidemics, wildland fires, funding and staffing levels and other objectives.

Figure 31a. Missoula Field Office Timber Harvest Volume Output and PSQ*

The figures below depict the number of acres available for commercial timber harvest and PSQ, which are described under the Impacts under Alternatives A, B, and C below.

Figure 32b. The number of acres available for commercial timber harvest by alternative

Figure 33. Sale quantity volume, by alternative, in millions of board feet per decade. Alternative A is measured by ASQ, B and C are measured by PSQ



Wildlife and Special Status Species Habitat. Wildlife such as big game and migratory birds, and special status species (listed, proposed, and sensitive species including candidates) may impact forest vegetation and products. Canada lynx and grizzly bear are two examples. The Canada Lynx Conservation Assessment Strategy emphasizes minimization of pre-commercial thinning projects that reduce snowshoe hare habitat in seedling/sapling sized stands in lynx habitat within lynx analysis units (LAUs) and critical habitat. This Plan has an objective to consider thinning methods within lynx habitat and lynx critical habitat in the early successional state if treatments would result in short-term effects with long-term benefits to snowshoe hare, red squirrel, and lynx. Pre-commercial thinning is one of the most effective tools available to emulate disturbance and trend forests toward natural ranges of species composition, densities, size classes (e.g., large and very large trees), and improved resilience over time. One of the biggest concerns related to restrictions on pre-commercial thinning is the potential impacts on western larch and its contribution to forest resilience. Western larch grows very poorly in high density conditions. If pre-commercial thinning is minimized many areas would not be able to attain natural conditions and the attainment of PSQ in Alternative A and the PSQ in Alternatives B and C is not likely. Optimization of growth is realized when trees have sufficient growing space which can be accomplished by thinning, prescribed burning or both.

The Canada Lynx Assessment Strategy also requires to “manage so that no more than 30 percent of the lynx habitat in an LAU is in an early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (i.e., does not provide winter snowshoe hare habitat). Emphasize sustaining snowshoe hare habitat in an LAU. If more than 30 percent of the lynx habitat in an LAU is in early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (e.g., clearcuts, seed tree harvest, precommercial thinning, or understory removal), no further increase as a result of vegetation management projects should occur on federal lands. Recognizing that natural disturbances and forest management of private lands also will occur, management-induced change of lynx habitat on

federal lands that creates the early stand initiation structural stage or silviculturally treated to remove horizontal cover should not exceed 15 percent of lynx habitat on federal lands within a LAU over a 10-year period.” This RMP has an objective that identifies the need to create lynx habitat in a pattern across landscapes over space and time so a requirement to maintain the LCAS recommendations for early stand initiation (early successional stages) should not affect attainment or movement toward the midrange of NRV if there are no large-scale disturbances as described previously. However, wildfires that burn with greater intensity and that cover larger areas than in the past are expected to be a common disturbance in the future. Wildfires of this nature will likely cause large areas to remain in early to mid-development successional stages (which do not have the opportunity to mature into late successional stages) or to eventually shift cover types from trees to shrubs, forbs and grasses in the case of repeated fire occurrences in the same areas. Fires of this nature would cause the size and distribution of early and mid-development successional patches to be misaligned with NRV. Actively managing forested landscapes within LAUs should help to moderate fire spread and intensity. Multi-story hare habitat is likely to have forest structures and densities that tend to be of higher susceptibility to high severity fire as well as to damage and mortality of the true firs and spruce from western spruce budworm, bark beetles, and other agents. With predicted and modeled potential for high severity fires and insect infestations that will likely occur, the above-stated limitations could affect attainment or movement toward the midrange of NRV for vegetation that remains after a large-scale disturbance since the maximum allowable amounts of habitat affected by the disturbance would disallow any additional management for ten years within an LAU. The ability to increase early successional species in lynx habitat, specifically western larch, would be most affected by the inability to create open conditions across portions of the landscape, either through prescribed fire or harvest, which western larch needs to successfully regenerate. In the event of future large-scale disturbances this LCAS requirement could also impede attainment of ASQ in Alternative A and the ASQ in Alternatives B and C by limiting the amount of timber harvest that could occur in LAUs across the Field Office

Aquatic, terrestrial, and special status species habitat management; travel management; wilderness study areas; and lands with wilderness characteristics would affect the quantity of forest products harvested. These effects are discussed in the forest vegetation section (section 3.2).

Impacts under alternative A: the ASQ would be 7.2 MMbf annually.

Impacts under alternative B: With an assumed average of 65 percent of the biological capacity being removed during timber harvest activities, the PSQ would be 7.9 MMbf annually. The actual forest products quantity would vary in a given year, with some years yielding up to 16 MMbf and other years yielding less than the annual average of 3.6 MMbf per year.

Impacts under alternative C: With an assumed average of 55 percent of the biological capacity removed during timber harvest activities, the PSQ would be 6.6 MMbf annually. The actual forest products quantity would vary in a given year, with some years yielding up to 16 MMbf and other years yielding less than the annual average of 3.6 MMbf per year.

Cumulative effects

Forest products are a result of lands available for harvest, probable sale quantity, and healthy forest vegetation communities. See Vegetation Management section and social economics for description of cumulative effects related to forest vegetation and the local economy.

3.4.6 Withdrawals

Proposed ACECs and a boundary around Garnet Ghost Town were considered for recommending withdrawal.

Indicators

As an administrative tool, the purpose of individual withdrawals can be driven by various needs of the specific, critical resource in need of protection. Each of those resources would have their own indicators to measure potential impacts from other resources or uses, and the analysis of these impacts would show that the application of standard operation procedures, design features, or best management practices would not prevent irreparable impacts.

Analytical Methods and Assumptions

A withdrawal is a formal action that sets aside, withholds, or reserves federal lands by statute or administrative order for public purposes. A withdrawal accomplishes one or more of the following:

- Transfers total or partial jurisdiction of federal land between federal agencies.
- Segregates federal land to operation of all or some of the public land laws and/or mineral laws.
- Dedicates federal land for a specific public purpose.

Withdrawals are established for a wide range of public purposes including military reservations, administrative sites, national parks, reclamation projects, recreation sites, and powersite reserves. The three major types of formal withdrawals are:

01. Administrative withdrawals: those made by the President, the Secretary of the Interior, or other authorized officer of the Executive Branch of the federal government;
02. Congressional withdrawals: legislative withdrawals made by Congress; and,
03. Federal Power Act or Federal Energy Regulatory Commission (FERC) withdrawals: power project withdrawals established under the authority of the Federal Power Act of 1920.

The BLM is responsible for reviewing proposed administrative withdrawals and restorations, making recommendations concerning them to the Assistant Secretary of the Interior for Land and Water Resources, and developing and conducting a withdrawal.

Affected Environment

Twenty acres associated with the Limestone Cliffs ACEC are currently withdrawn via a Public Land Order approved under the authority of FLPMA. Non-FLPMA withdrawals cover approximately 1,213 acres (Powersite Reserves, Federal Power Act Classifications) and would remain in place under all alternatives, unless a subsequent site-specific review and coordination with appropriate entities (i.e., FERC) results in revocation. A summary of current withdrawals is displayed in the table below.

Table 59. Summary of existing withdrawals

Location	Total Acres ¹	Authority/Purpose
T. 10 N., R. 12 W., Sec. 10	40	Admin-PSR
T. 11 N., R. 13 W., Sec. 7	164	Admin-PSR
T. 11 N., R. 13 W., Sec. 18	80	Admin-PSR
T. 11 N., R. 13 W., Sec. 21	200	Admin-PSR

Location	Total Acres ¹	Authority/Purpose
T. 11 N., R. 13 W., Sec. 22	120	Admin-PSR
T. 11 N., R. 15 W., Sec. 22	40	Admin-PSR
T. 11 N., R. 16 W., Sec. 8	120	Admin-PSR
T. 11 N., R. 17 W. Sec. 12	161	Admin-PSR
T. 11 N., R. 17 W., Sec. 2	179	Admin-PSR
T. 12 N., R. 17 W., Sec. 18	49	Admin-PSR
T. 11 N., R. 13 W., Sec. 4 and 9	20	Admin-FLPMA
T. 14N., R. 16W., sec. 32	40	FPA-FERC

¹ Does not include an estimated 40 acres within linear withdrawals for roads and powerlines.

PSR: Powersite Reservation

FLPMA: Federal Lands Policy and Management Act

FPA: Federal Power Act

FERC: Federal Energy Regulatory Commission

Environmental Consequences

Common to all alternatives. Under all alternatives, there are 1,213 acres of Powersite Reservations and Federal Energy Regulatory Commission withdrawals under the authority of the Federal Power Act.

Alternative A. In this no-action alternative, the BLM recommended 820 acres for withdrawal. These include the Limestone Cliffs ACEC (20 acres), Phil Wright Rock ACEC (640 acres), and cultural/historic sites including the ghost towns of Coloma, Garnet, Blackfoot City, and Reynolds City (up to 160 acres total). Of these recommendations, the Limestone Cliffs ACEC is the only area to be withdrawn, leaving 800 acres recommended for withdrawal.

Continuation of the Limestone Cliffs ACEC withdrawal (20 acres) and recommendation to withdraw an additional 800 acres from locatable mineral entry would remove these acres from potential exploration and development, but aid in the conservation of the values associated with the Limestone Cliffs, Phil Wright Rock, and the ghost towns of Coloma, Garnet, Blackfoot City, and Reynolds City.

Alternative B. Under this alternative, the BLM recommends a total of 283 acres for withdrawal. These areas of withdrawal include Limestone Cliffs SRMA (20 acres) and Garnet Ghost Town (263 acres).

Continuation of the Limestone Cliffs SRMA withdrawal (20 acres) and recommendation to withdraw an additional 263 acres from locatable mineral entry would remove these acres from potential exploration and development, but aid in the conservation of the values associated with Garnet Ghost Town.

Alternative C. Under this alternative, the BLM recommends a total of 1,015 acres to be withdrawn from location. These areas of withdrawal include Limestone Cliffs ACEC (20 acres), Garnet Ghost Town (355 acres), and Phil Wright Rock ACEC (640 acres).

If released, portions of the Wales Creek WSA will be designated as an area of critical environmental concern and a withdrawal of 4,850 acres is recommended to close the area to mineral entry under the mining laws.

3.5 Lands and Realty

3.5.1 Land Tenure

Over the past 30 years, the Missoula Field Office has a successful land tenure program with many land exchanges and acquisitions that have improved public access to BLM lands. The Field Office proposes a relatively small amount of acres allocated for disposal (Land Tenure Category 3) due to past land tenure adjustments, which consolidated BLM-managed lands while disposing of the smaller, scattered parcels. The land tenure criteria and legal descriptions are in Appendix Q, and the maps of land tenure are in appendix H.

Indicators

Acres of Land Tenure Category 1, Category 2, and Category 3

Analytical Methods and Assumptions

The BLM applied the criteria for land tenure categories to determine what lands should be allocated in each category.

The BLM assumes that proposals for land ownership adjustments of federal and non-federal lands will continue to be brought forth over the next few decades.

Affected Environment

The following is a summary of the Missoula BLM RMP Analysis of the Management Situation (August 2016), which is hereby incorporated by reference (USDI-BLM 2016). The Missoula Field Office identifies BLM-managed lands as either retention zones or other lands. Retention zones generally will remain in public ownership and be managed by the BLM. Transfers to other public agencies will be considered where improved management efficiency would result, and exchanges may be permitted based on site-specific criteria. FLPMA Sales would be permitted only by amending the RMP. Other Lands are generally isolated tracts that are considered difficult and uneconomic to manage. Such tracts may be considered for retention, exchange, sale, or transfer to another agency. The majority of the BLM-managed land in the planning area is zoned for retention

Land Ownership adjustments come in the form of exchanges, purchases, easements, donations, and sales. Acquisition through these adjustments are an important component of the BLM's land management strategy. The agency acquires land from willing sellers when it is in the public interest and consistent with land use plans. Access is acquired from willing landowners on a case-by-case basis as needs or opportunities arise. The Field Office uses acquisitions of road and trail easements and fee title acquisitions as means of obtaining legal access to BLM-managed land where it does not currently exist.

Perpetual easements and reciprocal rights-of-way are tools to provide legal access to federal lands.

Missoula Field Office acquired the DuPont Property and Sperry Grade. These properties are subject to conservation easements with Terms and Condition BLM would follow.

3.5.2 Access

The Field Office has a strong history that continues through today, of improving access to BLM-managed land. However, there are still areas that lack access. It is increasingly difficult to acquire access through non-federal land. The BLM acquires access from willing landowners on a case-by-case basis as needs or opportunities arise.

Indicators

Acres of land inaccessible to the public and BLM.

Analytical Methods and Assumptions

- Identify lands inaccessible to the public and BLM; prioritize Land Tenure categories 1 and 2.
- Access to public lands may be restricted to a particular type of use (such as hikers, motorized vehicles, and mountain bikes). A small portion of the BLM-managed public lands in the decision area are not accessible to the public or for administrative purposes.
- Access to public lands may occur via other public lands (federal, county, or state) or from willing landowners on a case-by-case basis. Improvements in access to public lands may occur through easements with willing landowners or land tenure actions (exchanges or acquisitions).
- Demand for adequate public access is expected to exceed acquisition opportunities. Easement, Fee title acquisitions and land exchange is likely to be the primary means of acquiring access when opportunities arise.

Affected Environment

The following is a summary of the AMS (August 2016)

Access is acquired from willing landowners on a case-by-case basis as needs or opportunities arise. The Field Office uses acquisitions of road and trail easements as the primary means of obtaining legal access to BLM-managed land where it does not currently exist. To date, 64 exclusive easements have been acquired, which provide legal access to BLM-managed land for the BLM, licensees, permittees, and the public. In addition, the Field Office has acquired 38 non-exclusive easements that provide administrative-only access across non-federal land.

The decision area has approximately 9,500 acres of public land identified as needing public and administrative access.

3.5.3 Land Use Authorizations

Land use authorizations for rights of way include exclusion areas, avoidance areas, and designated corridors. The Garnet RMP was amended in January 2009 for the designation of a right-of-way corridor under Section 368 of the Energy Policy Act of 2005 (Corridor 229-254). Maps of the right-of-way avoidance and exclusion areas are located in Appendix H.

Indicators

Acres designated as right-of-way avoidances and exclusion areas.

Acres designated for transportation and utility corridors.

Analytical Methods and Assumptions

- Identify other resource objectives or resource use objectives that would affect land authorization permits.
- Identify existing and potential public demand for access to private lands via BLM-managed lands.
- Demand for land use authorizations will continue. It is assumed that the demand for these authorizations would fluctuate directly with the degree of economic growth and development occurring within, and adjacent to, the decision area.

- The need to protect sensitive resources could result in construction delays or the need to relocate proposed land use authorizations.

Affected Environment

The following is a summary of the AMS (USDI-BLM 2016)

Right-of-way exclusion and avoidance areas. Lands may be classified as exclusion or avoidance areas in an RMP. Right-of-way exclusion areas are defined as areas that are not available for location of rights-of-way under any conditions. Right-of-way avoidance areas are defined as areas designated in a land use plan on which a right-of-way should be avoided if possible. The current right-of-way exclusion and avoidance classifications are approximately 533 acres of exclusion areas, and approximately 21,317 acres of avoidance areas.

Rights-of-ways. Rights-of-way are the most active portion of the lands and realty program in terms of the number of cases processed. As of July 2015, according to the BLM LR2000 database, the Field Office administers 217 existing rights-of-way grants that encumber approximately 2,912 acres.

Utility and transportation corridors. The Approved Resource Management Plan Amendments/Record of Decision (ROD) for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States (USDI-BLM 2009) was approved on January 14, 2009. The Garnet RMP designated corridor was for electric only (Corridor 229-254).

Permits and leases. Section 302 of FLPMA gives the BLM authority to issue, at its discretion, leases and permits for the use, occupancy, and development of the public lands. Uses that may be authorized under this authority include commercial filming, equipment storage sites, and apiaries. The Field Office administers two ongoing leases and permits involving a total of two acres of public land within the decision area. Permits issued are mostly short term in nature and used for commercial filming. The main request is for filming at Garnet Ghost Town.

Recreation and Public Purposes. Section 212 of FLPMA, the Recreation and Public Purposes Act of 1926, as amended (43 U.S.C. 869); authorizes the sale or lease of public lands for recreational or public purposes to state and local governments and to qualified nonprofit organizations. Some typical uses are historic monument sites, campgrounds, schools, city and county parks, firehouses, and hospitals. The BLM will not approve a Recreation and Public Purpose Act lease or conveyance unless the public land will be used for an established or defined specific project. The Missoula Field Office has nine Recreation and Public Purpose Act sales and one R&PP lease for approximately 1,027 total acres.

Environmental Consequences

Impacts common to all alternatives

Cultural resources. Surface disturbing activities must comply with Section 106 of the NHPA for federal undertakings. Cultural Resource Inventories will be completed prior to these actions and impacts to sites eligible for NHPA listing may need to be mitigated.

Aquatics Habitat and Soil, Water, Riparian-Wetlands. The management of these resources including special status species may have impacts. Proposed projects or activities that intersect Riparian habitat conservation areas, Streamside Management Zones, or riparian-wetland habitats, of which are identified at the site-specific level, may require design features, alternate construction locations, or dropped from consideration unless the activity is able to enhance, restore, or maintain the physical and biological characteristics of the RHCA, meet the SMZ law, abide by the Water Quality MOU and Non-Point Source

Management plan, and allow riparian-wetlands to meet (or make progress toward meeting) proper functioning condition.

Fish and wildlife. The management of wildlife and fisheries, including special status species, may have environmental consequences. The need to protect special status species and certain other species of fish and wildlife could affect surface-disturbing activities. Project or activity-level activities that could affect wildlife or fisheries may need to have design features, be relocated, or in some cases dropped from consideration. Projects would need to comply with applicable conservation strategies and recovery plans.

Solid minerals. The management of leasable, salable, and locatable minerals under all alternatives may result in requests for rights-of-way for utilities and access.

Access. Legal public or administrative access over non-federal lands to reach public lands lacking adequate access would be acquired from willing landowners using methods available. The decision area has approximately 9,500 acres of public land identified as needing public or administrative access.

Impacts under alternative A. Under the no-action alternative, the following allocations present a baseline to compare the action alternatives.

- Land tenure allocations include approximately 157,177 acres included in the retention zone, and approximately 5,445 acres as “other.”
- Right-of-way allocations include approximately 140,491 acres available for further consideration and possible routing of major utility and transportation right of ways (management areas 2, 3, 5, 6, 7, 12, 13, and 14).
- Approximately 21,317 acres of riparian areas, important recreation sites, historic and cultural sites, and other special management areas are identified as avoidance areas where rights-of-way will be discouraged (management areas 1, 4, 9, 10, and 11). The Quigg WSA (513 acres) and Limestone Cliffs ACEC (20 acres) are managed as exclusion areas.
- 236 acres of a right-of-way corridor.

Impacts under alternative B. This alternative proposes to retain approximately 59,462 acres in land-tenure category 1; disposal by any means is not allowed. Category 2 lands include approximately 103,000 acres generally managed for retention; however, land tenure actions such as exchanges would be allowed (except for FLPMA sales).

Right-of way allocations include approximately 46,988 acres as avoidance areas (4 SRMA's, and the NHT). The following describes specific impacts to these right-of-way avoidance areas:

- *National historic trails.* The need to manage national trails to protect the values for which they were designated could affect applicants for rights-of-way and BLM actions to obtain legal and physical access across non-federal lands to BLM lands. Proposed facilities such as power lines may need design features (such as burial of the line) or rerouted in order to protect the trail values. Land ownership adjustments such as sales or exchanges may need restructured or eliminated from consideration in order to avoid disposing of BLM-managed lands containing important trail segments.
- *Recreation management areas.* The 4 SRMAs, (see Appendix L) would be managed as rights-of-way avoidance areas, and could affect Lands and Realty actions. Land action proposed that do not follow the goals and objectives of the specific management guidelines, may need to have design features, relocated, or in some cases, dropped from consideration.

- *Phil Wright Rock ACEC* (see Appendix L). ACECs could impose stipulations on the use of these areas for land use authorizations. Land action proposed that do not follow the goals and objectives of the specific management guidelines, may need to have design features, relocated, or in some cases, dropped from consideration. Phil Wright Rock would preclude disposal of these lands.
- *Visual resources*. Management of visual resources could affect lands and realty actions if it is not compatible with the goals and objectives of the visual resource management classifications. Land action proposed that do not follow the goals and objectives of the specific management guidelines, may need to have design features, relocated, or in some cases, dropped from consideration. The WSAs (approximately 23,480 acres) would be managed as rights-of-way exclusion areas. If Congress were to release the Wales Creek and Hoodoo Mountains WSAs, approximately 17,358 acres would change from ROW exclusion to ROW avoidance (Hoodoos WSA and non-ACEC portions of Wales Creek).

Impacts under alternative C. This alternative proposes to retain approximately 63,027 acres in Land Tenure Category 1; disposal by any means is not allowed. Category 2 lands include approximately 94,139 acres generally managed for retention; however, land tenure actions such as exchanges would be allowed (except for FLMPA sales). The remaining 5,445 acres are allocated in Category 3; methods of land-tenure actions, including sales, would be allowed.

Right-of way allocations include approximately 55,062 acres as avoidance areas (2 SRMAs, and 4 BCAs) (see Appendix L). The following describes specific impacts to these right-of-way avoidance areas:

- *Recreation management areas*. 2 SRMAs, and 4 BCAs would be managed as rights-of-way avoidance areas, and could affect lands and realty actions if it is not compatible with the goals and objectives of the area (see Appendix L for management guidelines). Land actions proposed that do not follow the goals and objectives of the specific management guidelines, may need to have design features, relocated, or in some cases, dropped from consideration.
- *Visual resources*. Management of visual resources could affect lands and realty actions if it is not compatible with the goals and objectives of the visual resource management classifications. Land action proposed that do not follow the goals and objectives of the specific management guidelines, may need to have design features, relocated, or in some cases, dropped from consideration.

Under this alternative, approximately 39,490 acres would be managed as right-of-way exclusion areas. These include WSAs, protected LWCs, ACECs, and the NHT. If Congress were to release the Wales Creek and Hoodoo Mountains WSAs, 17,358 acres would change from ROW exclusion to ROW avoidance (Hoodoos WSA and non-ACEC portions of Wales Creek).

Cumulative Impacts. As the population continues to shift from urban areas to a more rural setting, more land will be subdivided. This will result in an increasing demand for rights-of-way to address access needs, enhanced telecommunications capacity, and electrical power. As more private lands are closed to recreational use, the public will turn their attention to available open lands. Consequently, there will be an increased demand for recreational access, whether through access easements, conservation easements that provide access, or land exchange proposals that enhance access.

3.6 Special Designations

3.6.1 Areas of Critical Environmental Concern

ACECs are defined in FLPMA as “areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historical, cultural, or scenic values; fish and wildlife resources or other natural systems or processes; or to protect life and safety from natural

hazards” (43 U.S.C., §1702[a]). Section 202(c)(3) of FLPMA mandates that priority shall be given to the designation and protection of ACECs in the development and revision of land use plans (43 U.S.C., §1712 [c][1]). BLM regulations for implementing the ACEC provisions of FLPMA regulations are found in 43 CFR 1610.7-2. Designation of an ACEC applies only to public lands administered by the BLM.

Indicators

- Number of ACECs requiring special management of attention; acres of ACECs.
- Management direction for conserving relevant and important values.

Analytical Methods and Assumptions

To be designated an ACEC, the area must meet both the criteria of relevance and importance found in 43 CFR 1610.7-2(a) and as defined in BLM Manual 1613, Areas of Critical Environmental Concern (USDI-BLM 1988). An area meets the relevance criteria if it possesses significant historic, cultural, or scenic values; fish or wildlife resources, including habitat, communities, or species; natural processes or systems; or natural hazards. In addition, the significance of these values and resources must be substantial in order to satisfy one or more of the following importance criteria:

- Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out mandates of FLPMA.
- Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
- Poses a significant threat to human life and safety or to property.

An ACEC must also require special management attention. Special management attention refers to management prescriptions developed during the preparation of an RMP expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP. This includes proposed actions deemed to be in conformance with the terms, conditions, and decisions of the RMP. Such management measures would not be necessary or prescribed if the critical and important features were not present (USDI-BLM 1988).

ACECs differ from other special designations in that the designation by itself does not automatically prohibit or restrict other uses in the area. The special management attention is designed specifically for the relevant and important values, and varies from area-to-area. Restrictions that arise from an ACEC designation are determined at the time the designation is made, and are designed to protect the values or serve the purposes for which the designation was made.

The BLM assumes that its management decisions for ACECs would adequately protect, maintain, or restore the relevant and important values associated with the ACECs. The BLM bases this assumption on the management direction applied to the ACECs under alternatives:

- Other activities not explicitly prohibited would be allowed, so long as the activity does not degrade the relevant and important values and is compatible with preserving and enhancing the key values of the tract.
- ACECs would be right-of-way avoidance or exclusion areas and closed to mineral materials.

- ACECs would either recommend locatable mineral withdrawal or require a plan of operations prior to exploration. Additionally, proposals would be subject to NEPA analysis with unnecessary and undue degradation stipulations.

Affected Environment

The Missoula Field Office currently manages three ACECs. The Rattler Gulch Limestone Cliffs ACEC was designated in the Garnet RMP, and the Bear Creek Flats and Phil Wright Rock ACECs were designated in a 1994 Amendment.

The Rattler Gulch Limestone Cliffs ACEC is a 20-acre designation in the Garnet Mountains, northwest of Drummond, Montana. In combination with a withdrawal from location and entry under the mining laws, the ACEC protects an area of Madison limestone outcrop with educational and recreational values. The accessibility, exposure, and structure of the limestone outcrop encourages the area's use by universities, colleges, and local high schools for student geologic mapping projects. Rock climbing opportunities contribute to the recreational value. Several anchors and bolts have been installed by the public to create climbing routes. These climbing routes have been named by the public and can be found on various websites and climbing publications.

The Bear Creek Flats ACEC consists of 565 acres of BLM-managed land, and is located along the Blackfoot River. It has high-value wildlife, watershed, recreation, and scenic features associated with the Blackfoot River. Specifically, those features include being associated with the nationally known Blackfoot River, having important riparian zones along the River and Bear Creek for the bald eagle and bull trout (currently listed as threatened under the Endangered Species Act), having 40 acres of old-growth ponderosa pine, and having a diversity in landscape. In addition, the area attracts locally important winter habitat for elk, deer, and moose.

The Phil Wright Rock ACEC consists of 640 acres along Rock Creek. It also has high-value wildlife, watershed, recreation, and scenic features. Those features include a valuable bighorn sheep spring, summer, and fall range; an important lambing area for the Upper Rock Creek bighorn sheep herd; locally valuable elk, deer, and big horn sheep winter range; excellent raptor nesting on the cliff; quality fishing opportunities on Rock Creek; and high-quality scenic values afforded by the cliff that overlooks Rock Creek.

Table 60. Summary of existing ACECs and relevant and important values

ACEC Name	Acres	Relevant and Important Values
Bear Creek Flats ACEC	565 acres	Bald eagle foraging and nesting habitat along the Blackfoot River; historic big game habitat; bull trout habitat; ponderosa pines; and high value scenic quality.
Limestone Cliffs ACEC	20 acres	Scientific, educational, and recreational values of the limestone cliffs.
Phil Wright Rock ACEC	640 acres	Bighorn sheep lambing habitat; bighorn sheep, elk, and deer yearlong and winter habitats; the scenic qualities of the cliffs; fisheries habitat of Rock Creek; riparian vegetation of Rock Creek; and raptor nesting habitat of the cliffs.

On April 30, 2018, the BLM completed and posted a Preliminary Areas of Critical Environmental Concern Report. This report re-evaluated the three existing and five internally proposed ACECs to determine whether they fit the criteria for relevant and important values, and required special management attention. The report has been available on the BLM's ePlanning website since April 2018, and is hereby incorporated by reference. The key findings of the report found that Phil Wright Rock was still relevant, important, and needed special management attention; the Bear Creeks Flats ACEC was still

relevant and important, but no longer needing special management attention due to other regulatory mechanisms in place to protect the bull trout and bald eagles; and the Limestone Cliffs ACEC was relevant and important for education and recreation values so could be managed as either a SRMA or ACEC in order to protect those values. The Wales Creek ACEC would only be designated if Congress releases the Wales Creek WSA.

Table 61. Summary of proposed ACEC designation findings

Proposed ACEC	Nomination	Preliminary Finding
Bear Creek Flats	Existing ACEC; BLM proposed	Recommended for ACEC designation under Alternative A; not recommended for designation under Alternatives B and C
Chamberlain Meadows	New, BLM and external proposed	Not recommended for ACEC designation under all alternatives
Cottonwood Meadows	New, BLM proposed	Not recommended for ACEC designation under all alternatives
Ghost Towns	New, BLM proposed	Not recommended for ACEC designation under all alternatives
Limestone Cliffs	Existing ACEC; BLM proposed	Recommended for ACEC designation under alternatives A and C
Phil Wright Rock	Existing ACEC; BLM proposed	Recommended for ACEC designation under all alternatives
Wales Creek	New, BLM proposed if Congress releases the WSA	Recommended for ACEC designation under Alternatives B and C if Wales Creek WSA is released
West Fork Buttes	New, BLM proposed	Not recommended for ACEC designation under all alternatives

If Congress were to release the Wales Creek WSA, the BLM would manage the Wales Creek ACEC. This ACEC consists of 5,602 acres in the Wales Creek watershed of the Garnet Mountains, and is important for the population of western pearlshell mussel and surrounding habitat the area contains. Statewide, western pearlshell mussel populations this robust are very rare. The designation of this area is intended to protect and maintain the physical and biological integrity of the watershed, allowing natural processes to shape and maintain aquatic habitat.

Environmental Consequences

Impacts common to all alternatives

Many environmental consequences are described in other sections that discuss the relevant and important values of these ACECs. In particular, refer to the aquatics section for the discussion of the Wales Creek ACEC (if WSA is released), and the wildlife section for a discussion of the Bear Creek Flats ACEC (bald eagle values and bull trout), and the Phil Wright Rock ACEC (bighorn sheep and other big game values).

Table 62. Summary of proposed ACEC designations

	Alternative A acres	Alternative B acres	Alternative C acres	ACEC Resource Values
Bear Creek Flats ACEC	565	0	0	Bald eagle foraging and nesting habitat along the Blackfoot River; historic big game habitat; bull trout habitat; ponderosa pines; and high value scenic quality.

	Alternative A acres	Alternative B acres	Alternative C acres	ACEC Resource Values
Limestone Cliffs ACEC	20	0	20	Scientific, educational, and recreational values of the limestone cliffs.
Phil Wright Rock ACEC	640	640	640	Bighorn sheep lambing habitat; bighorn sheep, elk, and deer yearlong and winter habitats; the scenic qualities of the cliffs; fisheries habitat of Rock Creek; riparian vegetation of Rock Creek; and raptor nesting habitat of the cliffs.
Wales Creek ACEC (<i>if Wales WSA is released</i>)	0	5,602	5,602	Essential habitat for sensitive aquatic species diversity, in particular for 2 of Montana's 14 viable western pearlshell mussel populations; unique geologic features supporting the pearlshell population

Impacts under alternative A. Three ACECs would continue to be managed and their management direction would continue to be followed under this alternative. The Limestone Cliffs ACEC is withdrawn from mineral entry, which eliminates the major threat of mineral activity altering the cliffs. Bear Creek Flats and Phil Wright Rock ACECs are closed to OHVs, which protects the habitat. The management direction found in Chapter 2 would protect the relevant and important values of the ACECs, minimizing impacts to them.

Impacts under alternative B. Management direction provides protection for relevant and important values of the Phil Wright Rock ACEC. Short-term negligible impacts are expected from forest vegetation treatments to improve habitat within the area. In addition, there could be short-term impacts from minerals; however, a Plan of Operations is required, which would implement design features and any mineral material disposals would have to follow VRM class II and III guidance. The Bear Creek Flats area still meets the relevance and importance criteria; however, with new laws and regulations, special management direction is no longer needed to protect the area. Bear Creek Flats would remain closed to OHVs. If the Wales Creek WSA were released by Congress, 5,602 acres would be managed as the Wales Creek ACEC.

Impacts under alternative C. Management direction provides protection for relevant and important values of Limestone Cliffs ACEC and Phil Wright Rock ACEC. The Bear Creek Flats area still meets the relevance and importance criteria; however, with new laws and regulations, special management direction is no longer needed to protect the area. Bear Creek Flats would remain closed to OHVs. Short-term negligible impacts are expected from forest vegetation. If the Wales Creek WSA were released by Congress, 5,602 acres would be managed as the Wales Creek ACEC. The Limestone Cliffs ACEC is withdrawn from mineral entry, thereby, no associated impacts of a mineral operation (roads, facilities, etc.) would occur in the 20-acre ACEC. The Phil Wright Rock ACEC (640 acres) would be recommended as withdrawn from mineral entry. Approximately 4,850 acres of the Wales Creek ACEC would also be recommended for withdrawal from mineral entry upon release of the WSA by Congress. As such, impacts from mineral entry in all alternatives are negligible.

Cumulative effects. See cumulative effects in the aquatics and wildlife sections for discussion on how the relevant and important values associated with the ACECs relate to other reasonably foreseeable future actions.

3.6.2 Backcountry Byways

The Garnet Range Winter Back Country Byway is part of the Garnet Winter National Recreation Trail.

Indicators

Miles of backcountry byway.

Analytical Methods and Assumptions

The Back Country Byway will continue to be managed for snowmobile and cross-country skiing use; recreational use will be emphasized.

Affected Environment

A component of the national scenic byway system, back country byways are corridors of high scenic, historic, archaeological, or other public interest values. They are primarily located on low-speed, gravel, or paved roads designed for passenger vehicles that traverse the region's backcountry (USDI-BLM 1993). The Field Office currently manages one byway, the Garnet Range Winter Back Country Byway. This is a Type IV byway and is to be managed specifically to accommodate snowmobile use. It was the first designated winter back country byway. Located on the Garnet Range Road and starting at the Highway 200 parking lot, snowmobilers and cross-country skiers can traverse the 12 to 13 miles of this trail. This back country byway was originally designated as part of a national recreation trail in 1984, and became an official back country byway in 1989. An interpretive kiosk located at the beginning of the byway enhances the public's understanding and appreciation for the historic and public interest values along the route.

Environmental Consequences

Under all alternatives, the BLM would continue to manage the Garnet Range Winter Backcountry Byway (see Appendix L for management direction). Cultural resources, special designations, visual resources, fish and wildlife, and livestock grazing have negligible impacts to this trail. Land use authorizations can affect the trail by allowing uses not consistent with the trail designation. Mineral development and vegetation management could cause short-term impacts if the trails are plowed. There could be user conflicts as well as diminished trail opportunities.

No cumulative effects were identified.

3.6.3 National Trails

The Garnet National Winter Recreation Trail was designated by the Secretary of the Interior; the Lewis and Clark National Historic Trail by Congress. The National Park Service is the trail administrator for the Lewis and Clark National Historic Trail.

Indicators

Miles of the Garnet National Winter Recreation Trail.

Miles and acres of the Lewis and Clark National Historic Trail; Lewis and Clark National Historic Trail corridor width.

Analytical Methods and Assumptions

Garnet National Winter Recreation Trail. Motorized vehicles not intended for snowmobile use and those wider than 50 inches can affect the intended use of the trail.

Lewis and Clark National Historic Trail. Ground disturbing activities can affect the Lewis and Clark National Historic Trail and the visual qualities. The BLM assumes that management direction will

adequately protect the values; this assumption is based on the national historic trail management direction under all alternatives.

The mineral potential within the trail corridor is low; therefore, a mineral withdrawal recommendation is not necessary.

The National Park Service will continue to be the trail administrator for the Lewis and Clark National Historic Trail; the BLM will continue this partnership.

The purpose of the Lewis and Clark National Historic Trail is to commemorate the 1804 to 1806 Lewis and Clark Expedition through the identification; protection; interpretation; public use and enjoyment; and preservation of historic, cultural, and natural resources associated with the expedition and its place in U.S. and tribal history.

In the planning area, the Lewis and Clark National Historic Trail is also known as the Cokahlarishkit Trail (Road to the Buffalo Trail), and is eligible for the National Register of Historic Places. Regulations and direction pertaining to cultural resources will apply. Tribal consultation is required for management direction changes to this trail.

A historic railroad grade follows the north side of the Blackfoot River and will continue to be used as a recreational retracement route for the Road to the Buffalo Trail/ Lewis and Clark National Historic Trail.

Affected Environment

The Missoula Field Office manages two National Trails—the Garnet National Winter Recreation Trail and the Lewis and Clark National Historic Trail. The Garnet National Winter Recreation Trail consists of 32 miles of snowmobile and cross-country ski trails in the Garnet Mountains. The trail starts at the Highway 200 parking lot and follows existing roads; it is suitable for winter use from January 1 through March 31. The trail offers both easy and difficult terrains suitable for beginner and experienced skiers and snowmobilers. Garnet Ghost Town is a central point of interest along the trail system. In 1994, additional trails were added to the system, for an approximate total of 106 miles. The Garnet National Winter Recreation Trail is groomed, along with approximately 16 miles of other trails, through a partnership with a local snowmobile club. In recent years, the trail system has diminished to approximately 81 miles of trails due to industrial timber lands being sold to private individuals, more people moving into the area fulltime, and trails being on county roads.

The Lewis and Clark National Historic Trail consists approximately 12 miles within the Blackfoot River corridor and valley. The Lewis and Clark Trail was designated a National Historic Trail after the National Parks and Recreation Act of 1978 (Public Law 95-625) amended the National Trails System Act to include the new category of National Historic Trails. According to the Foundation Document (USDI-NPS 2012), the purpose of the Lewis and Clark National Historic Trail is to commemorate the 1804 to 1806 Lewis and Clark Expedition through the identification; protection; interpretation; public use and enjoyment; and preservation of historic, cultural, and natural resources associated with the expedition and its place in U.S. and tribal history.

The Secretary of the Interior was given the trail administrator responsibility and long-term administration of the trail was delegated to the National Park Service (NPS). In the 1982 Comprehensive Management Plan (USDI-NPS 1982), the NPS recommended two types of development for Lewis's return trip between Traveler's Rest and Great Falls—a motor trail and a land trail. They proposed that the land trail would be located on the south side of the Blackfoot River between McNamara and Roundup Bridge, and that Johnsrud Park and Ninemile Prairie Access were to be trailheads for the land trail. The motor trail would be along Highway 200. A railroad grade runs through the Lower Blackfoot Corridor. It is used as the

Road to the Buffalo Trail, and could be further developed as the land trail. The rest of the trail is not accessible and could be the part of the motor trail.

Environmental Consequences

Garnet National Winter Recreation Trail

Under all alternatives, the BLM would continue to manage 32 miles of roads and trail as the Garnet National Winter Recreation Trail (see Appendix L for management direction). Cultural resources, special designations, visual resources, fish and wildlife, and livestock grazing have negligible impacts to the Trail. Land use authorizations not consistent with the trail's designation can cause impacts. Mineral development and vegetation management could cause short-term impacts if the trails are plowed; there could be user conflicts and diminished trail opportunities.

Lewis and Clark National Historic Trail

Alternative A. A corridor and specific management direction for the Lewis and Clark National Historic Trail was not identified in the Garnet RMP, but the trail was recommended to be managed as a Special Recreation Management Area along with the Blackfoot River. The BLM would continue to manage the railroad grade as a recreational retracement route for the Road to the Buffalo Trail, allowing the public to experience the trail. The Blackfoot River is a scenic corridor, with VRM class II and III designations. The trail would still be protected through the Section 106 process, so impacts to the trail would be minimized. Short-term impacts would likely occur outside of the trail by ground disturbing activities.

Alternative B. Within the corridor boundary (approximately 6,830 acres), the primary emphasis is the Trail and Trail experience. Activities within the corridor would need to meet the Trail's objectives and not impair the values. The trail corridor would be a rights-of-way avoidance area and visual resources primarily managed as a VRM class II. Management direction discussed in Chapter 2 and the Section 106 process gives adequate protection within the corridor.

Alternative C. Within the corridor (approximately 12,827 acres), the primary emphasis is the Trail and Trail experience. Activities within the corridor would need to meet the Trail's objectives and not impair the values. The trail corridor would be closed to non-energy leasables and mineral material sales. The trail corridor would be a rights-of-way exclusion area, and a managed primarily as a VRM class II. Management direction discussed in Chapter 2, the increased size of the corridor, and the Section 106 process gives additional protection within the trail corridor.

Cumulative effects. The Garnet area offers a different snowmobile experience as compared to the snowmobiling opportunities in the surrounding area (such as Seeley Lake area and The Nature Conservancy Lands).

The Lewis and Clark National Historic Trail is located on federal, state and private lands. Management on federal lands provides protection to the trail through corridor designation and management guidelines. Work will continue with other entities (like the Forest Service and other BLM offices) for the management of the trail, including working with the National Park Service trail administrator. On private and state land, resource management activities could have impacts on the Lewis and Clark National Historic Trail, as protection measures are not in place on these lands.

3.6.4 Wild and Scenic Rivers

Affected Environment

No rivers in the Decision Area are currently managed under the national Wild and Scenic Rivers Act (WSR Act) of 1968 (Public Law 90-542, as amended; 16 U.S.C. 1271-2287). The Wild and Scenic Rivers Act was enacted by Congress to provide a national policy for preserving and protecting selected rivers and river segments in their free-flowing condition for the benefit and enjoyment of present and future generations. Section 5(d)(1) of the Act directs Federal agencies to consider potential wild and scenic rivers in their land and water planning processes.

As part of the land use planning process for the Missoula RMP, the BLM interdisciplinary team analyzed river and stream segments in the decision area that might be eligible for inclusion in to the National Wild and Scenic Rivers System. The methods are detailed in the BLM's Wild and Scenic Eligibility Report (EMI 2010) pages 7-9, which is incorporated by reference here. This included screening rivers to identify those with BLM surface ownership. In addition, the BLM coordinated with other Federal and state river-administering agencies, and consulted applicable source listings including the National Rivers inventory. These initial screening and identification efforts resulted in a list of 39 river segments, carried forward for further consideration in the inventory process. Additional review focused on whether these 39 segments met free-flowing criteria and contain any outstandingly remarkable values as defined in the Wild and Scenic Rivers Act. Of the 39 river segments, six segments, totaling 27.6 miles, meet the eligibility criteria. These include three segments along the Blackfoot River, and portions of Gallagher, Belmont, and Rock Creeks. The following table displays the WSR-eligible segments:

Table 63. Eligible wild and scenic river segments in the decision area

Study River Name	Outstandingly Remarkable Values	Tentative Classification	Total Segment Length (miles)	2010 BLM Eligible Segment Length (miles)	Acquisitions Since 2010 (miles)	2018 Eligible Segment Length ¹ (miles)
Belmont Creek	Fish	Scenic	3.1	3.1	1.37	4.47
Blackfoot River Segment 1	Fish, Recreation	Recreational	56.7	3.8	0	3.8
Blackfoot River Segment 2	Fish, Recreation, Wildlife	Scenic	19.1	6.2	.58	6.83
Blackfoot River Segment 3	Fish, Recreation, Scenic, Wildlife	Recreational	6.3	6.3	0	6.3
Gallagher Creek	Fish	Recreational	4.1	4.1	0	4.1
Rock Creek	Fish, Geological, Recreation, Scenic	Scenic	11.1	2.1	0	2.1
Total	n/a	n/a	100.4	25.6	1.95	27.6

¹Since the publication of the 2010 WSR eligibility study, the BLM acquired lands along the Belmont Creek and Blackfoot River 2 segments. These acquisitions added 1.37 miles of potentially eligible stream length to Belmont Creek, and .58 miles to the Blackfoot River. The BLM considers these additions eligible, as these segments are representative of the adjoining segments already evaluated in 2010 and contain the same ORVs.

Environmental Consequences

Impacts common to all alternatives

Only Congress can designate a river as a Wild and Scenic River. The BLM identifies the eligible segments, and then recommends eligible segments as suitable, where appropriate. For any eligible segments that the BLM identified as suitable, the BLM will ensure that the outstandingly remarkable values associated with these areas are protected so that pending Congressional decisions are not compromised.

The BLM assessed suitability and placed the findings in the Wild and Scenic River Suitability Report, posted on the Missoula RMP ePlanning website on January 10, 2018. The findings of the WSR Suitability Report is in Appendix G. The report was available to the public during preliminary alternative review and will continue to be available through public comment.

Impacts under Alternative A. Six eligible segments are managed for eligibility until a BLM determination of suitability. Thus, the BLM would manage six segments—three segments along the Blackfoot River, one segment on Belmont Creek, one along Rock Creek, and one segment along Gallagher Creek—for their outstandingly remarkable values associated with these segments for protection.

Impacts under Alternative B. Five segments—three segments along Blackfoot River, the Belmont segment, and Gallagher segment—would not be suitable or recommended for inclusion in to the National

Wild and Scenic Rivers System. Thus, the BLM would not manage five segments—three segments along the Blackfoot River, one segment on Belmont Creek, and one segment along Gallagher Creek—for their outstanding remarkable values associated with these segments for protection.

As described in the Suitability Report, the outstandingly remarkable values would likely remain protected even without designation. The Belmont Creek segment and the three Blackfoot River segments contain outstandingly remarkable values of high-quality habitat for genetically pure populations of westslope cutthroat trout and bull trout. These segments would remain protected by the Endangered Species Act, which protects bull trout and its habitat, and the 2007 Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana, which provides protections for that species. State and federal law protects water quality. Furthermore, the BLM's management practices for reasonably foreseeable future actions (recreation, forest management, and grazing) under all alternatives are protective of the water quality and the outstandingly remarkable value for fish. The wildlife values of the Blackfoot River segments 2 and 3 (bald eagles, grizzly bear, and peregrine falcons) would remain protected through the Endangered Species Act, Bald Eagle and Golden Eagle Act, and BLM-sensitive species guidance (Manual 6840 direction). Under all alternatives, the Lower Blackfoot River corridor would be managed as a special recreation management area, thereby conserving the fishing and recreational activities identified as outstandingly remarkable values. The Gallagher Creek segment also includes westslope cutthroat trout, which, as mentioned above, would be protected under an inter-agency agreement. Little to no water developments are anticipated for these areas.

The free-flowing condition, ORVs and water quality of the eligible Rock Creek segment would be protected until a joint suitability evaluation with the Forest Service can be completed on the non-BLM Rock Creek eligible segments.

Impacts under Alternative C. Same as Alternative B

Cumulative Effects. The five segments would not be added to Montana's list of Wild and Scenic Rivers, which includes the three forks of the Flathead River and 150 miles of the Upper Missouri River, which were designated over 40 years ago in 1976.

3.6.5 Wilderness Study Areas

The BLM manages and protects wilderness study areas (WSA) to preserve wilderness characteristics, so as not to impair the suitability of such areas until Congress makes a determination to either designate the areas as wilderness or release them to multiple uses.

Indicators

Acres and number of wilderness study areas.

Analytical Methods and Assumptions

WSAs will be managed per BLM Manual 6330 until Congress makes a determination on whether to designate the WSA as a wilderness area.

In the Montana Statewide Wilderness Study Report Volume II – Wilderness Study Area Specific Recommendations (USDI-BLM 1991) it was recommended that the Wales Creek and Hoodoo Mountain WSAs not be designated as wilderness and to be released for other uses; Quigg West was recommended for wilderness designation contingent upon the designation of the adjacent area managed by the Lolo National Forest as wilderness.

WSAs contain lands with wilderness characteristics.

Affected Environment

In 1964, Congress passed the Wilderness Act, thereby establishing a national system of lands to preserve a representative sample of natural systems in a natural condition for the benefit of future generations. With the passage of FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated as wilderness. Section 603 of FLPMA specifically required the BLM to provide Congress with recommendations on the suitability or unsuitability of roadless areas of public lands of 5,000 acres or more, and on roadless islands; areas of less than 5,000 acres were included if certain criteria were met. Congress gave the BLM 15 years to complete the wilderness inventory. Only Congress can decide which areas, if any, will be designated as wilderness and added to the National Wilderness Preservation System.

The wilderness inventory was conducted on a state-by-state basis from 1978 to 1980. The wilderness inventory in Montana was conducted in two iterations, the initial and intensive inventories. The Wales Creek inventory is mentioned in the Montana Wilderness Inventory (Miles City and Lewistown BLM Districts) (USDI-BLM 1980). The inventory information for the rest of the planning area is in the Montana Overthrust Belt Wilderness Inventory (BLM 1980).

When wilderness characteristics, as defined by Section 2(c) of the Wilderness Act of 1964 (16 U.S.C., Section 1131), were found within a defined boundary, the presence of the wilderness resource was documented and the area was classified as a WSA. Values, resources, and uses occurring in each WSA were analyzed through legislative EISs. When completed, recommendations as to the suitability or unsuitability of each WSA for designation as wilderness were submitted to the President through the Secretary of the Interior and then to Congress. FLPMA required that the reports be submitted to the President by October 21, 1991, and to Congress by October 21, 1993 (43 U.S.C. Section 1702).

In addition to the WSAs studied under Section 603 of FLPMA, the BLM designated additional WSAs through the land use planning process under the authorities of Sections 201, 202, and 302 of FLPMA (referred to as Section 202 WSAs). These were typically areas that had wilderness characteristics only when combined with the contiguous lands of another agency. Any such WSAs designated before the 1993 report to Congress were forwarded to Congress.

There are three wilderness study areas within the decision area. The Wales Creek WSA consists of approximately 11,580 acres and is located along the eastern slopes of the Garnet Mountain Range, approximately 40 miles east of Missoula, Montana. The boundaries of the Wales Creek are formed by roads and the land ownership pattern rather than topographic features. The Wales Creek Fire Road, Chamberlain Mountain Road and a patented mine claim in Yourname Creek cheney-stem into the WSA. The WSA has steep timbered drainages ranging in elevation from 4,680 feet to nearly 7,000 feet and contains portions of Wales, Yourname and Pearson Creeks and Deer Gulch. A strong population of western pearlshell mussel is found in Wales Creek. Statewide, western pearlshell mussel populations this robust are very rare. The Wales Creek drainage also has several thermal springs. The WSA is forested with stands of spruce, lodgepole pine, Douglas fir, and subalpine fir. The area provides habitat for elk, deer, grizzly bear, black bear and mountain lion. Recreational uses are primarily hunting and snowmobiling. Some primitive camping associated with hunting occurs.

The Hoodoo Mountain WSA consists of approximately 11,380 acres and is located along the top of the east Garnet Mountain Range, approximately 60 miles east of Missoula, Montana. The boundaries of the Hoodoo Mountains WSA are a road on the east side and private land and state land elsewhere. Elevations range from 5200 feet to 7438 feet. The WSA is forested area with interspersed rock outcrops, open

grassland parks, and wet meadows. In recent years, the bark beetle has killed many of the lodgepole pine trees. The area contains habitats for variety of wildlife including elk, deer, black bear, and mountain lion. Wet Cottonwood Creek contains small cutthroat trout. Cattle grazing occurs in the WSA although portions are excluded. Old trails developed by the Blackfoot Forest Protection Association are still present. Hunting is the primary recreational use of the area followed by hiking and camping. In the past, there was limited snowmobile use; however, that has seemed to decrease in recent years.

The Quigg West WSA consists of 520 acres adjacent to the Forest Service Quigg RARE II area. The 520-acre tract is located on a south facing slope to the Rock Creek Drainage, approximately 20 miles west of Philipsburg, Montana. The boundaries of the Quigg West WSA are national forest lands to the north and west and private lands on the south and east by private lands. The WSA is located in the Rock Creek drainage and contains two narrow steep drainages Capron Creek and Sheep Gulch. Elevations range from 4,920 feet to 6,930 feet. Forested ridges blend into grass and talus slopes. The terrain (steep slopes, heavy vegetation, talus slopes) make access difficult. The area provides yearlong habitat for bighorn sheep, as well as elk and mule deer. Hunting is the primary recreational use followed by wildlife photography.

In the Montana Statewide Wilderness Report Volume I and II (USDI-BLM 1991), it was recommended that Congress not designate both the Wales Creek and Hoodoo Mountain WSAs as wilderness, but to release them for multiple uses. The report also recommended Quigg West for wilderness designation contingent upon wilderness designation of the adjacent Forest Service Quigg RARE II area. The Beaverhead-Deerlodge National Forest manages the Quigg area in conjunction with the adjacent roadless area on the Lolo National Forest. In their updated plan, the Beaverhead-Deerlodge National Forest recommends the Quigg area within their jurisdictional boundaries for wilderness designation. The Lolo National Forest is expected to update their land use plan in the near future.

Only Congress can decide which areas, if any, will be designated as wilderness and added to the National Wilderness Preservation System. Until Congress acts on the recommendations and either designates them as wilderness or releases them for other uses, WSAs are managed according to BLM Manual 6330, Management of Wilderness Study Areas (USDI-BLM 2012); as not to impair the suitability of such areas for preservation as wilderness.

Environmental Consequences

Impacts common to all alternatives

The three WSAs would continue to be managed according to BLM Manual 6330, which requires non-impairment of wilderness values. As such, wilderness values would not be impacted.

Impacts under Alternative A

The WSAs would be managed as limited to motorized use. Snowmobile use would be allowed in two of the WSAs; actual snowmobile use happens infrequently to rare, causing negligible effects to the wilderness values.

If Congress released the Wales Creek WSA, approximately 4,900 acres (in the Wales Creek drainage) would be managed as special management designation, Management Area 9 (see Appendix N) to safeguard unique or natural characteristics that require special management considerations. And, 6,680 acres would be available for multiple-use management, emphasizing wildlife habitat management. In the 4,900 acres, wilderness characteristics would be protected through special management direction. Naturalness, solitude, and primitive recreation may be impacted in the 6,680 acres through ground-disturbing activities such as vegetation management, which would alter the naturalness of the area, solitude, and primitive recreation would not be possible when treatments were active.

If Congress were to release the Hoodoo Mountain WSA, 1,700 acres will be managed as special management designation, Management Area 9 (see Appendix N)) to safeguard unique or natural characteristics that require special management considerations. The remaining 9,680 acres would be managed under guidance for specific big game habitats (management areas 4, 5 and 6). The special management direction of management area 9 would reduce impacts to the naturalness of the area as well as solitude and primitive recreation because ground-disturbing activities would be limited. Impacts from ground disturbing activities would occur in the remaining 9,680 acres—affecting naturalness, solitude, and primitive recreation.

Impacts under Alternative B

The WSAs would be managed as closed to motorized use including snowmobiles thereby eliminating any negligible effects concerning their possible use.

If Congress were to release the Wales Creek WSA, 5,602 acres would be managed as the Wales Creek ACEC, and impacts from ground disturbing activities would be minimized through management direction to protect the relevant and important values of the two viable western pearlshell mussel populations. Protection of the relevant and important values would also protect and reduce impacts to naturalness and primitive recreation. And, 4,987 acres would be managed as part of the Garnet Area SRMA and Garnet Winter Trails RMZ. Naturalness, solitude, and primitive recreation may be impacted by vegetation treatments and mineral development. The southern 995 acres would be managed as part of the Chamberlain SRMA.

If the Hoodoo Mountains WSA were released, it would be managed for multiple uses. If Congress were to release the Hoodoos WSA, ground-disturbing activities would impact the naturalness, solitude, and primitive recreation.

Impacts under Alternative C

Impacts to the WSAs under these alternatives from motorized use would be the same as alternative B.

If the Wales Creek WSA were released, 5,602 acres would be managed as the Wales Creek ACEC, and impacts from ground disturbing activities would be minimized through management direction to protect the relevant and important values of the two viable western pearlshell mussel populations. Protection of the relevant and important values would also protect and reduce impacts to naturalness and primitive recreation. The northern 4,987 acres would be managed as part of the Garnet Area SRMA and Garnet Winter Trails RMZ. Naturalness, solitude, and primitive recreation may be impacted. The southern 995 acres would be managed as part of the Chamberlain BCA. Naturalness would be impacted by management activities and solitude to a lesser extent because of timing restrictions on projects. The Chamberlain BCA will be managed for walk-in hunting opportunities, as such, primitive recreation (like hunting) would also be impacted to a lesser extent by project development depending on timing restrictions.

If the Hoodoo Mountain WSA were released, it would be managed as part of the Hoodoos BCA. Naturalness would be impacted by management activities, and solitude to a lesser extent. Primitive recreation would also be impacted to a lesser extent, dependent on timing restrictions and travel management.

Cumulative effects. Federal agencies other than the BLM in the three-county analysis area manage approximately 2,171,500 acres. Several designated wilderness and recommended wilderness areas are

located in on those lands. The BLM manages 162,611 acres, of which 22,480 acres are wilderness study areas. Cumulative impacts are not expected.

3.7 Social and Economic Conditions Including Environmental Justice

Key Points

Certain defining features of every area influence and shape the nature of local economic and social activity. Within the planning area, there is a diversity in population, economies, culture and lifestyle, amount of BLM surface lands, and the amount of BLM subsurface federal mineral acreage.

Socioeconomic impacts could result from management actions that:

- Support, increase, or reduce economic activity (such as economic output, labor income, and employment) from a resource use;
- Support, increase, or reduce generation of government revenues through taxes, royalties, levies, or fees on resource uses or associated economic activity;
- Support or alter social values associated with use of a resource; and,
- Support, increase, or reduce nonmarket values provided by existence or use of a resource.

Essentially, social and economic values provide context for management decisions. Social and economic conditions and trends could affect current and future uses of resources on BLM-managed lands (surface or mineral estate). Conversely, planning decisions could have social and economic effects, which stakeholders may view as either positive or negative.

The information provided in this section, is a summary of the information, data, and analytical results provided in the Socioeconomic Report, located in Appendix M.

Indicators

The following indicators describe social and economic characteristics of the planning area. Many of these indicators explain the effects of the alternative management scenarios. Key indicators include the following (additional indicators discussed in Appendix M):

- Population and population change.
- Employment by sector.
- Labor income by sector.
- Non-market values from protected natural and cultural resources.
- BLM-related revenues.
- Environmental justice populations.

In most cases, the social effects are described in terms of the effects to quality of life and values toward natural resources, which can be caused by changes in resource availability and use, as discussed in the analytical methods and assumptions section below.

Geographic and Temporal scales

In the affected environment section, social and economic characteristics of the nine counties within the planning area are discussed. Additionally, this, and the environmental consequences section, uses a more focused economic study area that examines BLM-specific contributions to a localized area in which BLM-related activities occur. This area includes Granite, Missoula, Powell, and Mineral Counties. These counties contain a third of three large-capacity sawmills with a hauling distance of less than 100 miles from BLM-managed lands. The study area for the social impacts analysis corresponds to the nine-county planning area.

It is anticipated that social and economic conditions will continue to change across the planning area over the life of the plan. The social and economic effects temporal scale is associated with the specific resource being discussed—especially in relation to the economic impact analyses.

Analytical Methods and Assumptions

Social impacts. Social impacts use the list of potentially affected stakeholder groups presented in the affected environment section, and considers the concerns and potential effects to these groups. Describing the planning area quality of life includes understanding the views and values held by individuals or groups that are affected by, or interested in, natural resource issues (stakeholders). Stakeholders base their views toward BLM resources, resource uses, and management actions on the values they hold. Oftentimes, these values are put forth as an individual's or group's focus of interest, the basis for the agenda they bring forth, and determines what an individual or group finds valuable in contributing to their quality of life.

One way to understand the possible views and values toward BLM resources, resource uses, and management actions is to identify a range of values that can be held by an individual or group. There are several ways one can discuss the range of possible value typologies, including work done by Brown and Reed (2000). Brown and Reed developed a list of 13 value typologies as a way to understand stakeholder values toward natural resources. The adaptation of Brown and Reed's list is presented in table 1 of Appendix M, along with additional discussion on values.

Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses. Indicators, such as acres, are identified to help guide the assessment of values. The analysis is primarily qualitative. However, quantitative measures, such as acres available for recreation and AUMs are referenced, as appropriate.

Economic impact analysis. This analysis estimates the role of BLM resources, uses, and management activities on employment and income in the communities throughout the planning area.

Economic contributions to counties in the analysis area was estimated with input-output analysis using the IMPLAN (Impact analysis for PLANning) modeling system (MIG 2016). The modeling system allows the user to build regional economic models for one or more counties for a particular year, and estimates the economic consequences of activities, projects, and policies on a region. IMPLAN uses BLM data on expenditures and resource uses to estimate the economic consequences of project implementation. Quantitative inputs (such as animal unit months, recreation visits, and Department of Interior payments to counties) were obtained from various program areas for this analysis. The model for this analysis used the 2016 IMPLAN data, which is the latest available dataset. Additional information on the economic impact analyses is included in Appendix M. This includes additional assumptions used for resource-specific quantitative economic impact analyses, which as analyzed for grazing, recreation, and timber; and for payments to states and counties, and BLM expenditures. These quantified economic impact analyses

include only the four-county focused analysis area (Granite, Mineral, Missoula, and Powell Counties) since these are the counties in which most of the economic effects of management actions would occur.

Regional economic impacts are estimated based on the assumption that each alternative will be fully implemented. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the economic impacts would be different from the estimates in these analyses.

Affected Environment

The Affected Environment section summarizes only key points from the Socioeconomic Report located in Appendix M. Please see this report for additional detailed information on the social and economic conditions of the planning area.

Population and population change. Population and demographic changes are instrumental to understanding a community since they may drive changes that can occur to such things as housing, infrastructure, education, and emergency services. Population changes due to in- or out-migration can affect local community ties and social relationships.

In 2015, the planning area had an estimated population of 324,506 residents, which is seventeen percent higher than the 276,875 residents estimated in 2000 (U.S. Census Bureau 2011, 2018). Over 77 percent of the population resided in Flathead, Missoula, and Ravalli Counties in 2015, with the most residents located in Missoula County. The three least populated counties in 2015 were Granite, Mineral, and Powell Counties, which had 3,164 residents, 4,184 residents, and 6,793 residents, respectively (U.S. Census Bureau 2018). Also contributing to planning area population are residents in Lake, Lincoln, and Sanders Counties, which had 2015 populations of 29,416 residents, 19,014 residents, and 11,286 residents, respectively (U.S. Census Bureau 2018).

Fluctuations in population can occur due to in- or out-migration and natural increases (births) or decreases (deaths). Based upon cumulative estimates of the components of population change from 2010-2016, in-migration of residents was the driving force behind the population increases in Granite, Ravalli, and Sanders Counties (U.S. Census Bureau 2017). Both natural increase and in-migration influenced the population increases in Flathead, Lake, and Missoula Counties from 2010-2016. Additional information on population and demographic characteristics are discussed in Appendix M.

Social trends, attitudes, and values. Social trends and attitudes is important information for decision makers because they can affect relationships between the agency and its constituents, the ability to successfully implement plans, and discuss the potential impacts to communities (both communities in the geographical sense and communities of interest).

A key aspect of the social effects analysis approach is to address impacts based on the varying key stakeholder points-of-view. These categories reflect different linkages people have to public lands. The point of categorization is to allow differentiation of social impacts based on broad differences in view. The key stakeholder categories that will be discussed in environmental consequences include interests in livestock grazing, recreation, access, and forest restoration and timber. Summaries of these categories are included in the Appendix M.

Employment and income. The regional economy that encompasses the nine-county planning area is diverse, and provided over 190,000 jobs in 2015 (BEA 2016a). Diverse economies are generally more stable and offer a greater number of employment opportunities. Highly specialized economies (such as

those that depend on a few industries for the bulk of employment and income) tend to be more prone to cyclical fluctuations and support more limited job opportunities. In 2015, for the nine-county area, the top three industry sectors providing employment were government and government enterprises (12.8 percent), retail trade (11.9 percent), and health care and social assistance (11.7 percent) (BEA 2016a). Industry sectors often associated with natural resources include mining, forestry, and farming. These sectors provided less than six percent of total employment (jobs) in 2015 (BEA 2016a). In 2016, the unemployment rate for the United States was 4.9 percent, and Montana was 4.1 percent (U.S. DOL 2016). Out of the nine-county planning area, Lincoln County had the highest unemployment rate (9 percent), followed by Sanders (7.8 percent) and Mineral (7.6 percent) Counties (U.S. DOL 2016).

Personal income is income received from multiple sources, including income received from participation in production, and from government and business transfer payments. Total personal income includes labor earnings (sum of wage and salary disbursements, supplements to wages and salaries, and proprietors' income (BEA 2014)) and non-labor income, which includes rent, dividends, interest, and transfer payments such as Social Security. High percent of non-labor income can indicate a place is a desirable retirement destination especially if the non-labor income is greatly dependent upon investment (rent, dividends, and interest) and age-related transfer payments such as Social Security and Medicare. However, high non-labor income can also indicate areas with poor economies and economic opportunities if non-labor income is greatly dependent upon income-maintenance transfer payments such as Medicaid, Supplemental Security Income, and unemployment insurance. In 2015, the total personal income for the planning area was \$12.5 billion (BEA 2016b). Labor earnings contributed over fifty percent to the overall planning area total personal income in 2015, whereas for the individual counties of Granite, Lake, Lincoln, Powell, Ravalli, and Sanders, over 50 percent of total personal income came from non-labor income (BEA 2016b). Additional employment and income conditions for the planning area are discussed in Appendix M.

BLM related revenue-PILT. Payments in Lieu of Taxes (PILT) are payments from the Federal Government to local governments to help compensate for lost property taxes resulting from tax-exempt federal lands located within the local jurisdiction. The payments are calculated based on the acreage of eligible lands within the county, population, and other federal transfers such as mineral royalties. Granite, Missoula, and Powell Counties are the only counties in the planning area with acres eligible for PILT payments from BLM-managed land (Table 64).

Table 64. 2016 PILT payments and acres

County	PILT Payment 2016	Total PILT Acres	BLM acres
Flathead	\$2,531,972	2,442,403	0
Granite	\$255,019	701,291	38,423
Lake	\$431,940	175,166	0
Lincoln	\$635,059	1,746,388	0
Mineral	\$233,513	642,150	0
Missoula	\$1,687,735	867,850	22,854
Powell	\$550,535	743,031	94,545
Ravalli	\$2,238,057	1,120,238	0
Sanders	\$333,584	917,344	0

Source: USDI 2016

Employment and income contributions by program area. Resource uses of BLM-managed lands contribute to local economies, and economic impacts specifically attributable to BLM-managed lands are estimated below. These estimates are only possible for those resource uses for which sufficient data are available, and include recreation, grazing, timber, payments to counties, and BLM expenditures.

Recreation and BLM expenditures contribute the most to employment in the regional economy, supporting 78 and 85 jobs, respectively, on an average annual basis (Table 65). Comparing this with the labor income data shows differences in income per job by program area. For example, timber provides approximately similar labor income compared to recreation, despite providing close to half of the employment. Each timber-related job provides approximately \$63,000 in labor income, and recreation-related jobs provide \$30,000 in labor income per job. These findings reveal that jobs supported by timber program pay well compared to jobs supported by recreation activities. Recreation-related employment is more likely to be seasonal, which contributes to the lower earnings.

Table 65. Current employment contributions to the regional economy by program area, 2016

Program Area	Employment	Labor Income (thousands of 2016 dollars)
Recreation	78	\$2,340
Grazing	11	\$357
Timber	44	\$2,774
PILT Payments to Counties	4	\$176
BLM Expenditures	85	\$4,386
Total	222	\$10,033
Percent of Regional Economy	0.25%	0.27%

Source: Author generated using IMPLAN 2016

Employment supported by activities on BLM-managed lands account for less than 0.3 percent of area employment and labor income in 2016. The employment contribution by program area translates into employment in varying sectors of the local economy (see table 10 in Appendix M for specific details). The sector with the most BLM-related employment is government, due to BLM expenditures. BLM-related employment is also higher in the retail trade sector, and accommodation and food services sector. Both of these sectors are associated with the recreation-tourism economy, which is supported by the BLM and other public and private lands in the planning area.

Non-market values and ecosystem services. BLM-managed lands produce a wide range of environmental goods and services that provide economic value. The term “non-market values” refers to the benefits individuals attribute to experiences of the environment, or uses of natural and cultural resources that do not involve market transactions and therefore lack prices. Social values, such as the role of BLM-managed land in local customs and lifestyles, can be considered a type of non-market value.

Ecosystem services are the benefits that people receive from the appropriate structure and function of ecosystems and are often categorized as provisioning (such as food and water), regulating (such as climate and disease regulation), cultural (such as viewsheds and spiritual), and supporting (such as soil formation) (MEA 2003). Some ecosystem services may involve market goods, such as timber, while others, for example water quality and carbon sequestration, would be considered nonmarket goods or values.

Consistent with BLM IM 2013-131, no attempt has been made within this planning process to assign monetary values to nonmarket values, because these values are difficult to quantify at this analysis level (USDI-BLM 2013). While not quantified, relevant non-market values and ecosystem services are represented throughout the other resource sections. For instance, the sections on forest vegetation, wildlife, lands with wilderness characteristics, and visual resources reveal important nonmarket values and ecosystem services of those resources, even though those sections do not use the language of nonmarket values used by economists. The BLM considers nonmarket and market values in their many forms throughout the planning process.

Environmental justice. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, states “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...” (Executive Order 12898). The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. It is important to note that minority populations, low-income populations, or tribes may experience common effects from a project even if they do not reside in the immediate analysis area.

Based upon the criteria and data presented in Appendix M, Lake and Lincoln Counties meet the criteria for environmental justice populations for both minority and low-income populations. The BLM has continued to consult and coordinate with tribes to identify whether any Native American cultural values, religious beliefs, or traditional practices could be affected. The BLM has considered input from persons or groups regardless of age, income status, race, or other social or economic characteristics. The outreach and public involvement activities taken by the planning team are discussed in chapter 4.

Environmental Consequences

This section summarizes direct, indirect, and cumulative impacts to social and economic values from the alternatives. Detailed results are provided in the Socioeconomic Report, Appendix M.

Impacts common to all alternatives

Social effects. Growing populations and development will place greater demand on public land resources and may affect the perceived aesthetics and uses associated with BLM lands. Through various mandates, public-land managers are expected to maintain the quality of visitors’ experiences, while providing forest products and cultural and recreational experiences to a greater number of people.

Increased populations of residential areas surrounding BLM-managed lands also increases the region’s need for infrastructure, and may place greater pressure on the BLM to provide utility rights-of-way, for example, to meet the region’s growing infrastructure needs. These pressures may threaten the role of public lands in contributing to a sense of place and the quality of life in surrounding communities (Stedman 2003).

Economic effects. Recreation. There are approximately 222,000 recreation visits to the decision area annually. The expenditures of local and non-local visitors would support approximately 78 jobs and \$2.3 million in labor income, annually (see Table 66 and Table 67). BLM-managed lands would continue to support a wide range of recreational experiences that contribute to the local quality of life and stimulate economic activity under all alternatives. Based on trends in regional population growth and decision area visitation, recreational use of public lands is anticipated to increase under all alternatives. This increase was not included in the economic impact modeling because this change is not a direct result of BLM’s management.

Economic effects. Minerals. Locatable minerals, including gold, silver, and copper are developed on BLM-managed lands. Most of the active mining claims are for prospecting, and therefore no quantities of mineral removal are reported to any government entities. Therefore, the quantities removed are not reflected in the economic impact analysis, and no mineral quantities are estimated for the alternatives to be included in the economic impact analysis. Nevertheless, this activity will continue to contribute income and raw materials to the local economy.

Economic effects. Payments to states/counties and BLM expenditures. As noted in the affected environment section, payments to local governments are made through the PILT program. These payments would support approximately 4 jobs and \$176,000 in labor income annually under all alternatives. In addition, the BLM's salary and non-salary expenditures support approximately 85 jobs and \$4.4 million in labor income in the local economy, annually (see Table 66 and Table 67).

Environmental justice effects. As indicated earlier, there are minority populations and low-income populations within the planning area that meet the criteria to be identified as environmental justice populations. The BLM has continued to consult and coordinate with tribes to identify whether any Native American cultural values, religious beliefs, or traditional practices could be affected. Analysis of potentially disproportionate adverse impacts to human health or environmental effects to environmental justice populations can be correlated to resource and resource use effects, in particular to the amount and location of surface disturbing or other disruptive activities allowed under each alternative.

Although there are identified environmental justice populations in the planning area, no particular BLM actions under any of the alternatives are identified as causing disproportionate adverse impacts to these populations. This is due to the programmatic nature of the management plan alternatives, which do not identify exact locations of future implementation actions. Implementing decisions and authorizing on-the-ground activities would require appropriate site-specific NEPA review in order to proceed. This would include additional screening to identify the location of potential environmental justice populations relative to the location of future actions and analysis to determine whether there would be disproportionately high and adverse human health or environmental effects to environmental justice populations. The BLM will continue to ensure that opportunities for effective public participation by potentially affected low-income populations, minority populations, or tribes are provided. If disproportionately high and adverse effects are identified, the BLM will encourage members of affected environmental justice populations to help develop and comment on ways to modify the actions to avoid or mitigate these effects, or consider other actions that could mitigate the effects.

Impacts under Alternative A. Alternative A would continue management according to the 1986 Garnet Resource Area RMP.

Social impacts: interests in livestock grazing. The forage available for livestock grazing would remain the same as is currently available. This alternative would maintain the quality of life for livestock permittees and other stakeholders who value using BLM resources. Ranching provides noneconomic benefits, such as support for tradition and heritage. Conversely, other stakeholders find concern with the environmental impacts of or user conflicts with grazing livestock. This alternative does not address these stakeholder concerns.

Social impacts: interests in recreation. Recreation management would continue as it has in the past. This alternative does not address the increasing community emphasis on recreation opportunities. Users would continue to enjoy their existing recreation opportunities in the same manner and conditions as has been available in the past.

Social impacts: interests in access. This alternative would maintain the quality of life experienced by stakeholders under the current management. However, stakeholders believe reduced access would better protect wildlife and forest vegetation, which is an important value to many stakeholders. Conversely, an aging population or those with decreased physical ability, which make accessing areas without motorized vehicles difficult, may desire increased motorized access to recreational areas of interest.

Social impacts: interests in forest restoration and timber. This alternative would maintain the quality of life experienced by stakeholders under the current management. However, for some stakeholders, this alternative does not adequately address the need for fire-resilient forests or may not provide adequate levels of forest products. Currently, some forest vegetation and conditions are outside the natural range of variability. Stakeholders who value healthy ecosystems, the resulting services they provide, nature study among value types would be better off if these conditions were addressed through management actions.

Economic impacts. Management actions under alternative A support 222 jobs and approximately \$10 million in labor income in the local economy annually.

Table 66. Employment (number of jobs contributed) by Missoula BLM Program Area, by Alternative, Average Annual

	Alternative A (Current)	Alternative B	Alternative C
Recreation	78	78	78
Grazing	11	11	10
Timber	44	55	44
PILT Payments to States and Counties	4	4	4
BLM Expenditures	85	85	85
TOTAL	222	233	221

Source: Author generated with IMPLAN 2016

Table 67. Labor Income contributed (\$1,000) by Missoula BLM Program Area, by Alternative, Average Annual

	Alternative A (Current)	Alternative B	Alternative C
Recreation	\$2,340	\$2,340	\$2,340
Grazing	\$357	\$378	\$341
Timber	\$2,774	\$3,461	\$2,770
PILT Payments to States and Counties	\$176	\$176	\$176
BLM Expenditures	\$4,386	\$4,386	\$4,386
TOTAL	\$10,033	\$10,741	\$10,014

Source: Author generated with IMPLAN 2016

Economic impacts: Range. The forage available for livestock grazing would remain the same as is currently available. Prescriptive grazing could be used as a management tool to reduce fine fuels; assisting in the reduction of the frequency and intensity of wildland fire. In addition, prescriptive grazing can be used to achieve specific habitat objectives such as the reduction of noxious weeds.

Alternative A would permit 6,292 AUMs annually. On an average annual basis, this level of grazing would support approximately 11 jobs and \$357,000 in labor income annually. However, actual use would vary based on local forage and market conditions, and therefore the economic impact of grazing would vary.

The collective contribution to permittees resulting from the public land grazing fee (\$2.11 per AUM in 2016) being below the cost of competitively priced AUMs would be \$137,732. If grazing permittees had to replace their public forage with private forage, the collective annual forage cost of grazing would be \$151,008 (6,292 AUMs at \$24.00 per AUM). With BLM forage, permittees collectively pay \$13,276. Therefore, the economic effect to ranchers is not fully captured in the employment and labor income figures presented above. However, this effect to ranchers can also be seen as a cost to providers of private forage. This also assumes that private forage opportunities would be available and located in places practical for utilization to the ranchers. Not factored into the private forage costs, are any costs associated with transporting livestock to lands available for grazing. Similarly, this assumes ranchers neighboring BLM-managed lands are of a size and means to utilize the available AUMs.

Economic impacts: timber and forest management. Softwood saw logs and pulp, poles, posts, and fuelwood are harvested for both commercial and personal use. Alternative A treatment levels are roughly similar to those in alternative C. Based on the forest product removal estimates listed in table 5 of Appendix M, forest product removal under alternative A would support 44 jobs and \$2.8 million in labor income in the local economy annually.

Christmas tree permits are sold for personal use. Revenues collected for these permits would be \$955 (191 trees at \$5 per permit). Assuming the cost of a competitively priced Christmas tree is \$30, the collective benefit to permittees is \$4,775. However, this can also be seen as a cost to private Christmas tree sales. The economic impact of Christmas tree permits is not captured in the employment and labor figures above. In addition, the gathering of a Christmas tree from public lands, may provide additional value and well-being in terms of recreation, family outings, and contributing to quality of life.

Economic impacts: non-market values. Administrative designations and the protection of resources promote non-market and ecosystem service values. This alternative would maintain the current provision of these values. However, because some forest vegetation and conditions are near the lower end of the natural range of variability this alternative may not sustain the current provision of ecosystem services if they are not maintained or improved.

Impacts under Alternative B. Alternative B places a priority on active restoration of vegetative communities to achieve a natural range of variability, and to achieve fire-resilient forests providing for community and wildland firefighter safety.

Social impacts: interests in livestock grazing. Alternative B emphasizes treating vegetative communities to achieve desired forage conditions for big game and domestic livestock, including prescribed fire and mechanical treatments. Alternative B provides the greatest number of acres available to livestock grazing (145,558 acres), mostly from more acres being available for prescriptive grazing as a management tool. This alternative provides the greatest AUMs considered across all alternatives at 6,660 AUMs annually. This alternative would maintain or enhance the quality of life for livestock permittees and other stakeholders who value using BLM resources. Ranching also provides noneconomic benefits, such as support for tradition and heritage.

Conversely, because this alternative has the highest number of acres available to grazing, other stakeholders who find concern with the environmental consequences or user conflicts associated with livestock grazing, may find this alternative does not meet their needs relative to alternatives A and C.

Social impacts: interests in recreation. This alternative emphasizes dispersed recreation opportunities, especially for hunting and fishing. Recreation would be a priority in the same areas as alternative A. The Lewis and Clark National Historic Trail corridor would be 1 mile, consistent with other segments of the trail on BLM-managed lands, and similar to how it is currently managed. Many users would continue to enjoy their existing recreation opportunities in the same manner and conditions as been available in the past.

Relative to alternative A, this alternative may provide improvements to the quality of life for a variety of stakeholders interested in recreation. Recreation management areas provide more clarity and assurance of the recreation experience. Relative to alternative A, stakeholders who value more undisturbed lands from mineral exploration may prefer this alternative. However, increased timber harvest as a result of active forest management might counteract this outcome. Stakeholders valuing the greatest amount of undisturbed lands for aesthetic, audible, biological, moral, ethical, or other beliefs may ultimately prefer alternative C.

Social impacts: interests in access. Alternative B has fewer acres closed to off-highway vehicle and snowmobile use relative to alternative C. This would positively affect the quality of life for individuals of an age or physical ability that find accessing areas without motorized vehicles difficult, or any users wishing to access BLM-managed lands with motorized assistance. Conversely, some stakeholders are concerned about the negative impact motorized uses have on fish and wildlife habitat, and therefore will be adversely affected by this aspect of alternative B. Similarly, the quality of life for non-motorized users may be lower than found in alternative C.

This alternative has fewer exclusion and avoidance areas for rights-of-way allocations than alternative C. This will have the same distribution of effects as the off-highway vehicle and snowmobile closures mentioned above. Some stakeholders who desire greater motorized access will prefer this alternative, while others who believe roads and rights-of-way are detrimental to wildlife and forest vegetation will prefer alternative C.

Social impacts: interests in forest restoration and timber. This alternative would enhance the quality of life for stakeholders who value using BLM-managed resources for economic contributions, as this alternative is expected to produce the greatest forest product-related jobs and income effects on the local economy. Those who give a high priority to resource uses include local residents concerned about economic development and its potentially positive effects on the social environment and quality of life of small communities.

The forest product harvest volume is, in part, a result of vegetation restoration activities. Forest management under alternative B emphasizes ecological integrity, terrestrial and aquatic wildlife species' habitat needs, and properly functioning watersheds while simultaneously providing forest products and creating ecosystems resilient to disturbances such as wildland fire and epidemic insect outbreaks. This provides value to a wide array of stakeholders—those who value the existence of healthy ecosystems, the services these systems provide, the reduction in fire threats and the recreation activities supported by healthy ecosystems (for example hunting, fishing, wildlife viewing, and nature study).

Conversely, active forest management will have negative quality of life effects to stakeholders who value natural processes, or those who are concerned by the disruptions that these management actions cause. For example, the aesthetic and noise disturbances caused by active management, the smoke and possible health impacts caused by prescribed burns, or the recreation interruptions from management in preferred recreation locations may decrease—possibly only temporarily—the quality of life for some stakeholders relative to alternative C.

Economic impacts. Management actions under alternative B are expected to support 233 jobs and between \$10.7 million in labor income in the local economy annually (see Table 66 and Table 67).

Economic impacts: range. Alternative B emphasizes treating vegetative communities, including the use of prescribed fire and mechanical treatments, to achieve desired forage conditions for big game and domestic livestock. In addition, native species are used in restoration projects, when feasible. Alternative B also provides the greatest number of acres available to livestock grazing, mostly as a result of more acres being available for prescriptive grazing as a management tool. This is estimated to result in the greatest level of AUMs in the considered alternatives at 6,660 AUMs annually (see table 14 in Appendix M). Actual use would vary based on local forage and market conditions.

The estimated effect of this level of annual AUMs to the regional economy is 11 jobs and \$378,000 in labor income annually.

The collective contribution to permittees resulting from the public land grazing fee (\$2.11/AUM in 2016) being below the cost of competitively priced AUMs would be \$145,787. If grazing permittees had to replace their public forage with private forage, the collective annual forage cost of grazing would be \$159,840 (6,660 AUMs at \$24.00 per AUM). With BLM-managed forage, permittees collectively pay \$14,053. Therefore, the economic effect to ranchers is not fully captured in the employment and labor income figures presented above. However, this effect to ranchers can also be seen as a cost to providers of private forage. This also assumes that private forage opportunities would be both available and located in places practical to the ranchers. Costs associated with transporting livestock to lands available for grazing are not factored into the private forage costs.

Economic impacts: timber and forest management. Alternative B is expected to have a higher forest product removal volume than alternatives A and C, and would increase local employment and labor income related to timber activities on the BLM-managed lands. Based on the estimated annual forest product volumes (see table in Appendix M), forest product harvests under alternative B would support 55 jobs and \$3.5 million in labor income in the local economy annually.

Christmas tree permits sold for personal use are expected to be higher under alternative B and C relative to alternative A. Revenues collected for these permits would be \$100 (200 trees at \$5 per permit). Assuming the cost of a competitively priced Christmas tree is \$30, the collective contribution to permittees is \$5,000. However, this can also be seen as a cost to private Christmas tree sales. The economic impact of Christmas tree permits is not captured in the employment and labor figures above. In addition, the gathering of a Christmas tree from public lands, may provide additional value and well-being in terms of recreation or family outings, and contribute to quality of life.

Economic impacts: non-market values. Administrative designations and the protection of resources promote non-market and ecosystem service values. Although the precise economic value of the goods and services protected by administrative designations and other management decisions is unknown, a positive relationship between protected acres and non-market and ecosystem service values is a reasonable assumption. Table 15 in Appendix M shows selected administrative designations as indicators of the supply of non-market values and ecosystem services. Many of these designations do not vary across alternatives; each alternative is expected to provide non-market and ecosystem service value. However, alternative B provides fewer acres under specific administrative designations designed to protect via special management designations than alternative C, such as backcountry conservation areas and protected lands with wilderness characteristics. Therefore, alternative B may provide lower levels of non-market values relative to alternative C.

Impacts under Alternative C. Alternative C emphasizes the greatest degree of conservation for fish and wildlife habitat, cultural, and historic resources. It also places an emphasis on allowing natural processes to occur in moving toward the attainment of the mid-range of natural range of variability in forested systems.

Social impacts: interests in livestock grazing. Alternative C has the lowest level of permitted AUMs at 6,014 annually (see table 11 in Appendix M). Therefore, the economic contribution of grazing on BLM-managed lands would decrease minimally relative to other alternatives.

This alternative may provide decreased quality of life for livestock permittees and other stakeholders who value using BLM resources for economic gain. Ranching provides noneconomic benefits, such as support for tradition and heritage. Therefore, this alternative, which provides the least acres available for grazing and AUMs annually may be less preferred to these stakeholder groups.

Conversely, other stakeholders, who may find concern with the environmental impacts or user conflicts of grazing livestock may prefer this alternative due to having the lowest number of acres available to grazing.

Social impacts: interests in recreation. Stakeholders who value dispersed recreation opportunities may favor alternative C. This alternative emphasizes dispersed recreation opportunities, especially hunting and fishing. Special designations, such as backcountry conservation areas, place wildlife-related recreation opportunities (hunting, fishing, wildlife viewing) as a priority (see table 16 in Appendix M). Alternative C designates four backcountry conservation areas and two recreation management areas.

Alternative C has the greatest number of acres closed to off-highway vehicle and snowmobile use. Therefore, this alternative could improve the quality of life for non-motorized recreation users who prefer to areas separated from motorized users. The increase in acres closed to off-highway vehicles and snowmobiles may alleviate any concerns by non-motorized recreation users related to vehicle exhaust fumes, disparities in speed, and noise. Some users may feel the reduction in open acres adversely affects their quality of life.

Social impacts: interests in access. Alternative C has the greatest number of acres closed to off-highway vehicle and snowmobile use. This would adversely affect the quality of life of individuals of an age or physical ability that makes accessing areas without motorized vehicles difficult. Conversely, stakeholders concerned about the negative impact motorized use had on fish and wildlife habitat will prefer this alternative's aspect.

Similarly, this alternative has the greatest number of exclusion and avoidance areas for rights-of-way allocations. This will have the same distribution of impacts as the off-highway vehicle and snowmobile closures. Some stakeholders who desire greater motorized access will not prefer this alternative, while others who believe roads and rights-of-way are detrimental to wildlife and forest vegetation will prefer this alternative.

Social impacts: interests in forest restoration and timber. This alternative would maintain the quality of life for stakeholders who value using BLM-managed resources for economic contributions relative to Alternative A. Alternative C is roughly equivalent to alternative A in proposed forest-product harvest volume, and related jobs and income effects on the local economy. Those who give a high priority to resource uses include many local residents concerned about economic development, and its potentially positive effects on the social environment and small community quality of life. In this respect, this alternative provides lower contributions relative to alternative B.

The forest-product harvest volume is, in part, a result of vegetation restoration activities. Forest management under alternative C places a greater emphasis on allowing natural processes to occur in moving toward the attainment of the mid-range of natural range of variability in forested ecosystems. This provides a value to a wide array of stakeholders—those who value the existence of healthy ecosystems, the services these systems provide, the reduction in fire threats, and the recreation activities supported by healthy ecosystems (for example hunting, fishing, wildlife viewing, and nature study).

Economic impacts. Management actions under alternative C are expected to support 221 jobs and \$10 million in labor income in the local economy annually. This is not substantively different from management actions under alternative A, which support 222 jobs and \$10 million in labor income annually.

Economic impacts: range. Alternative C has the lowest level of permitted AUMs at 6,014 annually. Therefore, the economic contribution of grazing on BLM-managed lands would decrease to 10 jobs and \$341,000 million in labor income annually.

The collective contribution to permittees resulting from the public land grazing fee (\$2.11/AUM in 2016) being below the cost of competitively priced AUMs, would be \$131,646. If grazing permittees had to replace their public forage with private forage, the collective annual forage cost of grazing would be \$144,336 (6,014 AUMs at \$24.00 per AUM). With BLM-managed forage, permittees collectively pay \$12,690. Therefore, the economic effect to ranchers is not fully captured in the employment and labor income figures presented above. However, this effect to ranchers can also be seen as a cost to providers of private forage. This also assumes that private forage opportunities would be available and located in places practical to the ranchers. Transporting livestock to lands available for grazing are not factored into private forage costs.

Economic impacts: timber and forest management. The average estimated annual forest-product harvest volume is roughly similar between alternatives A and C, although the distribution of products are somewhat different. Timber-related management under alternative C would support 44 jobs and \$2.8 million in labor income in the local economy annually. This is similar to the estimated employment and labor income supported by forest products under alternative A.

Christmas tree permits sold for personal use are expected to be higher under alternatives B and C, relative to alternative A. Revenues collected for these permits would be \$100 (200 trees at \$5 per permit). Assuming the cost of a competitively priced Christmas tree is \$30, the collective contribution to permittees is \$5,000. However, this can also be seen as a cost to private Christmas tree sales. The economic impact of Christmas tree permits is not captured in the employment and labor figures above. In addition, the gathering of a Christmas tree from public lands, may provide additional value and well-being in terms of recreation or family outings and contribute to quality of life.

Economic impacts: non-market values. Alternative C emphasizes the greatest degree of conservation for fish and wildlife habitat, cultural, and historic resources. Based on administrative designations as a proxy for non-market and ecosystem service values, alternative C provides a greater number of acres under specific administrative designations than alternative B, such as backcountry conservation areas and protected lands with wilderness characteristics. Therefore, alternative C may provide greater non-market and ecosystem service values.

Cumulative Effects. The temporal scale for the socio-economic cumulative effects analysis is the next 20 to 30 years. This analysis considers how past, present, and reasonably foreseeable future actions on lands throughout the region may interact with decisions made under the proposed plan to affect the social and economic environment. The economic analysis of the proposed plan is unique among the resources and

uses because the effects occur primarily off BLM-managed lands. In this way, the economic effects described above are cumulative in nature—they evaluate the role of BLM decisions under the proposed plan both on and off BLM-managed lands. However, the effects analysis does not address how actions taken on adjacent lands, or how trends occurring in the local region, will affect the social and economic consequences of the proposed plan.

Potential cumulative effects may occur to the various stakeholder interests.

Interests in livestock grazing. Sale, subdivision, and residential development of rangeland on private lands adjacent to BLM-managed lands will likely increase and reduce the amount of livestock grazing in the planning area. Subdividing would primarily affect individual grazing allotments and could result in breaking an allotment into smaller units, or in canceling the grazing lease entirely. This may lead to a shift away from ranching, and negatively affect the quality of life for those who value ranching as an important way-of-life in their communities.

Interests in recreation. The recreation-related effects identified in the social and economic environmental consequences section may be influenced by trends and activities that occur off BLM-managed lands. Shifts in the availability of large tracts of private lands for recreational use may shift this demand to lands remaining open to public use.

Continued population growth will increase the demand for recreation opportunities in the planning area and may require agencies to increase recreation-related expenditures. This will also contribute additional jobs and income to the local economy.

Interests in access. As the population ages, demand for easily accessible recreation opportunities will increase. Shifts in the availability of large tracts of private lands for recreational use may affect access to remaining lands. Consequently, there will be an increased demand for recreational access, whether through access easements, conservation easements that provide access, or land exchange proposals that enhance access.

3.8 Public Safety: Abandoned Mines

Affected Environment

Mine wastes from historic mine sites now considered to be abandoned mine lands are a threat to human health and the environment. Abandoned mines also contain hazardous mine openings and physical safety hazards associated with historic mine operations and unstable slopes. Heavy metals associated with mine waste may pose a risk to recreational users, and to terrestrial and aquatic environments. Abandoned mines can be considered inactive, located on or near public land where the owner or operator cannot be established, have no financial assets, or cannot assist with the reclamation of these mine sites.

BLM-managed lands in the decision area include features associated with past mining (hardrock and placer). Mining activity is mostly associated with gold, silver, copper, and barite mineralization, and two mine tailing repositories are located in the decision area. The BLM actively identifies, mitigates, and monitors abandoned mine land features and hazards on a case-by-case basis.

The majority of hazardous material issues on public lands are associated with illegal dumping.

Environmental Consequences

Under all alternatives, abandoned mines that pose a significant risk to human health and the environment would be remediated. Reclamation activities associated with abandoned mine lands may have temporary adverse effects to fish and aquatic species, but direct effects should be minimized with implementation of best management practices (Appendix P), and long-term effects are expected to increase vegetation cover, productivity, and diversity. Water quality should also improve following reclamation, as heavy metal concentrations would be reduced.

Rehabilitation and closure of abandoned mine land sites and associated features would result in the removal or obscuring of information contained in waste dumps, excavations, adits, and shafts used by exploration companies to sample and map mineral deposits.

3.9 Tribal Interests

Affected Environment

Indian trust resources are legal interests in assets held in trust by the Federal Government for federally recognized Indian tribes, nations, or individuals. Tribal treaties are negotiated contracts executed with the United States, and essentially are on the same legal footing as treaties with foreign nations. The Bitterroot Salish, Pend d'Oreille, and the Kootenai signed the Hellgate Treaty with the U.S. Government in 1895. More in depth discussions about this treaty are included in the Analysis of the Management Situation pages 35-38, which is incorporated by reference. Since the BLM manages portions of the ceded lands that are within the traditional use areas of the tribes, the BLM has a trust responsibility to provide the conditions necessary for Indian tribal members to satisfy their treaty rights and consider the potential impacts of BLM plans, projects, programs, or activities. Members of the tribes may exercise their hunting, fishing, and gathering rights on federal lands outside the boundaries of the reservation. Tribal members may also access and use places or resources that are important for religious or cultural reasons. Effective consultation and coordination with the tribes is necessary to identify any management issues with trust resources, treaty rights, or traditional or religious uses.

The BLM consults with Native American Tribes on issues relating to tribal traditional cultural properties and values.

Environmental Consequences

The BLM will continue to consult with Native American tribes on issues relating to tribal traditional cultural properties and values. The BLM, as a governmental agency, will maintain special government-to-government relationships with federally recognized Indian tribes, including the Confederated Salish and Kootenai Tribes, as tribes exercise their treaty rights such as hunting, fishing, and gathering on non-tribal federal lands, including those in the decision area.

Interest from the public in historical tourism and from Native Americans for traditional uses and practices will likely increase. Native American treaty rights such as game fishing, hunting large and small game, and gathering natural resources for subsistence, medicinal, and cultural purposes will likely continue and increase in the future.

Chapter 4. Collaboration, Consultation, and Public Involvement

4.1 Tribal Consultation

On March 21, 2017, the BLM sent a letter inviting four tribes to participate as cooperating agencies—Nez Perce Tribe, Shoshone-Bannock Tribes Fort Hall Reservation, Blackfeet Nation, and the Confederated Salish and Kootenai Tribes. The Confederated Salish and Kootenai Tribes declined to participate as a cooperating agency, but expressed an interest to stay informed and continue the formal consultation throughout the planning process. The BLM will continue government-to-government consultation with tribes.

4.2 Cooperating Agencies

According to the Council of Environmental Quality (CEQ) regulations §1505(b), “Agencies shall reduce delay by emphasizing interagency cooperation before the EIS is prepared rather than submission of adversary comments on a completed document.” Cooperating agencies share expertise and resources needed to help shape BLM land use plans and environmental analyses to better reflect the policies, needs, and conditions of their jurisdictions and the citizens they represent.

In the spring of 2016, the BLM sent letters to over forty federal, state, and local agencies, and tribal governments, inviting them to participate in the RMP revision as an official cooperating agency. Of the 40 agencies invited, three agencies have currently signed or in the process of signing a memorandum of understanding with the BLM to become official cooperating agencies. These agencies are: (1) Missoula County; (2) Montana Fish Wildlife and Parks, Region 2; and, (3) U.S. Forest Service—Region 1; Lolo National Forest; Helena and Lewis and Clark National Forest, Lincoln Ranger District; Bitterroot Deerlodge National Forest, Pintler Ranger District; Flathead National Forest; Rocky Mountain Research Station, Forestry Science Lab (Missoula); Fire Science Lab.

4.3 USFWS Consultation

The BLM has begun informal consultation with the U.S. Fish and Wildlife Service under Section 7(a)(2) of the Endangered Species Act, and will complete consultation before signing a record of decision for the RMP revision.

4.4 Public Involvement

The preparation of the draft RMP and EIS included four distinct public involvement efforts: (1) pre-scoping listening; (2) formal public scoping; (3) recreation focus groups; and, (4) public review of preliminary alternatives.

The BLM held 50 listening sessions and 4 public workshops. Public scoping commenced upon publication of the Notice of Intent in the Federal Register, on December 12, 2016. The BLM subsequently hosted four public workshops in Greenough, Helmsville, Missoula, and Phillipsburg to share information about the planning process. The BLM Scoping Report (August 2017, USDI-BLM) summarizes the public scoping comments.

The BLM provided the public an opportunity to view an early version of the alternatives—mainly the high-level allocations and concepts—before a full draft was complete. The BLM posted the preliminary

alternatives to its website and hosted three public open houses in Missoula, Greenough, and Philipsburg in January 2018.

4.5 Congressional Outreach

During cooperating agency outreach, the BLM contacted the three congressional representatives for Montana to share information about the Missoula RMP revision. BLM staff met with staff members from the offices of Senators Daines and Tester on September 8 and 12, 2016, respectively.

Glossary

Abandoned Mine Lands. An abandoned hard rock mine on or affecting public lands administered by the BLM, at which exploration, development, mining, reclamation, maintenance, and inspection of facilities and equipment, and other operations ceased as of January 1, 1981 (the effective date of BLM's Surface Management regulations codified at 43 CFR 3809) with no evidence demonstrating that the miner intends to resume mining.

Accelerated Erosion: Soil loss above natural levels resulting directly from human activities. Because of the slow rate of soil formation, accelerated erosion can lead to a permanent reduction in plant productivity.

Acquired Lands: Lands in federal ownership that were obtained by the government through purchase, condemnation, gift, or exchange.

Active Preference: That portion of the total grazing preference for which grazing use may be authorized.

Activity Plan: Site-specific plan that precedes actual development. This is the most detailed level of BLM planning, and is also referred to as project level or implementation level planning.

Actual Use: The amount of animal unit months consumed by livestock based on the numbers of livestock and grazing dates submitted by the livestock operator and confirmed by periodic field checks by the BLM.

Affected Environment: Natural, physical and human-related environment that is sensitive to changes due to proposed actions.

Air Quality: Refers to standards for various classes of land as designated by the Clean Air Act of 1978.

Air Quality Standards: Primary standards are designed to protect human health, including sensitive populations, such as people with asthma and emphysema, children, and senior citizens. Primary standards were designed for the immediate protection of public health, with an adequate margin of safety, regardless of the cost.

Secondary standards are designed to protect public welfare, including soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, and other economic, aesthetic, and ecological values, as well as personal comfort and well-being. Secondary standards were established to protect the public from known or anticipated effects of air pollution.

Allotment: An area of land where one or more livestock operators graze their livestock. Allotments generally consist of BLM lands but may also include other federally managed, state owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Allotment Categorization: Grazing allotments and rangeland areas used for livestock grazing are assigned to an allotment category during resource management planning. Allotment categorization is used to establish priorities for distributing available funds and personnel during plan implementation to achieve cost-effective improvement of rangeland resources. Categorization is also used to organize allotments into similar groups for purposes of developing multiple use prescriptions, analyzing site-specific and cumulative impacts, and determining trade-offs.

Allotment Management Plan: A written program of livestock grazing management, including supportive measures if required, designed to attain specific management goals in a grazing allotment.

Alluvium: Any sediment deposited by flowing water, as in a riverbed, floodplain, or delta.

Analysis of Management Situation: A comprehensive documentation of the present conditions of the resources, current management guidance, and opportunities for change.

Animal Unit Month (AUM): A standardized measurement of the amount of forage necessary for the sustenance of one cow unit or its equivalent for 1 month; approximately 800 pounds of forage. An AUM is the amount of forage needed to sustain one cow and her calf, one horse, or five sheep or goats for a month.

Annual Sale Quantity (ASQ): The maximum volume of timber that may be sold on a sustained-yield basis from the area of suitable land covered by the resource management plan for a time period specified in the plan. This volume is usually expressed on an annual basis as the average annual allowable sale quantity.

Appropriate Management Response (AMR): This term became obsolete in February 2009 when new interagency guidance was developed for implementing Federal Wildland Fire Management Policy. The definition was ‘any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a spectrum of tactical options (from monitoring to intensive management actions). The AMR is developed by using Fire Management Unit strategies and objectives identified in the Fire Management Plan.’

Appropriation: Public lands covered by an entry, settlement, claim, location, withdrawal, or reservation that sets the land apart for some particular use or disposal.

Aquatic: Living or growing in or on the water.

Aquifer: A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding large amounts of water.

Archaeological Resource/Remains: A term with legal definition and application, meaning any material remains of human life or activities that are at least 100 years of age, and that are of archaeological interest.

Area of Critical Environmental Concern (ACEC): Areas within the public lands where special management attention is required to: (1) protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or (2) protect life and safety from natural hazards.

Assessment: The act of evaluating and interpreting data and information for a defined purpose.

Authorized Officer: The federal employee who has the delegated authority to make a specific decision.

Authorized Use: Uses of public land that may be authorized include agriculture development, residential use (under certain conditions), business, industrial, and commercial uses, advertising; research projects, State National Guard maneuvers, and motion picture filming. Recreational concessions are considered business uses and may be authorized by lease. Timber harvest, livestock grazing, mineral extraction and special recreation events, among other uses, are authorized under other regulations and not under Section 302 of the Federal Land Policy Management Act (FLPMA).

Avoidance Areas: Areas to be avoided but may be available for location of rights-of-way with special stipulations. (BLM Land Use Planning Handbook, Appendix C)

Back Country Byways: Vehicle routes that traverse scenic corridors utilizing secondary or back country road systems. National back country byways are designated by the type of road and vehicle needed to travel the byway.

Basin: A depressed area having no surface outlet (topographic basin); a physiographic feature or subsurface structure that is capable of collecting, storing, or discharging water by reason of its shape and the characteristics of its confining material (water); a depression in the earth's surface, the lowest part often filled by a lake or pond (lake basin); a part of a river or canal widened (drainage, river, stream basin).

Beneficial or Positive Effect: An effect promoting a favorable result for a specific resource of resource use. Could be used in short-term, long-term, or both short- and long-term contexts.

Best Management Practices (BMPs): A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes. Best management practices are often developed in conjunction with land use plans, but they are not considered a land use plan decision unless the land use plan specifies that they are mandatory. They may be updated or modified without a plan amendment if they are not mandatory.

Big Game: Large species of wildlife that are hunted, such as elk, deer, bighorn sheep, mountain lion, black bear, and pronghorn antelope.

Big Game Analysis Unit: Logical locations across the landscape to conduct analysis of big game winter range. These areas were broken out based on a combination of Elk Management Units from Montana's Elk Management Plan (MFWP 2004) and watershed boundaries.

Biodiversity: The diversity of living organisms considered at multiple levels of organization including genetics, species, and higher taxonomic levels, and the variety of habitats and ecosystems, as well as the processes occurring therein.

Biological Assessment: The gathering and evaluation of information on proposed endangered and threatened species and critical habitat and proposed critical habitat. Required when a management action potentially conflicts with endangered or threatened species, the biological assessment is the way federal agencies enter into formal consultation with the U.S. Fish and Wildlife Service and describe a proposed action and the consequences to the species the action would affect.

Biological Weed Treatment: Treatments that involve living creatures, such as insects, sheep and goat grazing, plant pathogens, and biopesticides.

Biomass: Woody biomass is defined as the trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment, that are the by-products of forest management.

Board Feet: A unit of solid wood one foot square and one inch thick (BF - board foot, MBF - thousand board feet, MMBF - million board feet).

Browse: To browse (verb) is to graze a plant; also, browse (noun) is the tender shoots, twigs and leaves of trees and shrubs often used as food by livestock and wildlife.

Bunchgrass: Individual grasses that have the characteristic growth habit of forming a “bunch” as opposed to having stolens or rhizomes or single annual habit.

Burn Plan: A plan required for every fire application ignited by management. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription). Same as Prescribed Fire Burn Plan.

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts. See also Fire Severity.

Candidate Species: Any species included in the Federal Register notice of review that are being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service.

Canopy: Foliar layer(s) consisting of the crowns of trees or shrubs in a forest or woodland.

Carrying Capacity: The maximum stocking rate possible without damaging vegetation or related resources.

Channel: An open conduit either naturally or artificially created which periodically or continuously contains moving water or forms a connecting link between two bodies of water.

Chemical Weed Treatment: These are treatments using additives, such as applying herbicides or changing soil nutrient ratios.

Classification: The authority of the Secretary of the Interior to examine land to see whether it is proper for entry, selection, or location.

Classification of Lands: The process of determining whether lands are more valuable or suitable for transfer or use under particular or various public land laws than for retention in federal ownership for management purposes.

Clean Air Act (CAA): Federal legislation governing air pollution.

Climax Vegetation: The ecological vegetation community that represents the culminating stage or highest development of natural vegetative succession. The climax community often can perpetuate itself indefinitely unless disturbed by outside forces.

Closed: Generally denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs.

Closed Road: Closed to motorized public access and subject to administrative or permitted uses based on case-specific exceptions (such as for mining claimants with existing claims accessed by existing routes). Routes identified as closed would have a route bed left intact in case they are needed for valid existing rights only, or in the extended future for administrative purposes. Closed routes would be open to non-motorized use.

Code of Federal Regulations (CFR): The official, legal tabulation or regulations directing federal government activities.

Collaboration: A cooperative process in which interested parties, often with widely varied interests, work together to seek solutions with broad support for managing public and other lands.

Commercial Forest Land: Forest land that is producing, or has a site capable of producing, at least 20 cubic feet/acre/year of a commercial tree species.

Common Variety Minerals: Stone, gravel, pumice, pumiced, and cinders that, though possibly having value for trade, manufacture, the sciences, or the mechanical or ornamental arts, do not have a distinct, special value for such use beyond normal uses. On the public lands such minerals are considered salable and are disposed of by sales or by special permits to local governments.

Community: An assemblage of plant and animal populations in a common spatial arrangement.

Composition (of Forest Vegetation): The proportion of each tree species in a stand, expressed as a percentage of the total number, basal area, or volume of all tree species in the stand.

Condition Class: A classification of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk). Synonymous with Fire Regime Condition Class (FRCC).

Conformance: That a proposed action shall be specifically provided for in the land use plan or, if not specifically mentioned, shall be clearly consistent with the goals, objectives, or standards of the approved land use plan.

Conifer: A tree or shrub of the order Coniferae with cones and needle-shaped or scale-like leaves.

Coniferous: Pertaining to conifers, which bear woody cones containing naked seeds.

Connectivity: The degree to which similar but separated vegetation components of a landscape are connected.

Conservation Agreement: A formal signed agreement between the U.S. Fish and Wildlife Service or National Marine Fisheries Service and other parties that implements specific actions, activities, or programs designed to eliminate or reduce threats or otherwise improve the status of a species. Conservation agreements can be developed at a state, regional, or national level and generally include multiple agencies at both the state and federal level, as well as tribes. Depending on the types of commitments the BLM makes in a conservation agreement and the level of signatory authority, plan revisions or amendments may be required prior to signing the conservation agreement, or subsequently in order to implement the conservation agreement.

Conservation Strategy: A strategy outlining current activities or threats that are contributing to the decline of a species, along with the actions or strategies needed to reverse or eliminate such a decline or threats. Conservation strategies are generally developed for species of plants and animals that are designated as BLM Sensitive species or that have been determined by the Fish and Wildlife Service or National Marine Fisheries Service to be federal candidates under the Endangered Species Act.

Contiguous: Lands or legal subdivisions having a common boundary; lands having only a common corner are not contiguous.

Cooperating Agency: Assists the lead federal agency in developing an environmental analysis or environmental impact statement. The Council on Environmental Quality regulations implementing NEPA define a cooperating agency as any other federal agency that has jurisdiction by law or special expertise

for proposals covered by NEPA. Any tribe or federal, state, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Corridor: A designated right-of-way corridor is a parcel of land with specific boundaries identified by law, Secretarial order, the land-use planning process, or other management decision, as being a preferred location for existing and future rights-of-way and facilities. The corridor may be suitable to accommodate more than one type of right-of-way use or facility or one or more right-of-way uses or facilities that are similar, identical, or compatible. (43 CFR 2801.5(b)(9))

Council of Environmental Quality (CEQ): An Executive Office advisory council established by the National Environmental Policy Act of 1969 for review of federal program effects on the environment. The council conducts environmental studies and advises the President on environmental matters.

Cover: Any form of environmental protection that helps an animal stay alive (mainly shelter from weather and concealment from predators).

Cover Type: The present vegetation composition of an area, described by the dominant plant species.

Critical Habitat: An area occupied by a threatened or endangered species “on which are found those physical and biological features (1) essential to the conservation of the species, and (2) which may require special management considerations or protection.”

Cultural Resource / Cultural Property: A definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) or traditional cultural or religious importance to specified social and/or cultural groups. Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit.

Cultural Resource Inventory Classes: Class I – Existing data inventory: a study of published and unpublished documents, records, files, registers, and other sources, resulting in analysis and synthesis of all reasonably available data. Class I inventories encompass prehistoric, historic, and ethnological/sociological elements, and are in large part chronicles of past land uses. They may have major relevance to current land use decisions. Class II – Sampling field inventory: a statistically based sample survey designed to help characterize the probable density, diversity, and distribution of archaeological properties in a large area by interpreting the results of surveying limited and discontinuous portions of the target area. Class III – Intensive field inventory: a continuous, intensive survey of an entire target area, aimed at locating and recording all archaeological properties that have surface indications, by walking close-interval parallel transects (generally at 30 m intervals) until the area has been thoroughly examined.

Cultural Weed Treatment: These are treatments which involve human behavior, such as using quarantine, closure, or relocation of a particular activity to reduce weed spread, selective timing and choice of stock for grazing, containing livestock after they have grazed in a weed infested area, revegetation seed mix choices for rehabilitating new soil disturbances, land use choices, and public outreach methods.

Cumulative Impact: The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what

agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Decommissioned Road: Route is closed and rehabilitated to eliminate resource impacts (for example, to eliminate erosion or to restore a riparian area if route is located within a riparian area) and is no longer useable for public or administrative uses.

Deep Soils: Soils that are 40 to 60 inches deep to bedrock.

Denning Habitat: Habitat used during parturition and rearing of young until they are mobile. The common component appears to be large amounts of coarse woody debris, either down logs or root wads. Coarse woody debris provides escape and thermal cover for kittens. Denning habitat may be found either in older mature forest of conifer or mixed conifer/deciduous types, or in regenerating stands (over 20 years since disturbance). Denning habitat must be located within daily travel distance of foraging habitat (typical maximum daily distance for females is 3-6 miles).

Designated Roads and Trails: Specific roads and trails where some type of motorized vehicle use is allowed either seasonally or yearlong.

Design Features: Methods or procedures that reduce or lessen the impacts of an action. Part of the suite of mitigation measures and conservation actions, which includes Best Management Practices (BMPs), operating procedures, or design features that have been developed to avoid, minimize, rectify, reduce, or compensate for potentially significant adverse environmental impacts associated with surface-disturbing or disruptive activities.

Desired Future Condition: Outcomes representing the long-term vision of BLM with regard to the resources managed on BLM land.

Developed Recreation: Recreation that requires facilities and might result in concentrated use of an area; for example, a campground.

Dispersed Recreation: Recreation activities of an unstructured type that are not confined to specific locations such as recreation sites. Example of these activities may be hunting, fishing, off-road vehicle use, hiking, and sightseeing.

Disturbance: Events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include drought, floods, wind, fires, wildlife grazing, and insects and pathogens. Human-caused disturbances include actions such as timber harvest, fire, livestock grazing, road construction, and the introduction of exotic species.

Diversity: The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Easement: A right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecological Function: The process through which the constituent living and nonliving elements of ecosystems change and interact, including biogeochemical processes and succession.

Economics: The study of allocation of limited resources, goods, and services among competing uses.

Ecosystem: A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Eligibility (for Wild and Scenic Rivers): A river is eligible for inclusion in the National Wild and Scenic River System if it is free flowing and has at least one river-related value that is considered outstandingly remarkable.

Elk Management Unit: Designated by Montana Fish Wildlife and Parks, establishes statewide elk management population objectives and divides Montana's elk habitat into 35 management units, each with its own elk management objectives and elk population targets.

Emergent Vegetation: Aquatic plant species that are rooted in wetlands but extend above the water's surface.

Encroachment: Plant succession in the absence of disturbance, in areas the plant type is not desired. Often associated with vegetative type conversion such as conifer colonization of grass or shrub meadows.

Endangered Species: Any plant or animal species that is in danger of extinction throughout all or a significant portion of its range.

Entry: An application to acquire title to public lands.

Environmental Assessment: A concise public document that analyzes the environmental impacts of a proposed federal action and provides sufficient evidence to determine the level of significance of the impacts.

Environmental Impact Statement: A detailed written statement required by the National Environmental Policy Act when an agency proposes a major federal action significantly affecting the quality of the human environment.

Environmental Justice: Refers to the fair treatment and meaningful involvement of people of all races, cultures and incomes with respect to the development, implementation and enforcement of environmental laws, regulations, programs and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal state, local and tribal programs and policies.

Ephemeral Area: Watershed land area that delivers surface water flow during spring runoff, rain, and snowstorms to intermittent and perennial streams.

Ephemeral Stream: A stream or part of a stream that flows only in direct response to precipitation; it receives little or no water from springs, melting snow, or other sources; its channel is at all times above the water table.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents.

Exchange: A trading of public lands (surface and/or subsurface estates) that usually do not have high public value, for lands in other ownerships that do have value for public use, management, and enjoyment. The exchange may be for the benefit of other federal agencies as well as for BLM.

Exclusion Areas: Areas that are not available for location of rights-of-way under any conditions (BLM Land Use Planning Handbook, Appendix C).

Exploration: The work of investigating a mineral deposit to determine by geological surveys, geophysical surveys, geochemical surveys, boreholes, pits, and underground workings if it is feasible to mine.

Extensive Recreation Management Area (ERMA): An identified area of BLM land managed to provide stewardship of resources and visitor use. Investments are limited to stewardship actions only within ERMAs.

Federal Land Policy and Management Act of 1976: Public Law 94-579, October 21, 1976, often referred to as the BLM's "Organic Act," which provides the majority of the BLM's legislated authority, direction, policy, and basic management guidance.

Federal Land Transaction Facilitation Act (FLTFA): FLTFA monies accrue from disposal of BLM lands by sale and the monies stay within the state where the disposal parcels are located. The BLM is entitled to 60 percent of the fund, while the Forest Service, National Park Service, and Fish and Wildlife Service are each entitled to 10 percent. The remaining 10 percent covers administrative costs. A proposal to use the fund for a specific acquisition must be presented to and agreed upon by all four agencies.

Federal Power Project Reservation: A reservation of public lands for use in a project developed under the jurisdiction of the Federal Power Commission.

Federal Register: A daily publication that reports Presidential and federal agency documents.

Fire Frequency: How often fire burns a given area; often expressed in terms of fire return intervals. For example, a site might burn every 5 to 15 years.

Fire Intensity: The rate of energy released per unit length of the fire front; loosely, how hot the fire is burning.

Fire Management Category: A classification for landscape-level fire and fuels management strategies and options based on consideration of fire history, land status, issues, concerns, hazardous fuels, and other resource objectives. There are four categories which range from Category A where wild and prescribed fire are not desired due to reasons other than ecological; to Category D where fire may be desired and there are no constraints associated with the resource condition, or social, economic, or political considerations.

Fire Management Plan: A strategic plan that defines a program to manage wildland fire (*wildfire* and *prescribed fire*) and documents the fire management program in the approved land use plan; the plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Fire Management Unit: A land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, major fire regime groups, etc. that set it apart from the characteristics of an adjacent FMU. The FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire Management Zone: Administrative unit for wildland fire suppression, for the execution of all logistical, aviation, and support activities within this geographical area.

Fire Preparedness: Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

Fire Regimes: Descriptions of the patterns of fire occurrence, frequency, size, and severity in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually are repeated, and the repetitions can be counted and measured, such as fire return interval.

Fire Regime Condition Class: A classification describing the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk). *See also* Condition Class.

Fire Regime Groups: A classification of fire regimes into groups based on frequency and severity. The national classification includes five groups: **I** - frequent (0 to 35 years), low severity; **II** - frequent (0 to 35 years), stand replacement severity; **III** - 35 to 100+ years, mixed severity; **IV** - 35 to 100+ years, stand replacement severity; and **V** - 200+ years, stand replacement severity.

Fire Severity: The degree to which a site has been altered by fire; a product of fire intensity and residence time. *See also* Burn Severity.

Fishery: Habitat that supports the propagation and maintenance of fish.

Fish key watershed Fish Key Watersheds are those watersheds containing strongholds of aquatic species populations and will be the highest aquatic habitat restoration priority areas.

Flood Plain: The relatively flat area or lowlands adjoining a body of standing or flowing water which has been or might be covered by floodwater.

Fluvial: Pertaining to streams or produced by stream action.

Forage: All browse and herbaceous foods available to grazing animals, which may be grazed or harvested for feeding.

Forb: An herbaceous plant that is not a grass, sedge, or rush.

Forest Health: The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence, or unusual levels of insects and disease, and resilience to disturbance.

Forest Health Treatments: Treatments that restore forest ecosystems or stands to a condition that sustains their complexity, function and/or productivity while providing for human needs, fish and wildlife populations, and will be the highest aquatic habitat restoration priority areas.

Forest Resilience The capacity of a forest to absorb disturbance, retain ecosystem function and return, over time, to its pre-disturbance state.

Forest Land: Land that is now, or has the potential of being, at least 10 percent stocked by forest trees (based on crown closure) or 16.7 percent stocked (based on tree stocking).

Forestry BMPs: Standard operating procedures incorporated into project design for forest management activities such as timber harvest, roads, hazardous materials, stream crossings, post-fire salvage, and restoration. The practice are aimed at the protection of soils and site productivity, water quality, stream crossings and fish passage

Fossil: Mineralized or petrified form from a past geologic age, especially from previously living things.

Fragmentation: The splitting or isolating of patches of similar habitat. Habitat can be fragmented by natural events or development activities.

Free-Flowing River: Existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway.

Fuel Loading: Relative to flammable vegetation and natural debris, the amount of fuel present expressed quantitatively in terms of weight of fuel per unit area (ex: tons per acre).

Fuel Management: The act or practice of controlling flammability of vegetation and reducing resistance to control of wildland fires through mechanical, prescribed fire, chemical, or biological means, in support of land management objectives.

Fuel Treatment: The manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to fire control (e.g., lopping, chipping, crushing, piling and burning).

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Game Species: Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fisherman under state or federal laws, codes, and regulations.

Geographic Information System (GIS): A system of computer hardware, software, data, people and applications that capture, store, edit, analyze and graphically display a potentially wide array of geospatial information.

Goal: A broad statement of a desired outcome. Goals are usually not quantifiable and may not have established time frames for achievement.

Grazing Relinquishment: The voluntary and permanent surrender by an existing permittee or lessee, (with concurrence of any base property lienholder(s)), of their priority (preference) to use a livestock forage allocation on public land as well as their permission to use this forage. Relinquishments do not require the consent or approval of the BLM. The BLM's receipt of a relinquishment is not a decision to close areas to livestock grazing. *See also* Retirement of Grazing Privileges.

Grazing System: The manipulation of livestock grazing to accomplish a desired result.

Groundwater: Water contained in pore spaces of consolidated and unconsolidated surface material.

Guidelines: Actions or management practices that may be used to achieve desired outcomes, sometimes expressed as best management practices. Guidelines may be identified during the land use planning process, but they are not considered a land use plan decision unless the plan specifies that they are mandatory.

Habitat: (a) Species-specific environment or environmental conditions suitable for occupancy by that species. (b) particular land cover type that provides an environment or environmental conditions suitable for occupancy by many species.

Habitat Connectivity: Vegetative cover in sufficient quantity and arrangement to allow for the movement of wildlife.

Habitat Diversity: The variation in types, sizes, and shapes of landscape elements or vegetation types.

Habitat Type Group (HTG) An ecologically based stratification system that defines site potential and historic fire regimes, and enables land managers to predict responses to vegetation management activities (Pfister et al. 1977). Current species composition in a given habitat type group depends upon where an area is in terms of disturbance, stand development phase, succession and a number of additional factors. Forested lands within the analysis area were stratified into habitat type groups.

Hazardous Fuel: Excessive live or dead wildland fuel accumulations that increase the potential for uncharacteristically intense wildland fire and decrease the capability to protect life, property, and natural resources.

Healthy Forest Initiative of 2002: Presidential direction to the Departments of Agriculture and the Interior to improve regulatory processes and management efficiency in reducing the threat of destructive wildfires while upholding environmental standards and encouraging early public input during review and planning processes. The initiative is based on sound science and helps care for forests and rangelands, reduce the risk of catastrophic fire to communities, help save the lives of firefighters and citizens, and protect threatened and endangered species.

Heavy Metal: Any of the metals that react readily with dithizone, including zinc, copper, cobalt, lead, bismuth, gold, cadmium, iron, manganese, nickel, tantalum, tellurium, platinum, and silver.

Herbaceous: Pertaining to or characteristic of an herb (fleshy-stem plant) as distinguished from the woody tissue of shrubs and trees.

Historic: Period wherein nonnative cultural activities took place, based primarily upon European roots, having no origin in the traditional Native American culture(s).

Historic property or Historic Resource: “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term ‘eligible for inclusion in the National Register’ includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria.” (quoted from 36 CFR 900.2(e)).

Home Range: The area in which an animal travels in the scope of natural activities.

Hydrologic Condition: The current state of the processes controlling the yield, timing, and quality of water in a watershed. Each physical and biologic process that regulates or influences stream flow and groundwater character has a range of variability associated with the rate or magnitude of energy and mass exchange. At any point in time, each of these processes can be defined by their current rate or magnitude relative to the range of variability associated with each process. Integration of all processes at one time represents hydrologic condition.

Hydrologic Unit Code (HUC): A coding system developed by the U.S. Geological Survey to map geographic boundaries of watersheds by size.

Impact Analysis for Planning (IMPLAN): The IMPLAN Model is the most flexible, detailed and widely used input-output impact model system in the U.S. It provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region, or state, and used to assess "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This can be used to assess the economic impacts of resource management decisions, facilities, industries, or changes in their level of activity in a given area.

Implementation Decisions: Decisions that take action to implement land use plan decisions. They are generally appealable to Interior Board of Land Appeals.

Implementation Plan: A site-specific plan written to implement decisions made in a land use plan. An implementation plan usually selects and applies best management practices to meet land use plan objectives. Implementation plans include both activity plans and project plans.

Indian Tribe: Any Indian group in the conterminous United States that the Secretary of the Interior recognizes as possessing tribal status.

Initial Fire (Attack): An aggressive fire suppression action consistent with firefighter and public safety and values to be protected.

Integrated Weed Management: This is a decision support system involving deliberate selection, integration, and implementation of effective weed management tactics. It utilizes cost/benefit analysis and takes into consideration public interests and social, economic, and ecological impacts in the decision-making process.

Interdisciplinary Team: A group of individuals with different training, representing the physical sciences, social sciences, and environmental design arts, assembled to solve a problem or perform a task. The members of the team proceed to a solution with frequent interaction so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions. The number and disciplines of the members preparing the plan vary with circumstances. A member may represent one or more discipline or Bureau program interest.

Interim Management Policy: Policy that guides management of the BLM's Wilderness Study Areas. The policy balances the various uses of Wilderness Study Areas with the requirement to protect the lands wilderness values.

Interior Board of Land Appeals: The Department of the Interior, Office of Hearings and Appeals board that acts for the Secretary of the Interior in responding to appeals of decisions on the use and disposition of public lands and resources. Because the Interior Board of Land Appeals acts for and on behalf of the Secretary of the Interior, its decisions usually represent the Department's final decision but are subject to the courts.

Intermittent Stream: A stream that flows only when it receives water from rainfall runoff or springs, or from some surface source such as melting snow.

Invasive Plants: Plants that are invasive species.

Invasive Species: Organisms that have been introduced into an environment where they did not evolve. Executive Order 13112 focuses on organisms whose presence is likely to cause economic harm, environmental harm, or harms human health.

Inversion: The state of the atmosphere in which a layer of cool air is trapped near the Earth's surface by an overlying layer of warm air so that the lower layer cannot rise. Serious air pollution problems may result from air pollutants being emitted into the limited mixing depth below the inversion.

Land and Water Conservation Fund (LWCF): Most LWCF monies comes from Outer Continental Shelf oil and gas leasing, and are used for the purchase of land, waters and wetlands with an emphasis on special management areas. Congress allocates the money based on competing proposals submitted by various BLM offices.

Land Classification: A process for determining the suitability of public lands for certain types of disposal or lease under the public land laws or for retention under multiple use management.

Land Use Allocation: The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions.

Land Use Plan: A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land-use-plan-level decisions developed through the planning process, regardless of the scale at which the decisions were developed.

Leasable Minerals: Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium, and sodium minerals, and oil, gas, and geothermal.

Lessee (Grazing): Holder of a valid lease that authorizes grazing use of the public lands outside the grazing district.

Lentic: Standing water.

Lentic Riparian: Standing water habitat such as lakes, ponds, seeps, bogs and meadows.

Lentic Riparian-Wetland Resources: Resources whose capabilities and potentials are defined by the interaction of three physical components: 1) vegetation, 2) landform/soils, and 3) hydrology.

Limited Areas or Trails: Designated areas or trails where the use of off-road vehicles is subject to restrictions, such as limiting the number or types of vehicles allowed, dates and times of use (seasonal restrictions), limiting use to existing roads, primitive roads and trails, or limiting use to designated roads and trails. Under the designated roads and trails designation, use would be allowed only on roads and trails that are signed for use. Combinations of restrictions are possible, such as limiting use to certain types of vehicles during certain times of the year.

Livestock grazing standards and guidelines: Practices applied to the terms and conditions of grazing leases to avoid or lessen grazing impacts to streams, soils, water quality, riparian function, and aquatic habitat.

Locatable Minerals: Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Lode Mining: Mining of a mineral deposit in solid rock.

Long-term: Effects lasting more than 10 years.

Lotic: Moving water.

Lotic Riparian: Running water habitat such as rivers, streams and springs.

Lotic Riparian-Wetland Resources: Resources whose capabilities and potentials are defined by the interaction of three physical components: 1) vegetation, 2) landform/soils, and 3) hydrology.

Lynx Habitat: Lynx occur in mesic coniferous forest that have cold, snowy winters and provide a prey base of snowshoe hare. In the Rocky Mountains primary vegetation that contributes to lynx habitat is lodgepole pine, subalpine fir, and Englemann spruce. Secondary vegetation that, when interspersed within subalpine forests, may also contribute to lynx habitat, includes cool, moist Douglas-fir, grand fir, western larch, and aspen forest. Dry forest types (ponderosa pine, climax lodgepole pine) do not provide lynx habitat. Primary elevations for lynx habitat are between 1500-2000 m. (4,920 – 6,560 ft.) elevation zones in the northern Rockies.

Mechanized Travel: Moving by means of mechanical devices such as a bicycle; not powered by a motor (source: Washington Office Instruction Memorandum No. 2010-056 and Draft Travel and Transportation Management Manual to replace Manual 8342, Release 8-20).

Mine: An opening or excavation in the earth for extracting minerals.

Mineral: Any solid or fluid inorganic substance that can be extracted from the earth for profit.

Mineral Entry: The filing of a claim on public land to obtain the right to any minerals it may contain.

Mineral Estate: The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mineral Materials: Materials such as common varieties of sand, stone, gravel, pumice, pumicite, and clay, that are not obtainable under the mining or leasing laws but that can be acquired under the Mineral Materials Act of 1947, as amended.

Mineral Withdrawal: A formal order that withholds federal lands and minerals from entry under the Mining Law of 1872 and closes the area to mineral location (staking mining claims) and development.

Mining Claim: A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A single mining claim may contain as many adjoining locations as the locator may make or buy. The four categories of mining claims are: lode, placer, millsite, and tunnel site.

Monitoring Plan: The process of tracking the implementation of land use plan decisions and collecting and assessing data/information necessary to evaluate the effectiveness of land use planning decisions.

Motorized Travel: Moving by means of vehicles that are propelled by motors, such as cars, trucks, off-highway vehicles (OHV), motorcycles, snowmobiles, and boats (source: Washington Office Instruction Memorandum No. 2010- 056 and Draft Travel and Transportation Management Manual to replace Manual 8342, Release 8-20).

Motorized Vehicles: Synonymous with off-highway vehicle (OHV). Examples of this type of vehicle include all- terrain vehicle (ATV), utility type vehicle (UTV), sport utility vehicle (SUV), motorcycle, and snowmobile. (source: BLM Travel and Transportation Management Handbook 8342-1.).

- **All-Terrain Vehicle (ATV):** A wheeled vehicle other than a snowmobile, which is defined as having a wheelbase and chassis of fifty (50) inches in width or less, steered with handlebars, generally having a dry weight of 800 pounds or less, travels on three or more low-pressure tires, and with a seat designed to be straddled by the operator.
- **Motorcycle:** Motorized vehicles with two tires and with a seat designed to be straddled by the operator.

- **Off-Highway Vehicle (OHV):** OHV is synonymous with Off-Road Vehicles (ORV). ORV is defined in 43 CFR 8340.0-5 (a): Off-road vehicle means any motorized vehicle capable or, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: 1) Any non-amphibious registered motorboat; 2) Any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; 3) Any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; 4) Vehicles in official use; and 5) Any combat or combat support vehicle when used in times of national defense emergencies. OHVs generally include dirt motorcycles, dune buggies, jeeps, 4-wheel drive vehicles, SUVs, over-the-snow vehicles, UTVs and ATVs.
- **Over-the-Snow Vehicle:** An over-snow vehicle is defined as a motor vehicle that is designed for use over snow that runs on a track or tracks and/or a ski or skis, while in use over snow. An over-snow vehicle does not include machinery used strictly for the grooming of non-motorized trails.
- **Sport Utility Vehicle (SUV):** A street legal, high clearance vehicle used primarily on-highway but designed to be capable of off-highway travel.
- **Utility Type (or Terrain) Vehicle (UTV):** Any recreational motor vehicle other than an ATV, motorbike or snowmobile designed for and capable of travel over designated unpaved roads, traveling on 4 or more low-pressure tires, maximum width less than 74 inches, usually a maximum weight less than 2,000 pounds, or having a wheelbase of 94 inches or less. Utility type vehicle does not include vehicles specially designed to carry a person with disabilities.

MTFWP: Montana Department of Fish, Wildlife, and Parks

Multiple Use: Under the Federal Land Policy and Management Act of 1976, the term “multiple use” means the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.” (43 U.S.C. 1702, Sec. 103(c))

Multiple-indicator monitoring: Uses streambank alterations, woody browse, and stubble heights for analyzing impacts to riparian habitat.

National Ambient Air Quality Standards (NAAQS): The allowable concentrations of air pollutants in the ambient (public outdoor) air. National ambient air quality standards are based on the air quality criteria and divided into primary standards (allowing an adequate margin of safety to protect the public health) and secondary standards (allowing an adequate margin of safety to protect the public welfare). Welfare is defined as including (but not limited to) effects on soils, water, crops, vegetation, human-made materials, animals, wildlife, weather, visibility, climate, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.

National Environment Policy Act (NEPA) of 1969: An Act that encourages productive and enjoyable harmony between man and his environment and promotes efforts to prevent or eliminate damage to the

environment and biosphere and stimulate the health and welfare of man; enriches the understanding or the ecological systems and natural resources important to the Nation, and establishes the Council on Environmental Quality.

National Register of Historical Places: A register of districts, sites, buildings, structures, and objects, significant in American history, architecture, archaeology and culture, established by the “Historic Preservation Act” of 1966 and maintained by the Secretary of the Interior.

National Wild and Scenic Rivers System: A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in a free-flowing condition. The system consists of three types of streams: (1) recreation—rivers or sections of rivers that are readily accessible by road or railroad and that may have some development along their shorelines and may have undergone some impoundments or diversion in the past, (2) scenic—rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped but accessible in places by roads, and (3) wild— rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted.

Natural range of variability (NRV): A spectrum of ecological vegetative states and the spatial and temporal variation in these states. Modeling was used to develop a quantified estimate of the NRV for this RMP and knowledge of historical conditions helped corroborate the model results.

Noxious Weeds: A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States.

Nutrient Cycling: The circulation of chemical elements such as nitrogen, oxygen, carbon, and phosphorus in specific pathways from the abiotic (not involving or produced by organisms) portions of the environment into organic substances in plants and animals and then back into abiotic forms.

Objective: A description of a desired condition for a resource. Objectives can be quantified and measured and, where possible, have established time frames for achievement.

Obligate: Essential, necessary, unable to exist in any other state, mode, or relationship.

Off-Highway Vehicle (OHV): Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) Any non-amphibious registered motorboat; (2) Any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) Any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) Vehicles in official use; and (5) Any combat or combat support vehicle when used in times of national defense emergencies. OHVs generally include dirt motorcycles, dune buggies, jeeps, four-wheel drive vehicles, snowmobiles, and ATVs.

Operator: Any person who has taken formal responsibility for the operations conducted on the leased lands.

Open: Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs.

Outstandingly Remarkable (River) Values: Values among those listed in Section 1(b) of the Wild and Scenic Rivers Act are “scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values. . . .” Other similar values that may be considered include botanical, hydrological,

paleontological, or scientific. Professional judgment is used to determine whether values exist to an outstandingly remarkable degree.

Over-Snow Vehicle: An over-snow vehicle is defined as a motor vehicle that is designed for use over snow that runs on a track or tracks and/or a ski or skis, while in use over snow. An over-snow vehicle does not include machinery used strictly for the grooming of non-motorized trails.

Overstory: The layer of foliage in a forest canopy, often the uppermost layer(s) consisting of the crowns of trees or shrubs.

Paleontological Resources (Fossils): The physical remains of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for understanding past environments, environmental change, and the evolution of life.

Paleontology: A science dealing with the life forms of past geological periods as known from fossil remains.

Patent: The instrument by which the federal government conveys title to the public lands.

Perennial Stream: A stream that normally has water in its channel at all times.

Permit: For grazing authorizations issued under 43 CFR 4100, permits are normally issued for 10 years.

Permitted Use: The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease. Expressed in AUMs.

Perpetual Exclusive Easement: A perpetual exclusive easement acquired by the United States to use land of another owner for a particular purpose. An exclusive road easement grants control to the United States and may allow it to authorize third party use and set road use rules. When obtaining a road easement, the BLM's preferred option is to gain an exclusive easement to obtain the right for the general public to use and access the road.

Petroglyph: A figure, design, or indentation carved, abraded, or pecked into a rock.

Physical Weed Treatment: Treatments that use manual labor, mechanical equipment, or fire, such as hand pulling, mowing or tilling, and prescribed burning.

Pictograph: A figure or design painted on a rock.

Placer: An alluvial deposit of sand and gravel containing valuable minerals, such as gold.

Placer Mining: A method of mining in which the overburden is removed to expose gold-bearing gravel deposits beneath. The gravel is then sluiced to separate the gold. The Placer Mining BMPS are for placer mining operations (including reclamation, hazardous materials, weed control, roads, diversions, crossings) for the protection of water quality.

Probable Sale Quantity (PSQ): The allowable forest harvest level that can be maintained without decline over the long term, if the schedule of harvests and regeneration are followed. PSQ is an estimate of potential production rather than a specific level of forest product volume that would be offered every decade.

Planning Criteria: The standards, rules, and other factors developed by managers and interdisciplinary teams for their use in forming judgments about decision making, analysis, and data collection during planning. Planning criteria streamline and simplify the resource management planning actions.

Planning Decision (Land Use Plan Decision): Establishes desired outcomes and actions needed to achieve them. Decisions are reached using the BLM planning process. When they are presented to the public as proposed decisions, they can be protested to the BLM Director. They are not appealable to Interior Board of Land Appeals.

Population: Within a species, a distinct group of individuals that tend to mate only with members of the group. Because of generations of inbreeding, members of a population tend to have similar genetic characteristics.

Potential Natural Community (PNC): The biotic community that would become established if all successional sequences were completed without human interference, under the present environmental conditions (Winward 2000).

Power Site Classification: A classification made by the Federal Power Commission that is a segregation against the operation of the public land laws for lands that are needed or have potential for power projects and associated transmission lines. Lands classified to benefit transmission lines are open to the operation of the public land laws subject to their use for transmission lines.

Power Site Reserve: A reservation of public lands that have potential value for power development.

Precious Metals: A general term for gold, silver, or any of the minerals of the platinum group.

Precommercial Thinning: A thinning that does not yield trees of commercial value, usually designed to reduce stocking in order to concentrate growth on the more desirable trees or to meet desired vegetation and/or fuel loading conditions.

Prehistoric: Refers to the period wherein Native American cultural activities took place, and were not yet influenced by contact with historic nonnative culture(s).

Prescribed Fire: The planned ignition of fire in a planned area; implementation must occur under specified conditions to meet specific management objectives.

Prescribed Fire Burn Plan: A plan required for each fire application ignited by management. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription).

Prescription Livestock Grazing (Grazing): Grazing use authorized on land designated or not designated for livestock grazing designed to accomplish a specific purpose. For example, authorizing sheep and goats to graze a piece of land as a biological control agent to treat noxious weeds. Prescription grazing would normally be authorized on a temporary nonrenewable basis.

Primitive and Unconfined Recreation: Non-motorized, non-mechanized and undeveloped types of recreational activities.

Priority Habitats: Priority habitats would include habitat for all special status species as well as riparian areas, dry savannah forest, special habitats including caves, cliffs, snags, and down woody material, sagebrush, bitterbrush communities and mountain mahogany communities.

Priority Species: Priority species are those wildlife, fish or plant species that the BLM has determined to be unique or significant based on at least one of the following factors: density, diversity, population size, public interest, remnant character, or age.

Probable Sale Quantity (PSQ): A best assessment of the annual or decadal average amount of timber likely to be available for sale in a planning area.

Project Plan: A type of implementation plan. A project plan typically addresses individual projects or several related projects. Examples of project plans include prescribed burn plans, trail plans, and recreation site plans.

Project Area (Vegetation): An area of land within some type of management activity would occur and encompasses a region defined by logical boundaries such as: watersheds, ridges, highways, or ownership blocks of BLM lands. The project area can be both the analysis area and a starting point to determine where treatments or activities should occur, and includes the area needed for supporting structures and activities such as roads, transmission lines, or pipelines.

Proper Functioning Condition (PFC): Ecosystems are in PFC when they function within their historic range of variability. Proper functioning condition (PFC): adequate vegetation, landform, or woody material is present to dissipate high streamflow energy, capture sediment, aid floodplain development, improve floodwater retention and groundwater recharge, develop root masses that stabilize streambanks, and maintain channel characteristics. Riparian areas that have limited functioning condition and have hydrologic, vegetative, or geomorphic attributes that make them susceptible to impairment are considered **functioning-at-risk (FAR)**. Riparian areas that do not have adequate vegetation, landform, or woody material present are considered **nonfunctional (NF)**.

Protest: Application for review by a higher administrative level.

Public Lands: Under the Federal Land Policy and Management Act of 1976, the term “public lands” means any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management, without regard to how the United States acquired ownership” (43 U.S.C.1702, Sec. 103(e)).

Public Land Laws: A body of laws that regulates the administration of the public lands and the resources thereon.

Public Land Order: Creating, continuing, modifying, or revoking a withdrawal or reservation that has been issued by the Secretary of the Interior pursuant to his delegations of authority.

Quarry: An open or surface working, usually for the extraction of stone, slate, limestone, etc.

Rangeland: Land used for grazing by livestock and big game animals on which vegetation is dominated by grasses, grass-like plants, forbs, or shrubs.

Raptor: Bird of prey with sharp talons and strongly curved beaks such as hawks, owls, vultures, and eagles.

Reach: A segment of stream.

Reclamation: Reclamation is the reconstruction of topographic, soil, and plant conditions after disturbance, which may not be identical to the predisturbance site, but which permits the degraded land mass to function adequately in the ecosystem of which it was and is a part (Munshower 1994).

Reclamation Project: A water development and irrigation project of the Bureau of Reclamation.

Reclamation Withdrawals:

- First Form: A reclamation withdrawal of public lands that are or may be needed for the building and maintaining a reclamation project.
- Second Form: A reclamation withdrawal of public lands susceptible to irrigation from a reclamation project.
- The distinction between the first and second forms of withdrawals has been eliminated, and all such withdrawals are called reclamation withdrawals

Record of Decision: A document signed by a responsible official recording a decision that was preceded by the preparing of an environmental impact statement.

Recreation and Public Purposes (R&PP) Act: Authorizes the sale or lease of BLM lands for recreational or public purposes to State and local governments and to qualified nonprofit organizations. Examples of typical uses under the act are historic monument sites, campgrounds, schools, fire houses, law enforcement facilities, municipal facilities, landfills, hospitals, parks, and fairgrounds. Department of the Interior regulations for the Recreation and Public Purposes Act are found in Title 43 of the Code of Federal Regulations (43 CFR), Parts 2740 (Sales) and 2912 (Leases).

Relinquished Allotment (Grazing): An allotment where an existing permittee or lessee gives up his or her permit or lease causing the allotment to become unleased.

Reservation: A “setting aside” or dedication of lands for the federal government for a specific public purpose. “Reserved” land is not necessarily withdrawn. A permanent withdrawal dedicated to a specific public purpose.

Resource Advisory Council (RAC): A council established by the Secretary of the Interior to provide advice or recommendations to BLM management.

Resource Management Plan (RMP): A land use plan as prescribed by the Federal Land Policy and Management Act which establishes, for a given area of land, land-use allocations, coordination guidelines for multiple-use, objectives and actions to be achieved.

Retirement of Grazing Privileges: Ending livestock grazing on a specific area of land. *See also* Grazing Relinquishment.

Right-of-Way: A permit or an easement which authorizes the use of public lands for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, etc.; also, the lands covered by such an easement or permit.

Right-of-way Corridor: A parcel of land that has been identified by law, Secretarial order, through a land use plan or by other management decision as being the preferred location for existing and future right-of-way grants and suitable to accommodate one type of right-of-way or one or more rights-of-way which are similar, identical or compatible.

Riparian Area: A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. They include those portions of

terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines. (National Academy of Sciences 2002).

Riparian habitat conservations area (RHCA): the area around a waterbody, wetland, or landslide-prone area where riparian-dependent resources (primarily aquatic habitat and species) receive management emphasis and for which Riparian Management Objectives are developed.

Riparian management objective (RMO): developed for specific areas for shade (temperature), pools (channel function), barriers, and sediment (erosion and channel function) for protecting aquatic habitat and species.

River Designation: The process whereby rivers are added to the National Wild and Scenic Rivers System by an act of Congress or by administrative action of the Secretary of the Interior with regard to state-designated rivers under Section 2(a)(ii) of the Wild and Scenic Rivers Act.

Road: A linear route more than 50 inches wide declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use; unless identified and managed as a trail.

- **Decommissioned Road:** The stabilization and restoration of an unneeded road to a more natural state.
- **Impassable Road:** A road that has been treated in such a manner that the road is blocked and there is little resource risk if road maintenance is not performed on a regular basis (self-maintaining). Roads may become impassable as a result of a variety of means, including but not limited to one or more of the following: natural vegetation growth, road entrance obliteration, scarified ground, fallen trees, boulders, culvert or bridge removal, etc. Impassable roads may remain on the inventoried road system if use of the road is anticipated at some point in the future;
- **Temporary Road:** A transportation linear feature authorized or acquired for the development, construction, or staging of a project or event that has a finite lifespan. A temporary route is not intended to be part of the permanent transportation system, but may be part of the travel network. Temporary routes must be reclaimed by the project proponent (or their representative) when its intended purpose(s) has been fulfilled, unless through a separate review and decision making process the BLM incorporates and appropriately designates the route as part of its transportation system. Unless a temporary route is specifically intended to accommodate public use, it should not be made available for that use
- **Open Road:** Open year-round to public
- **Open Road with Restriction:** Open to the public with seasonal and/or vehicle type limitations.
- **Road Density:** Number of miles of open road per square mile.
- **Open Motorized Road Density:** Roads and motorized trails that are open to wheeled motor vehicle use by the public for any part of the non-denning season
- **Open Motorized Road Density in NDCE Zone 1:** The baseline for open road density on BLM lands in NCDE Zone 1 is 1.70 mi/mi² defined as conditions on existing BLM-administered public lands as of 12/31/2011, as modified by changes in numbers that were evaluated and found to be acceptable through the Endangered Species Act Section 7 consultation with the USFWS while the grizzly bear was listed as threatened. This does not include future land acquisitions.

Runoff: The water that flows on the land surface from an area in response to rainfall or snowmelt.

Salable Minerals: Common variety minerals on the public lands, such as sand and gravel, which are used mainly for construction and are disposed of by sales or special permits to local governments.

Scenic Quality: The degree of harmony, contrast and variety within a landscape.

Scenic River: A river or section of a river that is free of impoundments, and whose shorelines are largely undeveloped but accessible by roads in places.

Seasonal Restriction: A fluid minerals leasing constraint that prohibits surface use during specified time periods to protect identified resource values. The constraint does not apply to the operation and maintenance of production facilities unless analysis demonstrates that such constraints are needed and that less stringent, project-specific constraints would be insufficient.

Section 7 Consultations: The requirement of Section 7 of the Endangered Species Act that all federal agencies consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service if a proposed action might affect a federally listed species or its critical habitat.

Section 106 Compliance: The requirement of Section 106 of the National Historic Preservation Act that any project funded, licensed, permitted, or assisted by the federal government be reviewed for impacts to significant historic properties and that the State Historic Preservation Officer and the Advisory Council on Historic Preservation be allowed to comment on a project.

Security Habitat: Refers to the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with hunting or other human activities.

Sediment: Soil, rock particles, and organic or other debris carried from one place to another by wind, water or gravity.

Sedimentation: The process or action of depositing sediment.

Segregation: Any action, such as a withdrawal or allowed application (exchange) that suspends the operation of the general public land laws; removing lands from the operation of part or all the public land mineral laws.

Sensitive Species: Species designated by the State Director, usually in cooperation with the State agency responsible for managing the species and State Natural heritage programs, as sensitive. They are those species that: (1) could become endangered in or extirpated from a State, or within a significant portion of its distribution; (2) are under status review by the USFWS; (3) are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution; (4) are undergoing significant current or predicted downward trends in population or density such that federal listed, proposed, candidate, or State listed status may become necessary; (5) typically have small and widely dispersed populations; (6) inhabit ecological refugia or other specialized or unique habitats; or (7) are state-listed but which may be better conserved through application of BLM sensitive species status.

Seral: A temporal and intermediate condition pertaining to the successional stages of biotic communities.

Shrub: A low, woody plant, usually with several stems, that may provide food and/or cover for animals.

Significant Paleontological Resource (syn. Significant Fossil Resource): Any paleontological resource considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered scientifically

important because it is a rare or previously unknown species, of high quality and well-preserved, preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on Earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or are overly redundant or otherwise not useful for research.

Silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests to meet desired outcomes.

Slash: Forest residues such as branches, bark, tops, cull logs, broken or uprooted trees, and/or stumps that can be left on the ground or in piles after logging, vegetative or fuels treatments, or land use activities such as road construction.

Slope: The degree of deviation of a surface from the horizontal.

Soil Compaction: A layer of dense soil caused by repeated impacts on or disturbances of the soil surface. Compaction becomes a problem when it begins to limit plant growth, water infiltration, or nutrient cycling processes.

Soil Productivity: The capacity of a soil to produce a plant or sequence of plants under a system of management.

Solitude: (1) the state of being alone or remote from others; isolation; (2) a lonely or secluded place.

Source Water Protection Plan: A management plan, usually developed by local communities, that addresses public water system concerns based on information contained within Source Water Delineation and Assessment Reports.

Special Recreation Management Area (SRMA): An identified area of BLM land managed to provide entire recreation products (i.e., services, settings, and activity and outcome opportunities) in response to identifiable significant customer desires. Investments in facilities and/or visitor assistance are authorized within SRMAs.

Special Status Species: Includes proposed species, listed species, and candidate species under the Endangered Species Act; state-listed species; and BLM State Director-designated sensitive species.

Species: A unit of classification of plants and animals consisting of the largest and most inclusive array of sexually reproducing and cross-fertilizing individuals that share a common gene pool.

Species Diversity: The number, different kinds of, and relative abundances of species present in a given area.

Split Estate: Split estate is a land status term that applies when the surface is patented or deeded into non-federal ownership, while the federal government retains the mineral rights. Reverse split estate applies when the federal government transferred both the surface and mineral estate into non-federal ownership, but the surface estate was subsequently returned while the minerals, or a portion of them, were retained by the private landowner.

Stand: A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from adjacent communities.

Stand Composition: The proportion of each tree species in a stand expressed as a percentage of all trees, basal area or volume.

Streamside management zone (SMZ): the area along each side of a stream, lake, or other waterbody where certain forest practices applied under a timber sale are prohibited or limited for protecting water quality.

Steep Slopes: Slopes with a gradient between 20 and 60 percent (USDA-SCS 1993).

Stipulations: Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all federal leases. Other stipulations may be applied to the lease at the discretion of the surface management agency to protect valuable surface resources and uses.

Stream Reach: A specified length of a stream or channel.

Structure (Stream Channel): Any object, usually large, in a stream channel that controls water movement.

Structure (of Forest Vegetation): The horizontal and vertical distribution of plants in a stand, including height, diameter, crown layers, and stems of trees, shrubs, herbaceous understory, snags and coarse woody debris.

Succession: The replacement in time of one plant community with another. The prior plant community (or successional stage) creates conditions that area favorable for the establishment of the next stage.

Suitability (for Wild and Scenic Rivers): Evaluation of eligible rivers for inclusion into the national Wild and Scenic River System by Determining the best use of the river corridor and the best method to protect the outstandingly remarkable values within the river corridor.

Surface-Disturbing or Disruptive Activities: For the purposes of applying project design features, BMPs or other features to reduce or minimize effects, surface-disturbing and disruptive activities are defined below.

Surface-Disturbing Activities: The physical disturbance or removal of land surface and vegetation. Some examples of surface-disturbing activities include, but are not limited to, construction of roads, well pads, pipelines, powerlines, pits/reservoirs, facilities, recreation sites, and mining. Vegetation renovation treatments that involve soil penetration and/or substantial mechanical damage to plants (plowing, chiseling, chopping, etc.) are also surface- disturbing activities.

Disruptive Activities: Those resource uses and activities that are likely to alter the behavior of, displace, or cause excessive stress to wildlife populations occurring at a specific location and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of wildlife such that reproductive success is negatively affected, or the physiological ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. Examples of disruptive activities may include noise, vehicle traffic, or other human presence regardless of the activity. The term is used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, birthing, etc.), although it could apply to any resource value. This definition is not intended to prohibit all activities or authorized uses. For example, emergency activities (e.g., fire suppression, search and rescue), rangeland monitoring, routine maintenance associated with an approved authorization, dispersed recreational activities (e.g., hunting, hiking) and livestock grazing are not considered surface-disturbing or disruptive activities.

Sustainability: The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Sustained Yield: Maintenance of an annual or regular periodic output of a renewable resource from public land consistent with the principles of multiple use.

Terms and Conditions: Measures contained in livestock grazing permits and leases that are determined by the authorized officer to be appropriate to achieve management and resource condition objectives for the public lands and other lands administered by the BLM, and to ensure conformance with Fundamentals of rangeland health and Standards and guidelines for grazing administration.

Terrestrial Species: Ground-dwelling plants and animals.

Thermal Cover: Vegetation or topography that prevents radiational heat loss, reduces wind chill during cold weather, and intercepts solar radiation during warm weather.

Threatened Species: Any plant or animal species defined under the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range; listings are published in the Federal Register.

Tools: Something that helps to accomplish the stated goal or action for a resource/resource use or program. Tools include timing, duration of grazing, forage utilization, grazing rotation, deferment of grazing, stubble height, bank alteration, and structural features.

Total Maximum Daily Load: An estimate of the total quantity of pollutants (from all sources: point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality criteria.

Trail: Linear routes managed for human-powered, stock, or off-road vehicle forms of transportation, or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Travel Management Areas: Polygons or delineated areas where a rational approach has been taken to classify areas open, closed, or limited, and have identified and/or designated network of roads, trails, ways, and other routes that provide for public access and travel across the planning area. All designed travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or timeframes for allowable access or other limitations.

Treatment Area: The specific area of land where the actual management activity, such as timber harvest, prescribed burning, construction, or other activity would occur. One or more treatment areas can be included in a project area, which usually includes adjacent and/or surrounding areas that are not treated, and multiple activities could occur within a single treatment area, concurrently or over time.

Unauthorized Occupancy: Activities that result in full or part-time human occupancy or use. An example would be the construction, placement, occupancy, or assertion of ownership of a facility or structure (cabin, house, natural shelter, trailer, etc.) on BLM land.

Unauthorized Use: Activities that do not appreciably alter the physical character of BLM land or vegetative resources. Some examples of unauthorized use include the abandonment of property or trash, enclosures, and use of existing roads, primitive roads and trails for purposes that require a use fee or right-of-way.

Understory: Vegetation (e.g., trees or shrubs) growing under the canopy formed by taller trees.

Ungulates: Hoofed animals, including ruminants but also horses, tapirs, elephants, rhinoceroses, and swine.

Unleased Allotments (Grazing): Areas of land designated and managed for livestock grazing that are currently not leased or permitted by a qualified applicant.

Unreserved Public Lands: Public lands not covered by a reservation or a withdrawal except by the federal orders of withdrawal.

Uplands: Lands at higher elevations than alluvial plains or low stream terraces; all lands outside the riparian-wetland and aquatic zones.

Use Authorization: Approval of a proposed use for land or resources on the prescribed form or document designated for such use; a document showing permission to use land or the resources thereon; a formalized grant pursuant to a request to use land or resources.

User Day: Any calendar day, or portion thereof, for each individual accompanied or serviced by an operator or permittee on the public lands or related waters; synonymous with passenger day or participant day.

Utility Type (or Terrain) Vehicle (UTV): Any recreational motor vehicle other than an all-terrain vehicle, motorbike, or snowmobile designed for and capable of travel over unpaved roads, traveling on four or more low-pressure tires, maximum width is less than 74 inches, usually a maximum weight less than 2,000 pounds, or having a wheelbase of 94 inches or less. Utility type vehicles do not include vehicles specially designed to carry a person with disabilities.

Utilization (Rangeland): The proportion of the current year's forage production that is consumed or destroyed by grazing animals. Utilization is usually expressed as a percentage.

Vacant Available Lands (Grazing): Areas of land designated for livestock grazing that are not segregated into allotments. These lands may be formed into allotments if a qualified applicant applies for a lease or permit.

Vacant Public Lands: Public lands that are unappropriated and unreserved and not within a withdrawal; lands that are not reserved except by the general orders of withdrawal.

Valid Existing Rights: Locatable mineral development rights that existed when the Federal Land Policy and Management Act was enacted on October 21, 1976. Some areas are segregated from entry and location under the Mining Law to protect certain values or allow certain uses. Mining claims that existed as of the effective date of the segregation may still be valid if they can meet the test of discovery of a valuable mineral required under the Mining Law. Determining the validity of mining claims located in segregated lands requires BLM to conduct a validity examination and is called a "valid existing rights" determination.

Vegetation Community: An assemblage of plant populations in a common spatial arrangement.

Vegetation Manipulation: Alteration of vegetation by using fire, plowing, cutting, powered mechanical, or other means.

Vegetation Type: A plant community with distinguishable characteristics described by the dominant vegetation present.

Viable: Capable of sustaining a healthy, productive, and reproducing population over a long period of time.

Visual Resource Management (VRM) Classes: Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective that prescribes the amount of change allowed in the characteristic landscape.

Water Quality: The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

Water Quality Restoration Plans: A comprehensive plan developed in conjunction with Montana Department of Environmental Quality, local watershed groups, and numerous agencies and entities to address and establish water quality goals, Total Maximum Daily Loads, restoration strategies, and monitoring.

Water Table: The surface in a groundwater body where the water pressure is atmospheric. It is the level at which water stands in a well that penetrates the water body just far enough to hold standing water.

Watershed: A geomorphic area of land and water within the confines of a drainage divide. The total area above a given point on a stream that contributes flow at that point.

Watershed Approach: A framework to guide watershed management that: (1) uses watershed assessments to determine existing and reference conditions; (2) incorporates assessment results into resource management planning; and (3) fosters collaboration with all landowners in the watershed. The framework considers both ground and surface water flow within a hydrologically defined geographical area.

Watershed Assessment: An analysis and interpretation of the physical and landscape characteristics of a watershed using scientific principles to describe watershed conditions as they affect water quality and aquatic resources.

Weed Management Area: These are distinguishable zones based on similar geography, weed problems, climate, or human-use patterns with agreements between landowners to cooperatively manage noxious weeds.

Wetland Vegetation: The outer extent of the obligate and facultative wetland species that grows on land that is inundated or saturated by surface water or groundwater.

Wetlands: Areas that are inundated or saturated by surface or ground water often and long enough to support and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, shallows, swamps, bogs, muskegs, wet meadows, estuaries and riparian areas. (USDI 2015) Similarly, Executive Order 11990, Sec 7(c) (U.S. Congress, 1977a) defines wetlands as areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Certain riparian areas and wetlands may be classified as jurisdictional wetlands under Section 404 of the Clean Water Act (U.S. Congress 1972). These fall under regulatory purview of the Environmental Protection Agency and certain activities are subject to permitting through the U.S. Army Corps of Engineers. Jurisdictional wetlands are areas that are inundated or saturated by surface or ground water at a

frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wild River: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Wild, Scenic or Recreational River: The three classes of what is traditionally referred to as a “Wild and Scenic River.” Designated river segments are classified as wild, scenic and/or recreational, but the segments cannot overlap.

Wild and Scenic River Study: Rivers identified in Section 5 of the Wild and Scenic Rivers Act for study as potential additions to the National Wild and Scenic Rivers System. The rivers shall be studied under the provisions of Section 4 of the Wild and Scenic Rivers Act.

Wilderness: A congressionally designated area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Wilderness Characteristics: Key characteristics of a wilderness listed in section 2(c) of the “Wilderness Act” of 1964 and used by BLM in its wilderness inventory. These characteristics include size, naturalness, outstanding opportunities for solitude, outstanding opportunities for primitive and unconfined type of recreation, and special features.

Wilderness Study Area: A designation made through the land use planning process of a roadless area found to have wilderness characteristics as described in Section 2 (c) of the Wilderness Act of 1964.

Wildfire: An unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

Wildland Fire: Any non-structure fire that occurs in the wildland. This term was updated in February 2009 to include two (rather than three) types of wildland fire:

- **Wildfire:** An unplanned, unwanted wildland fire, including unauthorized human-caused fires and escaped prescribed fire projects.
- **Prescribed Fire:** A planned fire; planned ignitions.

Wildland Fire Use: This term became obsolete in February 2009, when new interagency guidance was developed for implementing Federal Wildland Fire Management Policy. The definition was ‘*application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans.*’ There is no new term to replace this, but the concept remains available as a planned management option. Prior to 2009, this term was the third type of **Wildland Fire**.

Wildland-Urban Interface (WUI): The line, area, or zone, where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.

Wildlife Corridor: Landscape elements that connect similar patches of habitat through an area with different characteristics. Wildlife corridors are also segments of land that create a link between critical habitats. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest. These linkage zones are where species migrate and intermingle ensuring genetic interchange and consequently long-term survival.

Winter Range: An area where specific wildlife species (primarily deer, antelope and elk) congregate during winter time periods. These areas are often composed of topographic or vegetative features that enhance survival for these species when conditions such as snow accumulation and temperature place increased energetic demands on individual animals.

Withdrawal: Removal or withholding of public lands by statute or secretarial order, from the operation of some or all of the public land laws.

Woodland: A forest community occupied primarily by noncommercial species such as juniper, mountain mahogany, or quaking aspen groves. All western juniper or limber pine are classified as woodlands, since juniper and limber pine are classified as noncommercial species.

List of References

All references to BLM manuals, handbooks, instruction memorandums and bulletins can be accessed with the following reference.

U.S. Department of Interior, Bureau of Land Management. [No date]. BLM Policy. USDI Bureau of Land Management Headquarters, Washington DC. <https://www.blm.gov/policy>.

Grassland/shrubland/range

Big Sagebrush Steppe – Inter-Mountain Basins Big Sagebrush Steppe. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=5454

Montane Sagebrush Steppe – Inter-Mountain Basins Sagebrush Steppe. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=5455

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service Gen. Tech. Rep. INT-66, Intermountain Forest and Range Exp. Sta., Ogden, Utah. 154 pp.

Rocky Mountain Lower Montane, Foothill, and Valley Grassland – Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=7112

Rocky Mountain Montane-Foothill Deciduous Shrubland – Northern Rocky Mountain Montane-Foothill Deciduous Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=5312

Rocky Mountain Subalpine-Upper Montane Grassland – Northern Rocky Mountain Subalpine-Upper Montane Grassland. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=7113

Rocky Mountain Subalpine Deciduous Shrubland – Northern Rocky Mountain Subalpine Deciduous Shrubland. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=5326

Rocky Mountain Subalpine-Montane Mesic Meadow. Montana Field Guide. Montana Natural Heritage Program Retrieved on February 21, 2018, from http://FieldGuide.mt.gov/display/ES_Detail.aspx?ES=7118

USDA-NRCS. 1997. National Range and Pasture Handbook.

Aquatics

Hastie, L.C., Cosgrove, P.G., Ellis, N., Gaywood, J.G. 2003. The threat of climate change in freshwater pearl mussel populations *Ambio*, Vol. 32: 40-46.

- Lee, O.C., J.R Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. *In* T.M Quigley and S. J. Arbelbide, eds "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume I. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep 18 PNW-GTR-405).
- Maxell, B. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Report to USFS Region 1, University of Montana, Wildlife Biology Program. Missoula, Montana. 161 pp.
- Maxell, B.A. 2005. Amphibian and aquatic reptile inventories conducted on and around lands administered by the Missoula Field Office of the Bureau of Land Management. Report to Missoula Field Office of the Bureau of Land Management. 53 pp.
- Maxell, B.A., P. Hendricks, M.T. Gates, and S. Lenard. 2009. Montana amphibian and reptile status assessment, literature review, and conservation plan. Montana Natural Heritage Program, Helena, MT and Montana Cooperative Wildlife Research Unit and Wildlife Biology Program, University
- Montana Fish Wildlife and Parks (MTFWP). 2007. Memorandum of understanding and conservation agreement for westslope cutthroat trout and Yellowstone cutthroat trout in Montana.
- Muhlfeld C, Kalinowski S, McMahon T. 2009. Hybridization reduces fitness of cutthroat trout in the wild. *Biology Letters*. 5:328–331.
- Reeves, G. H., and S. L. Duncan. 2009. Ecological history vs. social expectations: managing aquatic ecosystems. *Ecology and Society* 14(2): 8. Available online at <http://www.ecologyandsociety.org/vol14/iss2/art8/>
- Rodgers, T.L., Jellison W.L. 1942. A collection of reptiles and amphibians from western Montana. *Copeia*, Vol. 1942, No. 1. pp. 10-13.
- Stagliano, D. 2010. Freshwater Mussels in Montana: Comprehensive Results from 3 years of SWG Funded Surveys. Prepared for Montana Department of Fish Wildlife and Parks. 74 pp.
- Stagliano, D. 2015. Re-evaluation and trend analysis of western pearlshell mussel (SWG Tier 1) populations across watersheds of western Montana. Prepared for Montana Department of Fish Wildlife and Parks. 39 pp.
- USDA, Forest Service. 2009. Beaverhead-Deerlodge National Forest Land and Resource Management Plan, Final Environmental Impact Statement. Dillon, Montana.
- USDA, Forest Service. 2013. Conservation Strategy for Bull Trout on USFS lands in Western Montana. USDA Forest Service, Northern Region.
- ICBEMP. 2014. The Interior Columbia Basin Strategy: A strategy for applying the knowledge gained by the interior Columbia Basin ecosystem management project to the revision of land use plans and project implementation. Retrieved from <https://www.blm.gov/download/file/fid/11171>.
- U.S. Fish and Wildlife Service (USFWS). 1998a. Biological opinion for the effects to bull trout from the continued implementation of land and resource management plans and resource management plans as amended by the interim strategies for managing fish producing watersheds in eastern

Oregon and Washington, Idaho, western Montana and portions of Nevada (INFISH) and the interim strategy for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho and portions of California (PACFISH). U.S. Fish and Wildlife Service. Portland, Oregon.

USDI, Fish and Wildlife Service (USFWS). 1998b. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation (substitute core area) Watershed Scale. Region 1, Portland, Oregon.

USDI, Fish and Wildlife Service (USFWS). 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States; Final Rule. Federal Register/ Vol. 75, No. 200: 63898-64070.

USDI, Fish and Wildlife Service. 2015. Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). Portland, Oregon. 179 p.

Whitlock, C., Cross, W., Maxwell, B., Silverman, N., Wade, A.A. 2017. Executive Summary. 2017 Montana Climate Assessment. Bozeman and Missoula, Montana: Montana State University and University of Montana, Montana Institute on Ecosystems 318 p. doi:10.15788/m2ww8w.

Socioeconomics

U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2016a. Table CA25N: Total Full-Time and Part-Time Employment by NAICS Industry. Release date November 17, 2016.

U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2016b. Table CA05N: Personal Income by Major Components and Earnings by NAICS Industry. Release date November 17, 2016.

U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2014. Local Area Personal Income Methodology. Release date November 2014. Available at: <http://www.bea.gov/regional/methods.cfm>

BLM. 2013. IM 2013-131: Guidance on Estimating Nonmarket Environmental Values.

Brown, G and Reed, P. 2000. Validation of a forest values typology for use in national forest planning. For. Sci. 46(2):240-247.

MEA (Millennium Ecosystem Assessment). 2003. Ecosystems and Human Well-being: A Framework for Assessment. Washington, DC: Island Press. Also available online at <http://www.maweb.org/en/Framework.aspx#download>.

MIG (Minnesota IMPLAN Group). 2016. *IMPLAN Professional Version 3.0*.

U.S. Census Bureau. 2018. Table PEPAGESEX. Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2017. U.S. Census Bureau, Population Division. Released June 2018.

U.S. Census Bureau. 2017. Cumulative Estimates of the Components of Resident Population Change for Counties of Montana: April 1, 2010 to July 1, 2016. Release date March 2017. <https://factfinder.census.gov/>

U.S. Department of the Interior. 2016. Payment in Lieu of Taxes (PILT). County Payments.
<https://www.nbc.gov/pilt/counties.cfm>

U.S. Department of Labor, Bureau of Labor Statistics. 2016. 2016 Local Area Unemployment Statistics
<https://www.bls.gov/lau/#tables>. Release date April 21, 2017.

Forest Vegetation, Forest Resources and Wildland Fire Management

Ager, A. A., N. M. Vaillant, and M. A. Finney. 2010. A comparison of landscape fuel treatment strategies to mitigate wildland fire risk in the urban interface and preserve old forest structure. *Forest Ecology and Management* 259:1556–1570.

Arno, Stephen F and Carl E. Fiedler. 2005. *Mimicking Nature's Fire: Restoring Fire-Prone Forests in the West*. Washington (DC): Island Press.

Barrett, S.W, S.F. Arno, and J.P. Menakis. 1997. Fire episodes in the Inland Northwest (1540-1940) based on fire history data. Gen. Tech. Rep. INT-GTR-370. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 17 p.

Bentz, Barbara J., Jacques Régnière, Christopher J. Fettig, E. Matthew Hansen, Jane L. Hayes, Jeffrey A. Hicke, Rick G. Kelsey, Jose F. Negrón, Steven J. Seybold. 2010. Climate Change and Bark Beetles of the Western United States and Canada: Direct and Indirect Effects, *BioScience*, Volume 60, Issue 8, 1 September 2010, Pages 602–613, <https://doi.org/10.1525/bio.2010.60.8.6>

Bollenbacher, B. 2010. Pattern of vegetation matters on the KIPZ. USDA Forest Service, Northern Region.

Brown, James K.; Smith, Jane Kapler. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Byler, J. W., and Hagle, S. K. 2000. Succession functions of forest pathogens and insects: Ecosections M332a and M333d in northern Idaho and western Montana. United States: U.S. Dept. of Agriculture, Forest Service, State and Private Forestry, Forest Health Protection, Northern Region. Retrieved from <https://ir.library.oregonstate.edu/concern/defaults/pr76f4587?locale=en>.

Collins, B. M., Miller, J. D., Thode, A. E., Kelly, M., Wagtendonk, J. W., and Stephens, S. L. 2008. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. *Ecosystems*, 12(1), 114-128.

Davis, K. M., Clayton, B. D., and Fischer, W. C. 1980. Fire ecology of Lolo National Forest habitat types. USDA For. Serv. Gen. Tech. Rep. INT-79, 77 p. Intermountain Forest and Range Experiment Station, Ogden, Utah 84401.

Fettig C.J., Klepzig, K. D., Billings, R. F., Munson, A. S., Nebeker, T. E., Negrón, J. F., and Nowak, J. T. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. *Forest Ecology and Management*, 238(1-3), 24-53.

Finney, M. A., and Cohen, J. D. 2003. Expectation and evaluation of fuel management objectives. In P. N. Omi and L. A. Joyce (Eds.), *Fire, fuel treatments, and ecological restoration: Conference*

- proceedings, April 16-18, 2002, Fort Collins, CO. Proceedings RMRS-P-29 (pp. 353-366). Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.
- Finney, M. A. 2007. A computational method for optimising fuel treatment locations. *International Journal of Wildland Fire*, 16(6), 702-711.
- Fischer, William C.; Bradley, Anne F. 1987. Fire ecology of western Montana forest habitat types. General Technical Report INT-223. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 95 p.
- Haufler, J. B. 1999. Strategies for conserving terrestrial biological diversity. In R. K. Baydack, H. Campa III, and J. B. Haufler (Eds.), *Practical approaches to the conservation of biological diversity*. (pp. 17-30). Washington D.C.: Island Press.
- Hessburg, P. F., Salter, R. B., and James, K. M. 2007. Re-examining fire severity relations in pre-management era mixed conifer forests: Inferences from landscape patterns of forest structure. *Landscape Ecology*, 22, 5-24.
- Johnson, Charles G.; Clausnitzer, Rodrick R.; Mehringer, Peter J.; Oliver, Chadwick D. 1994. Biotic and abiotic processes in eastside ecosystems: the effects of management on plant and community ecology and on stand and landscape vegetation dynamics. Gen. Tech. Rep. PNW-GTR-322. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 66 p.
- Keane, R.E.; Loehman, R.; Clark, J.; [et al.]. 2015. Exploring interactions among multiple disturbance agents in forest landscapes: Simulating effects of fire, beetles, and disease under climate change. In: Ajith, H.; Perera, A.H.; Rimmel, T.K.; [et al.], eds. *Simulation modeling of forest landscape disturbances*. New York: Springer
- Landres, P.B., Penelope, Morgan, Swanson, F.J., 1999. Overview and use of natural variability concepts in managing ecological systems. *Ecological Applications* 9, 1179–1188.
- Losensky, John B. 1997. *Historical Vegetation of Montana*. Montana: Department of Natural Resources
- Montana Department of Natural Resources and Conservation (DNRC). 2007. Fire Protection Manual, Section 601, Forest Fire Protection in Montana. Available online at <http://dnrc.mt.gov/divisions/forestry/docs/fire-and-aviation/manuals/600manual/601-current-ffprotection-2015.pdf>
- Montana Wood Products Association. 2015. Timber Industry in Focus, educational information regarding forestry and the forest products industry in Montana. Retrieved from <http://www.montanaforests.com/catalogs/catalog142/section361/file2601.pdf>
- Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. Ogden, UT: USDA Forest Service, Intermountain Research Station. Retrieved from https://www.fs.fed.us/rm/pubs_int/int_gtr066.pdf
- Pfister, Robert D., Bernard L. Kovalchik, Stephen F. Arno, and Richard C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service General Technical Report INT-34. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 174 p.

- Pyne, Stephen J. 1982. *Fire in America, A Cultural History of Wildland and Rural Fire*. Seattle, Washington. Princeton University Press.
- Safford, H. D., Schmidt, D. A., and Carlson, C. H. 2009. Effects of fuel treatments on fire severity in an area of wildland-urban interface, Angora Fire, Lake Tahoe Basin, California. *Forest Ecology and Management*, 258(5), 773-787.
- Samman, S., and Logan, J. 2000. Assessment and response to bark beetle outbreaks in the Rocky Mountain area. General Technical Report RMRS-GTR-62. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. Retrieved from https://www.fs.fed.us/foresthealth/publications/rmrs_gtr62.pdf.
- Sampson, R and Adams, D. 1994. *Assessing forest ecosystem health in the Inland West*. New York: Food Products Press.
- Stephens, S. L., Moghaddas, J. J., Edminster, C., Fiedler, C. E., Haase, S., Harrington, M., Keeley, J.E., Knapp, E.E., McIver, J.D., Metlen, K., Skinner, C.N., and Youngblood, A.. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western US forests. *Ecological Applications*, 19(2), 305-320.
- USDI -BLM. 2003a. Fire/fuels Management Environmental Assessment Plan for Montana and The Dakotas. U.S. Department of Interior, BLM. September 26. Pgs 10-12, 79-81.

Cultural and Heritage Resources

- Tetra Tech. 2011. *Landscape Overview of Missoula Resource Management Plan (RMP) Area Including Portions of Granite, Missoula and Powell Counties, Montana*. Missoula, Montana.
- USDI-BLM. 1986. *Garnet Resource Area. Resource Management Plan*. Butte, Montana.

Air Quality and Climate

- EPA. 2009. *Compilation of Air Pollutant Emission Factors (AP-42), Fifth Edition, Volume I, Chapter 14: Greenhouse Gas Biogenic Sources. Section 14.4 Enteric Fermentation*. October 14.
- Federal Register. 2017. Montana Second 10-year Carbon Monoxide Maintenance Plan for Missoula. 82 FR 43180, 43180-43184. Environmental Protection Agency, September 14, 2017. Available online at <https://www.federalregister.gov/documents/2017/09/14/2017-19460/montana-second-10-year-carbon-monoxide-maintenance-plan-for-missoula>
- Halofsky, Jessica E.; Peterson, David L.; Ho, Joanne J.; Little, Natalie, J.; Joyce, Linda A., editors. 2018. *Climate change vulnerability and adaptation in the Intermountain Region*. Gen. Tech. Rep. RMRS-GTR20. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Available online at http://adaptationpartners.org/iap/docs/Halofsky_etal_2018_inpressreader7.pdf
- Intergovernmental Panel on Climate Change (IPCC). 2014. *Climate Change 2014 Synthesis Report Summary for Policymakers*. 32 p.
- Keane, R. 2017. *Fire Order Fire Effects Model (FOFEM). Version 6.4*. USDA Forest Service Intermountain Fire Science Lab. <https://www.firelab.org/project/fofem>

- MDEQ (Montana Department of Environmental Quality), Air Quality Bureau. 2017. Air Quality Monitoring Network Plan. Helena, MT: MTDEQ. 47 p.
- Missoula, City of. 2010. Greenhouse Gas Emission Inventory. Missoula, MT: City of Missoula. 168 p.
- Missoula, City of. 2012. Conservation and Climate Action Plan. Jones, Chase, and Andrew Valainis. Missoula, MT: City of Missoula. 87 p.
- USDA Forest Service. 2009. Beaverhead-Deerlodge National Forest Land and Resource Management Plan Chapter 3 - Forestwide Direction.
- USDA Forest Service. 2017. Final Environmental Impact Statement for the Forest Plan Amendments: Incorporating Habitat Management Direction for the Northern Continental Divide Ecosystem Grizzly Bear Population. Helena-Lewis and Clark, Kootenai, and Lolo National Forests.
- USDA. 2018. National Agricultural Statistics Service Quick Stats.
<https://quickstats.nass.usda.gov/#F40967BA-A828-3BCD-BF0C-3E595411195D>.
- USDI-BLM. 2010. Climate Change Supplementary Information Report: Montana, North Dakota, and South Dakota. U.S. Billings, MT: Department of Interior, Bureau of Land Management, Montana State Office.
- USDI-BLM. 2016. Analysis of the Management Situation Missoula Resource Management Plan. August 31.
- Western Regional Climate Center (WRCC). 2017. Period of Record Monthly Climate Summary. Available online at <https://wrcc.dri.edu/>

Special Designations

- Ecosystem Management Inc. (EMI). 2010. Final Wild and Scenic River Eligibility Report, Missoula Field Office, Montana. Available online at https://eplanning.blm.gov/epl-front-office/projects/lup/58107/130657/159468/WSR_Eligibility_Report.pdf
- USDI-BLM. 1980. Montana Wilderness Inventory, Miles City and Lewistown BLM Districts: Final Decision.
- USDI-BLM. 1988. BLM Manual 1613 – Areas of Critical Environmental Concern.
- USDI-BLM. 1991. Montana Statewide Wilderness Study Report – Volume I Statewide Overview and Volume II Wilderness Study Area Specific Recommendations.
- USDI-BLM. 1993. Handbook 8357-1 Byways
- USDI-BLM. 2012. BLM Manual 6330 - Management of Wilderness Study Areas
- USDI – National Park Service. 1982. Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use
- USDI – National Park Service. 2012. Foundation Document, Lewis and Clark National Historic Trail.

Energy and Minerals

Ecosystem Management Inc. (EMI). 2011. Final Mineral Assessment Report for the Missoula Field Office.

Lands and Realty

FLMPA - Federal Land Policy and Management Act of 1976 as amended: Sections 102, 203, 205-207, 209, 302 and 501-507.

LWCF- Lands and Water Conservation Fund Act of 1964

Mineral Leasing Act of 1920 (MLA) as amended (1973)

Recreation and Public Purposes (R&PP) Act of 1926, as amended (43 U.S.C. 869)

Energy Policy Act of 2005, PL 109-58 (HR 6), enacted August 8, 2005

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, Final Project Report CEC-500-2006-022. Available online at <https://www.nrc.gov/docs/ML1224/ML12243A391.pdf>

U.S. Department of the Interior, Bureau of Land Management (USDI-BLM). 2009. Approved Resource Management Plan Amendments/Record of Decision (ROD) for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States. BLM/VO-GI-09-005-1800.

USDI-BLM. 2017. Scoping Report, Missoula Resource Management Plan, BLM Missoula Field Office, Missoula. 47 p. Available online at https://eplanning.blm.gov/epl-front-office/projects/lup/58107/116491/142168/Missoula_BLM_RMP_Scoping_Report.pdf

USDI-BLM. 2016. Analysis of the Management Situation, BLM Missoula Field Office, Missoula, Montana. 410 p.

USDI-BLM. 2018. Preliminary Area of Critical Environmental Concern Report. Missoula Resource Management Plan, Missoula Field Office, 3255 Fort Missoula Road, Missoula, MT 59804-7204, April 30, 2018. Available online at https://eplanning.blm.gov/epl-front-office/projects/lup/58107/144093/177634/Missoula_BLM_RMP_Preliminary_ACEC_Report.pdf

Paleontological Resources

Tetra Tech. 2011. Landscape Overview of Missoula Resource Management Plan Area Including Portions of Granite, Missoula, and Powell Counties, Montana.

Wildlife

Brewer, Lorraine T., Renate Bush, Jodie E. Canfield, and Alan R. Dohmen. 2007. Northern goshawk Northern Region overview: Key findings and project considerations. May.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon.

- Buskirk, S.W., and L.F. Ruggerio. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx and Wolverine in the Western United States.
- Clough, Lorraine T. 2000. Nesting habitat selection and productivity of northern goshawks in west-central Montana. Wildlife Biology M.S. thesis, The University of Montana, Missoula. December.
- Craighead, L., R. Walker, and E. Roberts 2001. The American Wildlands US Northern Rockies Corridors of Life Model. Dec. 2002
- Dixon, Rita D., and Victoria A. Saab. 2016. Black-backed woodpecker. In The birds of North America. Cornell, NY: Cornell Laboratory of Ornithology and the Academy of Natural Science.
- Ecosystem Research Group (ERG). 2012. Wildlife habitat assessment for the Kootenai and Idaho Panhandle plan revision zone (KIPZ). December 19.
- Ecosystem Research Group (ERG). 2016. Modeled wildlife habitat assessment. In Draft Environmental Impact Statement Volume 2: Revised Forest Plan. Kalispell, MT: USDA Forest Service.
- Forristal, Christopher David. 2009. Influence of postfire salvage logging on black-backed woodpecker nest-site selection and nest survival. Fish and Wildlife Management M.S. thesis, Montana State University, Bozeman. April.
- Franklin, Jerry F., Mitchell, Robert J., and Palik, Brian J. 2007. Natural disturbance and stand development principles for ecological forestry. Gen. Tech. rep. NRS-19. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 44 pp.
- Goggans, R., R.D. Dixon, and C. Seminara. Oregon Department of Fish and Wildlife, USDA Deschutes National Forest. 1987. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Nongame Project Number 87-3-02.
- Greenwald, D.Noah, D.Coleman Crocker-Bedford, Len Broberg, Kieran F. Suckling, and Timothy Tibbitts. 2005. A review of northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin 33, (1): 120-29.
- Griffin, Paul C., and L. Scott Mills. 2007. Precommercial thinning reduces snowshoe hare abundance in the short term. Journal of Wildlife Management 71, (2): 559-64.
- Halofsky, Jessica E., David L. Peterson, S. Karen Dante-Wood, Linh Hoang, Joanne J. Ho, and Linda A. Joyce. 2018. Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains Part 2. Fort Collins, CO. March.
- Hays, David W., and Elizabeth A. Rodrick. 2004. Flammulated owl (*Otus flammeolus*). In Management recommendations for Washington's priority species.24-1 – 24-5. Olympia, WA: Washington Department of Fish and Wildlife.
- Hayward, Gregory D., and Jon Verner. 1994. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. September.
- Hejl, Sallie J., Mary McFadzen, and Thomas Martin. 2000. Maintaining fire-associated bird species across forest landscapes in the northern Rockies. August 4.

- Hitchcox, Susan M. 1996. Abundance and nesting success of cavity-nesting birds in unlogged and salvage-logged burned forest in northwestern Montana. M.S. thesis, The University of Montana, Missoula.
- Hoyt, Jeff S., and Susan J. Hannon. 2002. Habitat associations of black-backed and three-toed woodpeckers in the boreal forest of Alberta. *Canadian Journal of Forestry Research* 32: 1881-88.
- Hutto, Richard L. 1995. Composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. *Conservation Biology* 9, (5): 1041-58.
- Interagency Canada 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.
- Jonkel, J. A. 2018. Montana Department of Fish, Wildlife, and Parks, personal communication regarding grizzly bear distribution south of the NCDE.
- Kendall, K.C., J.B. Stetz, J. Boulanger, A.C. Macleod, D. Paetkau, and G.C. White. 2009. Demography and genetic structure of a recovering grizzly bear population. *Journal of Wildlife Management* 73:3-17.
- Kennedy, Patricia L. 2003. Northern goshawk (*Accipiter gentilis atricapillus*): A technical conservation assessment. January 3.
- Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. *Canadian Journal of Zoology* 68:845-51.
- Koehler, G. M., K. B. Aubry. 1994. Lynx. Pages 74-98 In L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, J. L. Lyon, W. J. Zielinski, tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the Western United States. Gen. Tech. Rep. RM-254. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Koehler, Gary M., and J. David Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. *Journal of Forestry* 88: 10-14.
- Linkhart, Brian D., R.T. Reynolds, and R.A. Ryder. 1998. Home range and habitat of breeding Flammulated Owls in Colorado. *Wilson Bulletin* 110: 342-51.
- Lyon, L.J., T.N. Lonner, J.P. Weigand, C.L. Marcum, W.D. Edge, J.D. Jones, D. W. McCleerey, and L.L. Hicks. 1985. Coordinating elk and timber management: Final report of the Montana Cooperative Elk-Logging Study. Helena: Montana Department of Fish, Wildlife, and Parks. 55p.
- Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuring. 1996. Relationships among grizzly bears, roads, and habitat use in the Swan Mountains, Montana. *Journal of Applied Ecology* 33:1395-1404
- McCallum, D. Archibald. 1994. Review of technical knowledge: Flammulated owls. In Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. edited by Gregory D. Hayward and Jon Verner, 14-27.

- McLellan, B.N., and D.M. Shackleton. 1989. Immediate reactions of grizzly bears to human activities. *Wildlife Society Bulletin* 17:269–274.
- McGrath, Michael T., Stephen DeStefano, Robert A. Riggs, Larry L. Irwin, and Gary J. Roloff. 2003. Spatially explicit influences on northern goshawk nesting habit in the Interior Pacific Northwest. *Wildlife Monographs* 154: 1-63.
- Milburn, Amanda , Barry Bollenbacher, Mary Manning, and Renate Bush. 2015. U.S. Forest Service Region 1 Vegetation Classification, Mapping, Inventory and Analysis Report 15-4 v1.0.
- Montana Department of Fish, Wildlife, and Parks (MFWP). 2005a. Comprehensive Fish and Wildlife Conservation Strategy. Missoula, Montana. 658 p. Available online at <http://fwp.mt.gov/fishAndWildlife/conservationInAction/fullplan.html>
- Montana Department of Fish, Wildlife, and Parks (MFWP). 2005b. Montana final elk management plan. Wildlife Division, Helena, MT. 397 p
- Montana Natural Heritage Program. 2013. Animal species of concern. October 7.
- Pierson, Jennifer Christy. 2009. Genetic population structure and dispersal of two North American woodpeckers in ephemeral habitats. PhD dissertation, The University of Montana, Missoula. December.
- Proffitt, K. M., B. Jimenez, C. Jourdonnais, J. A. Gude, M. Thompson, M. Hebblewhite, and D. R. Eacker. 2015a. The Bitterroot elk study: Evaluating bottom-up and topdown effects on elk survival and recruitment in the southern Bitterroot Valley, Montana. Final Report, Montana Fish Wildlife and Parks, Helena, USA. Available online at <http://fwp.mt.gov/fwpDoc.html?id/473152>.
- Proffitt KM, Goldberg JF, Hebblewhite M, Russell R, Jimenez BS, Robinson HS, Pilgrim K, Schwartz MK. 2015b. Integrating resource selection into spatial capture-recapture models for large carnivores Ecosphere. 6. DOI: 10.1890/ES15-00001.1
- Reynolds, R.T., and B.D. Linkhart. 1992. Flammulated owls in Ponderosa pine: Evidence of preference for old-growth. In *Old-growth forests in the Southwest and Rocky Mountain Regions: Proceedings of a workshop*. edited by M.R. Kaufmann, W.H. Moir and R.L. Bassett, 166-69.
- Reynolds, Richard T., Russell T. Graham, and Douglas A. Boyce Jr. 2008. Northern goshawk habitat: an intersection of science, management, and conservation. *Journal of Wildlife Management* 72, (4): 1047-55.
- Reynolds, Richard T., Russell T. Graham, M.Hildergard Reiser, Richard L. Bassett, Patricia L. Kennedy, Douglas A. Boyce, Greg Goodwin, Randall Smith, and E.Leon Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States.
- Reynolds, Richard T., Suzanne M. Joy, and Douglas G. Leslie. 1994. Nest productivity, fidelity, and spacing of northern goshawks in Arizona. *Studies in Avian Biology* 16: 106-13.
- Rowland, Mary & J. Wisdom, Michael & Johnson, Bruce & Kie, John. 2000. Elk Distribution and Modeling in Relation to Roads. *The Journal of Wildlife Management*. 64. 672. 10.2307/3802737.
- Ruggiero, Leonard F., Keith B. Aubry, Steven W. Buskirk, L.Jack Lyon, and William J. Zielinski. 1994. The scientific basis for conserving forest carnivores American marten, fisher, lynx, and wolverine in the western United States.

- Russell, R.E., J.A. Royle, V.A. Saab, John F Lehmkuhl, W.M. Block, and J.R. Sauer. 2009. Modeling the effects of environmental disturbance on wildlife communities: avian responses to prescribed fire. *Ecological Applications* 19: 1253-1263.
- Saab, Victoria A., and Jonathan G. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pin/douglas-fir forest of southwestern Idaho.
- Samson, Fred B. 2006a. A conservation assessment of the northern goshawk, black-backed woodpeckers, flammulated owl, and pileated woodpecker in the Northern Region.
- Samson, Fred B. 2006b. Habitat estimates for maintaining viable populations of the northern goshawk, black-backed woodpecker, flammulated owl, pileated woodpecker, American marten, and fisher.
- Squires, J. R. 2010. USDA Forest Service, Rocky Mountain Research Station, personal communication regarding Canada lynx presence in the Garnet Mountains, Missoula Field Office.
- Squires, John R., Nicholas DeCesare, J., Jay A. Kolbe, and Leonard F. Ruggiero. 2008. Hierarchical den selection of Canada lynx in western Montana. *Journal of Wildlife Management* 72, (7): 1497-1506.
- Squires, John R., and Leonard F. Ruggiero. 1996. Nest-site preference of northern goshawks in southcentral Wyoming. *The Journal of Wildlife Management* 60, (1): 170-77.
- Tomson, Scott Dean. 1999. Ecology and summer/fall habitat selection of American Marten in northern Idaho. Wildlife Biology M.S. thesis, The University of Montana, Missoula. March.
- U.S. Department of the Interior-FWS (USFWS). 1982. Grizzly Bear Recovery Plan, Draft Supplement: Habitat-based Recovery Criteria for the Northern Continental Divide Ecosystem. Grizzly Bear Recovery Office, U.S. Fish and Wildlife Service, University Hall #309, University of Montana, Missoula, MT 59812. Available online at https://www.fws.gov/mountain-prairie/es/species/mammals/grizzly/2017-10-05_SIGNED_DRAFT_HBRC_RP_Supplement_for_NCDE_Grizzly_Bear.pdf
- USFWS. 1993. Grizzly Bear Recovery Plan, Draft Supplement: Habitat-based Recovery Criteria for the Northern Continental Divide Ecosystem. Original Approved: January 29, 1982, Revised Plan Approved: September 10, 1993. Grizzly Bear Recovery Office, U.S. Fish and Wildlife Service, University Hall #309, University of Montana, Missoula, MT 59812. Available online at https://www.fws.gov/mountain-prairie/es/species/mammals/grizzly/2017-10-05_SIGNED_DRAFT_HBRC_RP_Supplement_for_NCDE_Grizzly_Bear.pdf
- USFWS. 2000. Endangered and threatened wildlife and plants, determined for threatened status for the contiguous U.S. distinct population segments of the Canada lynx and related, rule, final rule. 35 pp.
- USFWS. 2005. Recovery outline: contiguous United States Distinct Population Segment of Canada lynx. U.S. Fish and Wildlife Service region 6, Montana Field Office, Helena, Montana. 21 pp.
- USFWS. 2012. Amended incidental take statement for the biological opinion on the effects of the Missoula BLM RMP on grizzly bears. U.S. Fish and Wildlife Service, Helena, MT. 12 pp.

- USFWS. 2014. 50 CFR, Part 17, Endangered and threatened wildlife and plants; revised designation of critical habitat for the Contiguous United States distinct population segment of the Canada lynx; final rule. U.S. Fish and Wildlife Service. Pages 54782-54846.
- USFWS. 2015. Threatened, Endangered, and Candidate Species in Montana, Endangered Species Act. Ecological Services, Montana Field Office, Helena, Montana. 8 pp.
- USFWS. 2018a. Final Northern Continental Divide Ecosystem Grizzly Bear Conservation Strategy. U.S. Fish and Wildlife Service, Montana Field Office, Helena, MT. 276 pp.
- Walker R.S. and Craighead L. 1997. Analyzing wildlife movement corridors in Montana using GIS. Proceedings of the 1997 International ESRI Users Conference. Environmental Sciences Research Institute, Redlands, California.
- Wasserman, T.N., S.A. Cushman, M.K. Schwartz, and D.O. Wallin. 2010. Spatial scaling and multimodel inference in landscape genetics: *Martes Americana* in northern Idaho. *Landscape Ecology* 25: 1601-12.
- Wright, Vita. 1996. Multi-scale analysis of flammulated owl habitat use: owl distribution, habitat, and conservation. Dissertation, University of Montana, Missoula.
- Wright, Vita, Sallie J. Hejl, and Richard L. Hutto. 1997. Conservation implications of a multi-scale study of flammulated owl (*Otus flammeolus*) habitat use in the Northern Rocky Mountains, USA. In *Biology and conservation of owls of the Northern Hemisphere: Second international symposium: General Technical Report NC-190*. edited by James R. Duncan, David H. Johnson and Thomas H. Nicholls, Chap. General Technical Report NC-190, 506-16. USDA Forest Service.

Visual Resources

- BLM 1984 Visual Resource Management Manual 8400 Wildlife and Special Status Species Habitat (WH)
- BLM 1986 Visual Resource Inventory Handbook 8410-1

Lands with wilderness characteristics

- USDI-BLM. 2012. Manual 6310 – Conducting Wilderness Characteristics Inventory of BLM lands
- USDI-BLM. 2012 Manual 6320 - Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process

Cave and Karst Resources

- Campbell, Newell P. 1978. *Caves of Montana*. Montana Bureau of Mines and Geology.

Soil, Water, and Riparian

- Heath, Ralph C. 1984. Groundwater Regions of the United States. U.S. Geological Survey Water Supply Paper No. 2242. U.S. Government Printing Office, Washington D.C.

- Jackson, R.B., Kate Lajtha, Susan E. Crow, Gustaf Hugelius, Marc G. Kramer, and Gervasio Pineiro. 2017. The Ecology of Soil Carbon: Pools, Vulnerabilities, and Biotic and Abiotic Controls. *Annual Review of Ecology, Evolution, and Systematics*, 2017. 48:419–45.
- Munshower, F.F. 1994. *Practical Handbook of Disturbed Land Revegetation* Lewis Publishers, Boca Raton, Florida, 288 p.
- Montana Department of Natural Resources and Conservation (DNRC). 2015. *Montana Forestry Best Management Practices*. Montana Department of Natural Resources and Conservation, Forestry Division. 2015 revision. 64 p. Available online at <http://dnrc.mt.gov/divisions/forestry/docs/assistance/practices/mt-forestry-management-best-practices-guide.pdf>.
- National Academy of Sciences. 2002. *Riparian Areas: Functions and Strategies for Management*. Committee on Riparian Zone Functioning and Strategies for Management, Water Science and Technology Board, National Research Council.
- USDA. 2018. *Web Soil Survey*. Internet-based soil survey. USDA, Natural Resources Conservation Service.
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. *The Federal Land Policy and Management Act, as amended*. U.S. Department of the Interior, Bureau of Land Management Office of Public Affairs, Washington, D.C. 69 pp.
- U.S. Department of the Interior Bureau of Land Management (USDI-BLM). 1997. *Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management*. USDI-BLM-Montana State Office. August 1997. 22 p.
- USDI-BLM. 2005. *Land Use Planning Handbook*. BLM Manual H-1601-1, Release 1-1693. March 11, 2005.
- USDI-BLM. 2007. *Vegetation Treatments Using Herbicides on Bureau of Land management Lands in the 17 Western States*, Programmatic Environmental Impact Statement, Chapter 2.
- USDI-BLM. 2008. *BLM Manual 7100 – Soil Resource Management*, Release 7-108. USDI Bureau of Land Management, Sept. 15, 2008. 17 p.
- USDI-BLM. 2010. *Memorandum of Understanding Regarding Water Quality Management on Bureau of Land Management Land 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. April 2010.
- USDI-BLM. 2015. *Riparian Area Management: Proper Functioning Condition Assessment for Lotic Areas*. Technical Reference 1737-15, second edition. Bureau of Land Management, National Operations Center, Denver, CO.
- U.S. Congress. 1972. *Federal Water Pollution Control Act (“Clean Water Act”)*. 33 U.S.C. §§1251-1387.
- U.S. Congress. 1974. *Safe Drinking Water Act, as amended 1986*. 42 U.S.C. § 300h-7-State Programs to establish wellhead protection areas (a) state programs 42 U.S.C. § 300j-13-source water quality assessment.

- U.S. Congress. 1977a. Executive Order 11990 – Protection of Wetlands. May 24, 1977, 42 FR 26961, 3 CFR, 1977 Comp., p. 121.
- U.S. Congress. 1977b. Executive Order 11988 – Floodplain Management. May 24, 1977; 42 FR 26951, 3 CFR, 1977 Comp., p. 117; Amended by Executive Order 12148, July 20, 1979; 44 FR 43239, 3 CFR, 1979 Comp., p. 412
- Whitlock, C., Cross, W., Maxwell, B., Silverman, N., Wade, A.A. 2017. 2017 Montana Climate Assessment. Bozeman and Missoula MT: Montana State University and University of Montana, Montana Institute on Ecosystems. 318 p. doi:10.15788/m2ww8w.
- Winward, Alma H. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

Abbreviations and Acronyms

ACEC	Area of Critical Environmental Concern
AMS	Analysis of the Management Situation
ATV	All-Terrain Vehicle
BCA	Backcountry Conservation Area
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council on Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
EIS	Environmental Impact Statement
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
FRCC	Fire Regime Condition Class
GHG	Greenhouse Gas
HFI	Healthy Forest Initiative
HFRA	Healthy Forests Restoration Action
HRV	Historic Range of Variability
HTG	Habitat Type Group
HUC	Hydrologic Unit Code
IMPROVE	Interagency Monitoring of Protected Visual Environments
INFISH	Inland Native Fish Strategy
LAU	Lynx Analysis Unit
LWCF	Land and Water Conservation Fund
MAAQS	Montana Ambient Air Quality Standards
MDEQ	Montana Department of Environmental Quality
MFWP	Montana Fish, Wildlife and Parks
MOU	Memorandum of Understanding

NAAQS	National Ambient Air Quality Standards
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OHV	Off-Highway Vehicle
PFC	Proper Functioning Condition
PILT	payments in lieu of taxes
PSD	Prevention of Significant Deterioration
REA	Rapid Ecoregional Assessment
RHCA	Riparian Habitat Conservation Area
RMO	Riparian Management Objective
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right of Way
SIMPPLLE	Simulating Patterns and Processes at Landscape Scales
SRMA	Special Recreation Management Area
TMDL	Total Maximum Daily Load
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WSA	Wilderness Study Area
WUI	Wildland-Urban Interface

Appendices

See Volume II for the following appendices to this DEIS.

Appendix A. Air Quality and Climate

Appendix B. Aquatic and Riparian Habitat Conservation Strategy

Appendix C. Forest Vegetation

Appendix D. Impaired Waters

Appendix E. Locatable Minerals Reasonable Foreseeable Development Scenario

Appendix F. Major Laws

Appendix G. Wild and Scenic River Suitability Report

Appendix H. Maps

Appendix I. Noxious and Invasive Species List

Appendix J. Post-Wildfire Emergency Stabilization and Rehabilitation Procedures

Appendix K. Probable Sale Quantity Determinations and Calculations

Appendix L. Recreation Management Areas

Appendix M. Socioeconomic Report

Appendix N. Summary of No-action Alternative Management

Appendix O. Supplemental Rules

Appendix P. Design Features and Best Management Practices

Appendix Q. Lands and Realty

Appendix R. Rangeland Health Summary