FINDING OF NO SIGNIFICANT IMPACT (FONSI)

ENVIRONMENTAL ASSESSMENT # DOI-BLM-UT-Y010-2009-0092-EA
Black Ridge Fuels Reduction for Vegetative Restoration and Resource Protection

This unsigned FONSI and the attached EA #DOI-BLM-UT-Y010-2009-0092-EA for the proposed Black Ridge Fuels Reduction for Vegetative Restoration and Resource Protection project is available for public review and comment until February 28, 2010.

Based on the analysis of potential environmental impacts in the attached EA and in consideration of the significance criteria in 40 CFR 1508.27, I have determined that with required and proposed mitigating measures the fuels reduction and restoration project would not result in significant impacts on the human environment. An environmental impact statement (EIS) is not required.

The decision to approve or deny the proposed project and, if appropriate, a signed FONSI with rationale, will be released after consideration of public comments and completion of the EA.

United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-UT-Y010-2009-0092EA
November, 2009

Black Ridge
Fuels Reduction for Vegetative Restoration and Resource Protection

T. 27 S., R. 23 E., Secs. 22, 27-31, 33 and 34
T. 28 S., R. 22 E., Secs. 1, 12 and 13
T. 28 S., R. 23 E., Secs. 3-10, 13-15, 17-31, and 33-35
T. 28 S., R. 24 E., Secs. 28-31, 33 and 34
T. 29 S., R., 23 E., Secs. 3 and 4; T. 29 S., R. 24 E., Secs. 3, 4, and 6

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Black Ridge -- Fuels Reduction for Vegetative Restoration and Resource Protection

Environmental Assessment DOI-BLM-UT-Y010-2009-0092EA

Contents

Page

1.0 PURPOSE and NEED ……1

1.1 Introduction ……1
1.2 Background ……1
1.3 Need for the Proposed Action ……2
1.4 Purpose of the Proposed Action ……5
1.5 Conformance with BLM Land Use Plan(s) ……6
1.6 Relationship to Statutes, Regulations, or other Plans ……7
1.7 Identification of Issues ……11
1.8 Summary ……13

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION...13

2.1 Introduction ……13
2.2 Alternative A- Proposed Action ……22
2.3 Alternative B – No Action ……35
2.4 Alternatives Considered, but Eliminated from Further Analysis ……35
2.4.1 Alternative C ……35
2.4.2 Alternative D……36
2.4.3 Alternative E ……37
2.4.4 Alternative F ……37

3.0 AFFECTED ENVIRONMENT ……38

3.1 Introduction ……38
3.2 General Setting ……38
3.3.0 Critical Elements of the Human Environment and Other Resources .41
3.3.1 Critical Elements or Resources Present But Not Affected ……41
3.3.1.1 Air Quality ……41
3.3.1.2 Cultural Resources and Native American Concerns 43
3.3.1.3 Threatened, Endangered (T&E) or Candidate Plant Species ..44
3.3.1.4 Geology/Minerals and Resource/Energy Production ……44
3.3.1.5 Paleontology ……45
3.3.2 Critical Elements or Resources Present /Brought Forward for Analysis ……47
3.3.2.1 Watersheds ……47
3.3.2.1.1 Floodplains ……48
3.3.2.1.2 Water Quality ……49
3.3.2.1.3 Wetlands/Riparian Areas ……50
3.3.2.1.4 Soils ……51
3.3.2.2 Invasive, Non-native Plant Species ……53

3.3.2.3 Rangeland Health Standards and Guidelines ……..……54
3.3.2.4 Livestock Grazing ……...55
3.3.2.5 Woodlands/Forestry ……..……..57
3.3.2.6 Vegetation ...……58
3.3.2.7 Fish and Wildlife (Including Special Status Species) ……..…59
3.3.2.8 Recreation …….……..……65
3.3.2.9 Visual Resources ……..……...66
3.3.2.10 Fuels/Fire Management ……..…….…..67
3.3.2.11 Socio-economics …….……..……70

4.0 ENVIRONMENTAL IMPACTS ……...……71
4.1 Introduction …….…….……71
4.2 Direct & Indirect Impacts …….…….……...72
4.2.1 Alternative A - Proposed Action …….……..72
4.2.1.1 Watersheds ……..……..……72
4.2.1.1.1 Floodplains ……74
4.2.1.1.2 Water Quality ……..…..……76
4.2.1.1.3 Wetlands/Riparian Areas …….……78
4.2.1.1.4 Soils ..……79
4.2.1.2 Invasive/Non-native Plant Species …..……83
4.2.1.3 Rangeland Health Standards and Guidelines ……..….……86
4.2.1.4 Livestock and Grazing …….……..……...87
4.2.1.5 Woodlands/Forestry ……..……..……90
4.2.1.6 Vegetation ……..……..……92
4.2.1.7 Fish and Wildlife (Including Special Status Species) ……..95
4.2.1.8 Recreation …….…105
4.2.1.9 Visual Resources …….…….…107
4.2.1.10 Fire and Fuels …….…….…109
4.2.1.11 Socio-economics …...……...111
4.2.2 Alternative B – No action Alternative ……113
4.2.2.1 Watersheds ……114
4.2.2.1.1 Floodplains ……..……114
4.2.2.1.2 Water Quality ……..……114
4.2.2.1.3 Wetlands/Riparian Areas ……..……..114
4.2.2.1.4 Soils ……...……115
4.2.2.2 Invasive, Non-native Plant Species …..……115
4.2.2.3 Rangeland Health Standards and Guidelines …..…….115
4.2.2.4 Livestock and Grazing …….……116
4.2.2.5 Woodlands/Forestry …….……116
4.2.2.6 Vegetation ……..…….……117
4.2.2.7 Fish and Wildlife (Including Special Status Species) …..117
4.2.2.8 Recreation ……118
4.2.2.9 Visual Resources …….……118
4.2.2.10 Fire and Fuels ……...……..119
4.2.2.11 Socio-economics ……..…….……119

4.3 Monitoring and Compliance ……120
4.4 Cumulative Impacts Analysis ……120
4.4.1 Reasonable and Foreseeable Actions on Adjacent Lands ……..122
4.4.2 Cumulative Impacts ……123
4.4.3 Past and Present Actions ……126

5.0 CONSULTATION & COORDINATION ……127
5.1 Introduction ……127
5.2 Persons, Groups, & Agencies Consulted ……127
5.3 Summary of Public Participation ……
5.3.1 Comment Analysis ……
5.3.2 List of Commenters ……
5.3.3 Response to Public Comment ……
5.4 List of Preparers ……

6.0 REFERENCES, GLOSSARY ……..
6.1 References Cited ……
6.2 Glossary of Terms ……
6.3 List of Acronyms Used in this EA ……

APPENDICES

APPENDIX A
Interdisciplinary Team Analysis Record Checklist
APPENDIX B
Vicinity Map
Project Map
APPENDIX C
Standard Operating Procedures (SOPs) and Mitigation Measures for Herbicide Treatment
APPENDIX D
Stock Pond Repair Location
Road Crossing Reinforcement
APPENDIX E
Geologic Map
Paleontology Map
APPENDIX F
Mexican Spotted Owl Survey Area
Southwestern Willow Flycatcher Map
APPENDIX G
OHV Designated Roads in Project Area

Black Ridge -- Fuels Reduction for Vegetative Restoration and Resource Protection

DOI-BLM-UT-Y010-2009-0092EA

1.0 PURPOSE & NEED

1.1 Introduction

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of a fuels reduction and restoration project proposed for implementation on Black Ridge by the Bureau of Land Management (BLM), Canyon Country Fire Zone, and the Moab Field Office. The EA is a site-specific analysis of potential impacts that could result from implementation of the proposed action or from implementation of one of the alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any ―significant" impacts could result from the analyzed actions. ―Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of ―Finding of No Significant Impact" (FONSI). If the decision-maker determines that this project has ―significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If analysis supports a decision reflecting no significant impacts, a Decision Record may be signed for the EA approving a selected alternative, whether the proposed action or another alternative. A Decision Record (DR), including a FONSI statement, documents the reasons why implementation of the proposed action or selected alternative would not result in ―significant" environmental impacts (effects) beyond those already addressed in the Moab Field Office Resource Management Plan (October, 2008) and the Utah Land Use Plan Amendment for Fire and Fuels Management (September, 2005).

1.2 Background

Since the inception of the National Fire Plan (NFP) in 2002, the BLM has been prioritizing areas for fuels treatment based on fuel conditions, distance from Wildland/ Urban Interface (WUI) areas and other human infrastructure, ecosystem health, and resource values that may be at risk. The general goals outlined in the NFP include the implementation of fuels treatments that will (1) reduce the risk of catastrophic fire; (2) protect communities; (3) reduce fuel hazards; (4) reduce wildfire acres and costs; and (5) restore fire-adapted ecosystems. The Moab Field Office Resource Management Plan (RMP) incorporates the landscape level fire management goals and objectives for the Canyon Country Fire Zone first established in the Utah Land Use Plan (LUP) Amendment for Fire and Fuels Management (September, 2005) that were based on the general goals of the NFP. Detailed information included in the LUP Amendment and incorporated into the RMP describes wildland fire conditions based on fire regime and

current condition class, a measurement that reflects the fire frequency and potential for fire severity and intensity in a selected area compared with assumed historic wildland fire conditions for that area (Chapter 3, page 3-31). In addition, the RMP authorizes the reduction of hazardous fuels throughout the Moab Field Office to restore ecosystems; to protect human, natural and cultural resources; and to reduce the threat of wildfire to communities (Record of Decision and Approved Management Plan, page 58). Treatments may be planned in areas where key ecosystem components have been compromised and/or where a high intensity catastrophic fire would severely impact resources. Compromised factors may include vegetation composition (density, canopy closure, displacement of historical community, etc.), structural stage, and/or stand age; where invasive plants have spread or have the potential to spread; in areas with high fire frequency and/or severity; and/or where insects or diseases have altered vegetation or have the potential to severely alter vegetative composition.

The goal of treating vegetation is to restore ecosystem health by reproducing the natural variability, stability, and diversity of the vegetative communities within a project area. In addition, successfully completed treatments enhance public and firefighter safety by providing an increased range of suppression strategies.

1.3 Need for the Proposed Action

In many areas of the southwestern United States and particularly across public lands, pinyon (Pinus edulis) and juniper (Juniperus osteosperma) trees are dominant species. Although controversy exists regarding the historic density and structure of the pinyon-juniper woodlands that currently occupy millions of acres of land across the Colorado plateau region, it is generally accepted that much of what is now pinyon-juniper woodland may have once been land vegetated dominantly by grasses and forbs with no more than 10-15 trees every two-to-three acres (Brockway et al., 2002). Climate, grazing and fire suppression are the major factors most often linked to the expansion of pinyon-juniper woodlands (Miller and Wigand, 1994).

Historical conditions and historic fire occurrence in pinyon-juniper woodlands can vary across a given landscape due to many different contributing factors. Fire patterns and fire behavior are closely related to unique topography, soils, environmental conditions and vegetation that is present at a given time (Tausch and Hood, RMRS-GTR-202, page 58). Prior to European settlement, more complex vegetative communities contained a mixture of fire patterns and behavior based on their multifaceted fuel types. In general, studies show that in southern Utah vegetative cover was below fifty percent less than in present day (RMRS-GTR-202, 2007) with greater mixtures of size and age-classes of trees. Fires may have been infrequent across the area, although patterns of disturbance indicate that there was a shifting distribution of woodland and sagebrush dominance throughout the landscape (RMRS-GTR-202, 2007). Canyon bottoms and swales appear to have the highest fire frequencies with larger fires occurring during periods of drought.

The term ―natural fire regime" is a general classification of the role of fire in a landscape based on what is known or understood about the historical conditions in a given area. Fire regime classifications are devised based on the average number of years between

fires, and are further distinguished by ―condition class." The condition class of a specific area relates directly to its departure from a natural fire regime and the present condition of the ecosystem as a result of this departure. Fire regime condition class, or FRCC, can range from low (FRCC 1) to high (FRCC 3) depending on the attributes in an area and how substantially those attributes have been altered from their natural or historic range. The Utah Land Use Plan Amendment for Fire and Fuels Management (September, 2005) states that most of the BLM lands in Utah are characterized as FRCC2 and FRCC 3 due to the prevalence of invasive species, long-term losses of native vegetation, known missed fire return intervals, and persistent drought (Chapter 2, page 2-9). Public Law 108-148, the Healthy Forests Restoration Act of 2003 (HFRA) authorizes the expedited treatment of areas with a high FRCC in which wildland fire poses a threat to the quality of a watershed and/or in areas that have experienced significant resource damage.

Ecological restoration is generally approached from the context of the ―fundamental characteristics" of an ecosystem, which may be determined from historical data, commonly accepted indications of past conditions, and/or from scientific data collected directly from undisrupted sites. Over the past several decades, ecosystems on public lands in southeastern Utah have experienced gradual losses of biodiversity, sustainability, and successional vegetative development. Overall, compromised ecosystems have a lowered resiliency and cannot easily recover from impacts such as prolonged climate changes and/or cycles of disturbance like high intensity fire. Elements critical to an ecosystem that may result from or be affected by an uncharacteristically intense wildland fire or from lengthy periods of drought include accelerated erosion; altered and/or declining soil development and losses in sustainable nutrient cycling; loss of natural hydrologic pathways; deterioration or loss of watershed integrity resulting in degradation of water quality and quantity; and deterioration of habitat and habitat diversity (Bartos, D., et al., 1999).

Juniper Woodlands

Fuels reduction treatments often target areas where dense monocultures of pinyon-juniper woodlands occur and where fire has been absent to the extent that fuel loads are considered to be a threat to the ecosystem. The Canyon Country Fire Zone Fire

Management Plan (FMP) September, 2004, identifies and integrates up-to-date wildland fire management guidance, direction, and activities required to implement national fire policy as addressed in the goals and objectives authorized by the LUP Amendment. The FMP is a more detailed representation of the fire management activities relative to the Moab Field Office. Page five of the document outlines specific management objectives including the use of various fuels management methods to: Reduce hazardous fuels; restore wildlife habitat; improve and/or maintain rangelands; protect the characteristics of special areas; protect developed recreation facilities; and prevent watershed degradation. The FMP further specifies (Chapter 2, pages 2-5 and 2-6) that pinyon-juniper woodlands with less than 100-year-old trees should be treated through the use of prescribed fire or mechanical means to restore native shrub and grass communities.

The invasive annual, cheatgrass *(Bromus tectorum)* has moved into what were originally healthy sagebrush-dominated communities throughout southeastern Utah. Cheatgrass can increase fire frequency because it matures earlier in the season than native perennials, rapidly depletes available soil moisture, and dies back as the season enters the hot, dry period. Because cheatgrass thrives in a landscape with frequent, low-intensity fires it can spread quickly, especially in a sagebrush-steppe community as sagebrush can take much longer to recover from fire. In other words, as cheatgrass moves into an area it gradually converts that area into an environment more favorable to itself. Therefore, an increase in fire frequency in cheatgrass-invaded areas can lead to a cycle of cheatgrass expansion which can deplete sagebrush seed banks and convert native vegetation to cheatgrass monocultures (Whisenant, 1989). At the same time cheatgrass is moving into historic sagebrush-grass-forb communities, pinyon-juniper woodlands are also expanding into many mid-elevation sagebrush communities (Fire Science Digest, 2008).

The FMP for the Canyon Country Fire Zone outlines the risks, values, and hazards for the three field offices within the zone and delineates the entire area into fire management units. The 22 fire management units (FMUs) within the Canyon Country Fire Zone are discussed in the FMP in relation to wildland fire management goals for each unit. FMU boundaries were based on topographic features, values to be protected, political boundaries, fuel types, fire regime and/or condition class, accessibility and other distinguishing characteristics. The proposed action falls between FMU 16 – Dry Valley and FMU 17 – La Sal. Both of these FMUs are described primarily as a diverse mixture of open and closed pinyon-juniper woodlands with extensive sagebrush parks and grasslands. There are some existing areas of cheatgrass and other invasives that expand during wetter years, and areas in FMU17 that were previously chained and have been unmaintained over the years have a component of remaining slash. The FMP recommends fuel management strategies such as prescribed fire and mechanical and/or other types of treatment to reduce hazardous fuel conditions, and advocates treatment in vegetative communities with condition class two and three to improve forage in elk winter and spring ranges and for livestock grazing (Canyon Country Fire Zone FMP, pages 71-79).

1.4 Purpose(s) of the Proposed Action

The Canyon Country Fire Zone and Moab Field Office of the Bureau of Land Management (BLM) propose to reduce vegetative fuels and implement vegetative/habitat restoration activities within an approximate 30,000-acre project area of public lands administered by the BLM. The area proposed for treatment is in the foothills of the Manti La Sal mountain range along Black Ridge, an expansive area of slopes, mesas, and drainages. Black Ridge is located roughly ten to fifteen miles southeast of the city of Moab in the southeastern portion of Utah (see attached Map 1). In the early 1960's, the BLM reduced the pinyon-juniper woodlands in some areas of Black Ridge through the use of an anchor chain-type treatment in which trees were upended and root balls exposed. Slash created from the chaining was left on-site in some areas where it remains today. Other sections of the Black Ridge landscape were treated for fuels reduction and forage enhancement by prescribed fire and through the use of hand and mechanical cutting.

Maintenance of the treated areas has not occurred in the years that have passed since the projects were implemented. As a result, both pinyon and juniper trees have re-established and are the dominant vegetation in the previously treated areas as well as throughout the majority of the proposed project area. Interspersed throughout the expanse of Black Ridge are many thousands of acres in which the tree canopy is totally closed, robbing the understory of needed light and other resources necessary for survival. These thousands of acres of public land consist of dense stands of pinyon and juniper trees with very little to no understory grasses, shrubs or forb species.

Historic grazing practices over many decades removed the fine fuels that enabled wildland fire to naturally control tree growth, and grazing also reduced palatable herbaceous plant species while woody species gained the advantage. In addition to fewer wildland fires occurring in the area, modern firefighting techniques have been effective at suppressing wildland fires while they are relatively small. Most of the pinyon-juniper in the proposed project area matured during this historic period of fire suppression and outdated grazing practices, which has resulted in much higher densities and few natural openings. Portions of the mesa now have compromised ecosystems, a loss of biodiversity, and declining wildlife habitat and are currently experiencing accelerated rates of erosion. The goals of the proposed fuels reduction treatment would focus on the protection of resources a from a severe, high intensity wildland fire. In addition, project goals would include watershed and habitat restoration as well as safeguarding public health and safety in adjacent recreational and WUI areas.

In defining ―fuels reduction," the characteristics that comprise vegetative fuels include crown fuels (live and dead material in the canopy of trees), surface fuels (grass, shrubs, litter, and wood in contact with the ground), and ground fuels (duff, buried wood, etc.). Some of the vegetative components that may contribute to an increase in the number or intensity of crown fires are the continuity and density of the tree canopy combined with fuel moisture levels and wind. Shrubs and small trees also contribute to crown fires both by increasing the intensity of fire on the ground and serving as ―ladder fuels" that carry surface fire to the canopy. Surface fuels can also carry fire when vegetation is dead or

has low moisture content. Because of the potential for surface fires to ignite ladder fuels and result in a crown fire, surface fuels must also be considered when planning treatments. The relationship between surface and crown fire has been researched and described (Scott and Reinhardt, 2001), with specific methods identified to help determine stand-level fuels treatment prescriptions. In vegetative communities such as pinyon-juniper, effective treatments have limited crown fires by first reducing volatile surface fuels and then thinning trees or pruning to elevate the fuel base to above the ground surface. In designing a specific fuel treatment prescription, techniques for reducing crown fire occurrence and severity may include (1) increasing canopy base height, (2) reducing canopy bulk density, (3) reducing forest canopy continuity and (4) reducing surface fuels.

While fuel management prescriptions are designed to bring about a change in fire behavior for an identified project area, a relatively small acreage project may be irrelevant in the event of a landscape scale wildland fire. Consequently, although not every acre would need to be treated to effectively reduce the potential for high intensity fire, fuel treatment objectives take into consideration the functions and structure of larger landscape areas such as watersheds. Several federal and statewide programs such as President Clinton's Clean Water Initiative (1998) and the Utah Department of Environmental Quality's watershed protection plans, demonstrate the federal and local government commitment to restore and protect watersheds, with an emphasis on the principles of watershed management. Government agencies such as the BLM and Forest Service, along with state agencies, various community groups and the private sector are recognizing areas of mutual concern in solving natural resource issues as they relate to watershed goals. In October of 2000, several federal agencies and departments developed a "Unified Federal Policy for a Watershed Approach to Federal land and Resource Management." This Unified Federal Policy calls for each of the agencies to use a consistent, science-based approach to watershed assessment and to select priority watersheds for protection and restoration. Landscape-scale restoration treatments are now universally recognized as an instrument that can help restore resilience to watersheds to help them recover quickly from or even benefit from wildland fire. Because watershed management involves the combined workings of a watershed such as land use, soils, and vegetation, these resources are all essential project components when planning fuels reduction and restoration treatments.

Treatments may be designed not only to reduce wildfire hazard but also to maximize benefits for other resources. As such, restoration goals also target an increase in forage, the improvement of habitat for wildlife and/or livestock, the control of insect and disease outbreaks, the protection or improvement of a particular vegetative community such as sagebrush, and other purposes in addition to improved watershed conditions and watershed yield.

1.5 Conformance with BLM Land Use Plan(s)

As required by 43 CFR 1610.5, the proposed action is in conformance with established management guidelines. In September of 2005, the Utah Land Use Plan Amendment for Fire and Fuels Management (UT-USO-04-01) amended 21 of the BLM's land use plans

across the state to bring them into greater compliance with national guidance and direction for wildland fire and hazardous fuel reduction activities. The Utah Land Use Plan (LUP) amendment authorized the use of a full spectrum of fuels management tools in the Moab Field Office area to reduce the risk of catastrophic wildland fire and to restore ecosystems (2.2.2.1 Management Strategies and Actions to Meet DWFC, Page 2-4). The LUP Amendment identifies major vegetation groups, defines the desired wildland fire condition (DWFC) for each of the major groups, and authorizes fire and fuel management actions designed to accomplish DWFC (LUP Amendment, Chapter 2, Table 2.1, page 2-5).

Landscape level fire management goals and objectives authorized in the LUP amendment include fuels treatments designed to restore ecosystems and to protect human, natural and cultural resources (2.2.1 Proposed Action, Page 2-2). In October of 2008 the Moab Field Office Record of Decision (ROD) and Approved Resource Management Plan was authorized. The RMP identifies major vegetation groups, defines the desired future condition (DFC) for each of the major groups, and recommends actions including fire and fuel management to help achieve DFC. The RMP also adopts the comprehensive LUP Amendment for Fire and Fuels Management and carries forward the direction and guidance approved by the LUP Amendment (Moab ROD and Approved Resource Management Plan, page 58).

The proposed action falls within grazing allotments that are specifically identified in the Moab Field Office ROD and Approved Resource Management Plan as targeted for vegetation treatments through manual, mechanical, biological, or chemical methods and by prescribed burning and use of livestock (see Volume 1, Proposed RMP, page 3-41). The Moab Field Office ROD authorizes both maintenance of existing vegetation treatments and the implementation of new vegetation treatments through the above activities to increase available forage (page 71). The ROD also directs, in its livestock grazing goals and objectives (ROD, page 69), the implementation of National Sage-grouse Habitat Conservation Strategy (BLM, 2004) and the Strategic Management Plan for Sage-grouse (UDWR, 2002) where applicable. These sage-grouse strategies are specifically recommended for the Hatch Point and Black Ridge allotments, portions of which fall within the area of the proposed action. Fuel treatments in accordance with BLM sagebrush conservation guidance are recommended to benefit multiple use objectives (Volume 1, Proposed RMP and Final EIS, page 2-14, Table 2.1).

1.6 Relationship to Statutes, Regulations, or other Plans

The Federal Land Policy and Management Act of 1976 (FLPMA), as amended (43 U.S.C. 1701 et seq.) is the basic authority for BLM activities. It establishes the principle that public lands be retained in Federal ownership and provides for the management, protection, development, and enhancement of the public lands under the principles of multiple use, sustained development, and sustained yield.

The proposed action is directly tiered to, influenced and supported by the programmatic environmental report prepared for the assessment of vegetation treatment activities on public lands. The environmental report supports the use of a variety of fire and non-fire

treatment methods to reduce hazardous fuels, control unwanted vegetation, and improve habitat and resource conditions in 17 of the western states and Alaska. The analysis in the EIS consists of two parts: The *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Report* (17 States Vegetation PER), which evaluates the effects of vegetation treatments such as manual, mechanical, and biological activities (non-herbicide); and the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (17 States Herbicide PEIS), which analyzes the impacts of using herbicides on public lands. The scope of these analyses are to provide BLM field offices with information to: (1) assess and reduce the risk of catastrophic wildfires on public lands and in the WUI; (2) slow the spread of invasive plant species, noxious weeds, and other unwanted, undesirable, or competing vegetation; (3) improve ecosystem health by restoring fire-adapted ecosystems; (4) identify and implement best management practices; and (5) understand the potential cumulative effects of fuel treatment activities (17 States Vegetation PER, page 1-3, 2007).

The implementation of effective wildland fire management programs is mandated in Departmental Manual 620 (Wildland Fire Management). Section 1.5 (C) (Objectives) instructs the BLM to —..develop fire management plans, programs, and activities which are based on the best available science; that incorporate public health and environmental quality considerations; and support bureau land, natural, and cultural resource management goals and objectives."

The National Fire Plan (NFP) was designed to manage the potential impacts of wildland fire to communities and ecosystems and to reduce the risk of catastrophic wildland fire. Implemented in 2001 and encompassing agencies of the Department of Agriculture (Forest Service) and Department of Interior (National Park Service, Fish and Wildlife Service, BLM), the NFP focuses on strategies for improving fire preparedness, restoring and rehabilitating burned areas, reducing hazardous fuels, assisting communities, and identifying research needs. The National Fire Plan stresses accountability and collaboration at the local level (state, county and local communities).

Public Law 108-148, the Healthy Forests Restoration Act of 2003 (HFRA), focuses on hazardous fuel treatment of BLM lands at risk of wildland fire. HFRA was designed to address threats to forest and rangeland health, to protect, restore, and enhance ecosystems, and to intensify efforts to protect watersheds. Watershed condition is a term that describes the ability of a system to receive and process precipitation without ecosystem or hydrologic degradation (Brooks and others 2003). Conditions can be influenced by such things as the composition and density of vegetative cover, litter accumulations, and the amount of rock and/or bare soils in a watershed area. Because a wildland fire of high severity can destroy both vegetation and litter layer as well as altering soil properties, the ability of the watershed to process precipitation after a fire can be detrimentally impacted (RMRS-GTR-42-volume 4, Effects of Fire on Soil and Water). Restoration initiatives that focus on the retention of hydrologic equilibrium are the major focus of watershed management projects (Baker 1999, Baker et al., 1998). Section 102 of the HFRA authorizes the implementation of hazardous fuel reduction

projects on federal lands in proximity to a municipal water supply system or in proximity to a stream feeding such a watershed where a fire disturbance would have adverse effects on the water quality. Adverse effects could include those risks posed by erosion following wildland fire.

The Healthy Lands Initiative (HLI) was launched by the Secretary of the Interior in 2007 to improve the health of public lands in the western United States by accelerating land restoration and increasing productivity. The 2009 federal budget increased dollars for HLI and directed funding toward landscape-level restoration efforts in Utah and other western states. A portion of Utah's HLI funding was allocated for the restoration of sagebrush habitat through the Utah Partners for Conservation and Development (UPCD), while additional funds were directed toward Utah's Watershed Restoration Initiative (WRI). The WRI is also a UPCD-sponsored initiative that encourages collaboration among landowners, private organizations, state agencies, and federal agencies such as the BLM. WRI goals include a focus on the restoration and management of ecosystems to enhance wildlife and biological diversity, to improve watersheds by increasing water quality and yield, and to provide opportunities for sustainable land use. Of primary focus for the project proposed is the Utah WRI approach to ecosystem restoration through vegetation management and seeding. The BLM has previously submitted requests and received approval for collaborative funding that has augmented the procurement of seed and seed application for restoration projects in the Canyon Country Fire District.

The Utah Division of Water Quality (UDWQ) stresses the importance of treating uplands to stabilize soils in their Watershed Approach initiative. High severity fires can be followed by extreme soil erosion, with unstable soils that may be swept down drainages into lowland watersheds or water bodies. General standards for water quality in Utah are found in the "Standards of Quality for Waters of the State," R317-2-6, Utah Administrative Code, December 1997.

A memorandum of understanding (MOU) was developed between the Department of Interior, USDA Forest Service, State Foresters and the National Association of counties to prioritize the annual selection of fuels treatment projects in both the wildland-urban interface and outside the wildland-urban interface. In conformance with the guidelines developed within the MOU, areas that have the highest risk for catastrophic fire have been identified by cooperating agencies in southeastern Utah and prioritized for completion over the next several years to meet goals of both the President's Healthy Forests Initiative as well as the HFRA.

The Fundamentals of Rangeland Health (43 CFR 4180) regulations require the BLM to develop and implement rangeland health standards in consultation with Resource Advisory Councils. Standards for land health include measures such as fuels treatments to ensure functioning watersheds, riparian/wetlands, vegetation communities, and water quality resources.

As required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and the National Historic Preservation Act (16 USC 1531), local Native American tribes were notified of the proposed action in July of 2008.

The implementation of effective wildland fire management programs is mandated in Departmental Manual 620 (Wildland Fire Management). Section 1.5 (C) (Objectives) instructs the BLM to —…develop fire management plans, programs, and activities which are based on the best available science; that incorporate public health and environmental quality considerations; and support bureau land, natural, and cultural resource management goals and objectives."

Public Rangelands Improvement Act 1978, Title II (43 U.S.C. 1901 *et seq*.), as amended. Among other management objectives, this act provides for temporary discontinuance of grazing uses for the specific purpose of improving public rangeland conditions and production.

BLM Grazing Management Regulations, 43 CFR Subpart 4180.2(e), requires development of guidelines to address the restoration, maintenance and enhancement of habitats to promote the conservation of federally proposed, federally candidate, and other special status species.

BLM National Policy Guidance on Special Status Species Management (Manual 6840). This manual provides direction for the conservation of special status animal and plant species as well as for their habitats.

San Juan County is committed to reviewing relevant federal and state planning documents for issues directly relating to the county, and to responding and/or providing recommendations for plans. Although the San Juan County Master Plan, approved and adopted July 8, 1996 does not contain specific direction regarding fire and fuels management, it does list the broad vegetal types located on public lands within the county. Chapter V, —Resource Capabilities," page 50, generally addresses pinyon-juniper woodlands and discusses the lack of recent natural disturbance in these areas as well as the expansion of pinyon-juniper into sagebrush areas.

The proposed action alternatives and no action alternative are also consistent with other federal, state, and local laws, regulations, and plans to the maximum extent possible, including the following:

- Endangered Species Act of 1973 (ESA), as amended.

- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (Migratory Bird Treaty Act), January 11, 2001.

- Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances, November 1999.

- BLM –Best Management Practices for Raptors and Their Associated Habitats in Utah," Utah BLM, August 2006.

- Bureau of Land Management National Sage-Grouse Habitat Conservation Strategy, November, 2004; and, National Sage-Grouse Strategy Implementation, December 20, 2004.

- Federal Noxious Weed Act of 1974, 7 U.S.C. §§ 2801-2814, January 3, 1975, as amended 1988 and 1994.

- Environmental Protection Agency, 40 CFR 51.300, Protection of Visibility.

- Clean Air Act of 1963; Air Quality Act of 1967; Clean Air Act Extension of 1970; Clean Air Act Amendments of 1977 and 1990.

1.7 Identification of Issues

Project discussion, design, scoping and alternative development have been ongoing for many years regarding the best way to recondition the resources within and surrounding the Black Ridge area. An environmental assessment was prepared in 1999 for a prescribed fire treatment to restore vegetation on approximately 1,000 acres of an area along Black Ridge called Lackey Fan. Issues analyzed in the 1998 EA included cultural resources, fire ecology and management, air quality, soils, watershed, woodland/vegetation resources, wildlife, livestock grazing, recreation, visual resource management, roads, and Areas of Critical Environmental Concern (ACECs). The approving official signed a Finding of No Significant Impact and the decision was made to proceed with the treatment, although negative public response to the decision as well as a scarcity of fire and fuel resources resulted in postponement of the project.

The current project proposal was presented to the Moab Field Office resource staff in February of 2009. Specific direction from the Healthy Forest Restoration Act regarding the development of alternatives requires the BLM to study, develop and describe the proposed action and the alternative of no action. Furthermore, an additional action alternative or alternatives may be proposed during the scoping or collaborative process. The Interdisciplinary Team used a systematic approach in analyzing the proposed project and potential alternatives. Current scientific information was utilized in the development of the proposed action including analyses of similar pinyon-juniper fuels reduction projects within the Moab Field Office as well as data assimilated from Emergency Stabilization and Rehabilitation projects conducted in pinyon-juniper communities within and adjacent to the Moab Field Office boundaries. In addition to the expertise of the BLM fuels specialist, information was also exchanged with collaborating agencies including other federal, state, and local entities. The interested public was notified of the proposed treatment and the ongoing analysis phase of the project in May of 2009 through the Utah BLM State Office Environmental Notification Bulletin Board (https://www.blm.gov/ut/enbb/index.php).

Proposed vegetation treatments and the environmental analysis of each treatment are completed on a site-specific and project-specific basis. Because of the evolving nature of fuels treatment, the variety of factors involved in determining treatment alternatives, and the effect of unpredictable external factors such as drought, disease, and/or insect predation, each treatment area is analyzed on an individual basis to study the most effective way to achieve treatment goals. Although environmental analyses from previous NEPA documents and the data analyses from other fuels treatments were considered in the alternative selection process for this proposed action, specific information, effects, and activities associated with this project will be analyzed independently. For the purposes of this EA, the resources identified as potentially impacted by the proposed action that may affect or may be affected by watershed condition including floodplains, water quality, wetlands/riparian, and soils are listed as sub-headings under the watershed resource. Team analysis identified the potentially impacted (PI) resources listed below. Potentially impacted resources are described in Chapter 3 (3.3.2) and analyzed in Chapter 4 (4.2 and 4.3). Resources present but not impacted (NI) are discussed in Chapter 3 (3.3.1), while resources not present (NP) are omitted from further discussion (see Appendix A for Interdisciplinary Team Analysis Record Checklist).

1.7.1 Watersheds

- Overall long-term watershed benefits; see discussion in EA

1.7.1.1 Floodplains

- Overall long-term benefits; see discussion in EA

1.7.1.2 Water Quality

- Browns Hole residents use water from springs and streams for domestic and irrigation purposes; these sources need to be protected as well as upstream drainages.

1.7.1.3 Wetlands/Riparian Zones

- There are several healthy riparian areas in the project area.

1.7.1.4 Soils

- Impacts over the long term are positive and will improve overall watershed and soil conditions.
- Short-term impacts include soil compaction, increased erosion. Can be minimized by avoiding wet soil conditions and steep slopes.

1.7.2 Invasive, Non-native Plant Species

- Removal of vegetation has potential to spread invasive species.

1.7.3 Rangeland Health Standards and Guidelines

- Project may help to improve areas that are not meeting standards and guidelines. Information provided in EA.

1.7.4 Livestock Grazing

- Impacts to permittee by temporary closures but will benefit in long run.

1.7.5 Woodland/Forestry

- Proposed action will help return pinyon-juniper woodlands to healthy and functional levels.
- Opportunities for utilization such as firewood, Christmas trees, nut gathering should be considered.

1.7.6 Vegetation

- There are no documented special status plant species in the proposed project area.
- There will be impacts to P/J and sagebrush to improve watershed and vegetative cover.

1.7.7 Fish and Wildlife (Including Special Status Species)

- Suitable Mexican spotted owl habitat; approximately 75 acres.
- Deer and elk winter range
- Migratory birds and raptors habitat
- Turkey habitat

1.7.8 Recreation

- Would improve hunting opportunities.
- Would help in implementing designated route system.

1.7.9 Visual Resources

- Impacts in the long term are positive. The area is combination of VRM II and III. See write-up.

1.7.10 Fuels/Fire Management

- Reduction of over-stocked pinyon-juniper woodlands, chaining slash, and pinyon-juniper encroachment in sagebrush areas would restore ecological processes and reduce the threat to WUI and non-WUI areas from a catastrophic wildfire.

1.7.11 Socio-economics

- S/B positive – information provided.

1.8 Summary

This chapter has presented the purpose and need of the proposed project, as well as the relevant issues, i.e., those elements of the human environment that could be affected by the implementation of the proposed project. In order to meet the purpose and need of the proposed project in a way that resolves the issues, the BLM has developed several action alternatives and a no action alternative as outlined in Chapter 2. The potential environmental impacts or consequences resulting from the implementation of each alternative are then analyzed in Chapter 4 for each of the identified issues.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Introduction

The proposed Black Ridge treatment would be accomplished in several phases over an approximate ten-year period however, due to the wide distribution of fuels in the area, conflicts with other projects, extreme fire seasons, and/or budgetary constraints, the project could be extended. Each phase of treatment would be divided into treatment units with each unit averaging between 100-500 acres. The specific amount of acreage for each phase and lands treated within an individual unit would vary dependent upon vegetation type and fuel loading, and a single unit may be treated at one time or in conjunction with another unit.

The 30,000 acres encompassing the project treatment area involves a variety of vegetative communities with a mixture of topography that will assist in the design and planning for unit boundaries. Vegetative communities include sagebrush and grassy meadows, scrub oak and other brush, old-growth, young, and mid-age pinyon-juniper woodlands, and small pockets of ponderosa pine containing some old growth. The Moab Field Office RMP provides general guidelines to achieve the desired vegetative condition for the landscape of the field office. To achieve these conditions, a determination is made for each vegetative community that recommends specific treatment actions for a particular community to guide vegetation toward desired management directions or ―Desired Future Condition" (DFC). DFC guidelines are established in the RMP from a landscape-level perspective for each broad vegetative community (ROD and Approved Resource Management Plan, Appendix S). The guidelines for treatment actions to achieve DFC as outlined in the RMP are similar to the DWFC as described in Chapter 1.5 above and authorized in the LUP Amendment for Fire and Fuels Management.

A brief summary of treatment goals and objectives for the areas of treatment emphasis and, where applicable, references to DFC and DWFC are as follows:

Treatment Plan

1. Pinyon-Juniper Woodlands

Pinyon-juniper woodlands are spread throughout ten states in the western U.S., and in most cases have rapidly expanded over the past 200 years into the sagebrush steppe vegetative community (Tausch, et al., 2005) and other forest types. In southeastern Utah the woodlands are primarily mixed stands of Utah juniper (*Juniperus osteosperma)* and both singleleaf and two-needled pinyon (*Pinus monophylla and Pinus edulis*). Studies show that the average density of pinyon-juniper in sagebrush ecosystems in some Utah areas is 50% higher than it was historically (Chambers, et al., 2005). The Utah Land Use Plan Amendment for Fire and Fuels Management (page 2-5), and the Moab Field Office

Existing Treatment Area – Black Ridge

RMP (ROD, Appendix S-11) establish the DWFC and DFC for pinyon-juniper woodlands as open stands with an established grass and shrub understory. In non-historic

pinyon-juniper areas the restoration of the vegetative community that existed prior to pinyon-juniper encroachment is desired. Fire and fuel management objectives established in the Utah LUP Amendment include a wide array of fuel modification treatments and minimal suppression where possible to mimic the natural fire return interval (estimated to be 15-50 years).

Fuel management treatment goals in pinyon-juniper woodlands may be varied, although fuel load reduction, restoration of sagebrush communities, improvement of watersheds, and enhancement of forage production are common treatment objectives (Miller and Tausch, 2001). Research shows that increasing the treatment focus in these dense woodlands to a broad landscape scale can improve treatment effectiveness (Hann and Bunnell, 2001). ―Restoration" of the project area does not necessarily imply an objective of returning an ecosystem to a condition that may have existed at a point in history, but rather the restoration of functional processes required to sustain resource values.

Tree removal and/or thinning are the primary management tools employed in the process of decreasing fuel loads and continuity. With Stand Density Index (SDI) used as a measurement tool, thinning guidelines generally recommend reducing stands approximately 25% of maximum SDI or lower, which will open the canopy and allow an increase in understory species.

SDI is based on the relationship between mean tree size and the number of trees per unit area in a forest stand. The maximum SDI for pinyon-juniper stands has not been fully determined, although ongoing studies generally reflect a maximum SDI of 415 for mixed stands (Page, BLM, 2006). Treatment goals and objectives include leaving a select mix of vigorous pinyon and juniper trees of various size and age classes. The desired overall visual aesthetic following treatment is an open, park-like area with small clusters of multiple age classes of trees throughout the project area.

Desired Visual Aesthetic Following Treatment in Sagebrush

2. Sagebrush Meadows/ Grasslands

As one of the most widespread of the shrub communities in the southwest, sagebrush is a desirable component of a variety of vegetative zones and is an important browse species for both big game and livestock. Many sagebrush sites currently support some annual weeds including cheatgrass and may also be experiencing encroachment by pinyon-juniper. The Moab Field Office RMP (ROD, Appendix S-11) and the Utah LUP Amendment (page 2-6) identify the DFC and DWFC

for sagebrush stands as diverse age classes with healthy grass and forbs understory. Fire and fuel management objectives for this vegetative community involve a balance between invasive species concerns, wildlife habitat, and the restoration of an historic fire return interval. The Utah LUP Amendment and the Moab RMP recommend treating dense stands of sagebrush with fire, mechanical, or chemical treatments followed by seeding to improve native grass and forb density and cover and to remove encroaching pinyon and juniper trees.

Bullhog Working in Pinyon-Juniper

Because grasslands oftentimes inhabit areas with similar conditions as sagebrush, the DFC and DWFC for grasslands and recommendations for treatment are comparable to those suggested for sagebrush. Where native grasslands occurred historically, the DFC is native grass and forb communities (ROD, Appendix S-4). Recommended treatments are fire, mechanical, and/or chemical activities that would reduce encroaching trees, shrubs and invasive plants (Utah LUP Amendment, page 2-7; ROD, Appendix S-4). Management decisions authorized in the Moab RMP reflect the BLM National Sage-grouse Conservation Strategy in the implementation of vegetation and land treatments, in that sagebrush/steppe vegetative communities are a high priority for fuel reduction to avoid catastropic fire (Moab Approved Resource Management Plan – Vegetation, page 131).

3. Ponderosa Forest

The proposed project area may contain a few groupings of mid- to old-age growth ponderosa pine. These pines are well known for their long tap roots and heat tolerance, which allows them to grow in areas not favorable for other pine species. Prior to the early 1800's, ponderosa pine forests in the southwest United States generally burned under low- to mixed-severity fire regimes (RMRS-GTR-198, 2007). These types of fire disturbances kept the forest floor cleared of debris and dense regeneration, with stands that were less susceptible to large-scale crown fire. Ponderosa forests in the Colorado/Utah area were most likely open, park-like areas with clumps of even- or uneven-aged trees interspersed with grass-dominated meadows (White, 1985). In fact, southern Utah ponderosa forests are known to be somewhat of an anomaly (Battaglia and Shepperd, RMRS-GTR-202, 2007), as inventories indicate that the typical Utah ponderosa forest is poorly stocked and contain mostly young, small diameter trees (O'Brien, 1999). Ponderosa pine stands in the project area are considered to be outside

of their historic fire regime, and include few grassy openings and both tree age and size limits. Much of the ponderosa community has been infiltrated by pinyon-juniper, and other portions have a shrub-dominated understory with little or no grass or forb species. A wildland fire in this area would most likely result in severe fire effects and could include ponderosa stand-replacement.

According to the Utah LUP Amendment and the Moab Field Office RMP, the DWFC and DFC for ponderosa is an open stand with a native grass and forb understory (Chapter 2, page 2-7 and Appendix S-14, respectively). Fire and fuel management objectives include conducting mechanical fuels treatments, prescribed fire, and allowing fire to play a natural role when possible. Research involving thinning treatments in ponderosa pine forests throughout the west show that treatments focusing on the removal of smaller trees will generally be effective at reducing the potential for wildfire spread and intensity (Arno and Fiedler, 2005; Graham and others, 1999; Martinson and Omi, 2003; Scott 1998). In areas where pinyon-juniper and shrubs such as Gambel oak have expanded into the understory, restoration treatments are necessary before fire can be reintroduced. Ponderosa pines frequently grow in small clumps, often with interlocking crowns, which provide habitat for species that utilize tree trunks and crowns. The size, density, number, and location of such clumps profoundly affect both wildlife habitat and the future risk of crown fire. Finding a balance between wildlife habitat considerations, individual tree health, and future fire risk is a vital part of planning restoration treatments (Dennis and Sturtevant, 2007). Restoration treatments focus on returning the forest to irregularly structured, uneven-aged stands with a component of large-diameter trees that can withstand fire (Battaglia and Shepperd, RMRS-GTR-202, 2007). Shade-tolerant conifers and shrubs are removed or reduced with the eventual reintroduction of prescribed surface fire.

Example of Ponderosa Stand with Healthy and Diverse Understory

Mechanical equipment may be more cost effective in areas where there is a great deal of material to be removed, although thinning operations can hinge on other factors such as the size and amount of material to be treated, accessibility, and topography. Grazing activity should be managed following initial treatment to help establish the desired understory of grasses and forbs.

4. Wildland/Urban Interface (WUI)

The small communities of Pack Creek and Brown's Hole are within the area targeted for the proposed action. The town of La Sal is adjacent to the southeastern border of the project area, with homes typical of the wildland/urban interface that has become common throughout the southwest. The homes are miles from the nearest local fire suppression resources, structures intermingle with woodlands and brush, and the public lands adjacent to and surrounding the homes sites have been compromised by many factors and are susceptible to high intensity wildland fire.

Pack Creek Wildland/Urban Interface

In response to the destruction of many residential homes during the 1985 fire season, the USDA Forest Service and the National Fire Protection Association created a program called the National Wildland-Urban Interface Initiative. The program aimed to identify areas where hazardous fuels on public lands surround or intermix with residential or other private properties, and to determine an appropriate management direction for each of these areas. Values at risk within a WUI community are not limited to structures and infrastructure (i.e. roads and bridges), but also include lifestyle and environmental aspects such as recreation, scenery, wildlife and air quality. In its landscape level fire management goals and objectives The Utah LUP Amendment authorizes the reduction of hazardous fuels to restore ecosystems; protect human, natural and cultural resources; and to reduce the threat of wildfire to communities (Chapter 2, page 2-2). The plan amendment also establishes WUI areas as a fire management priority and sets the protection of human life as the primary priority (Chapter 2, page 2-12).

The proposed treatment would reduce hazardous fuels by increasing the canopy spacing, removing diseased trees and altering the fuel continuity in treatment units adjacent to the WUI communities. It should be noted that recent research results show that the potential for damage to homes from a wildland fire increases when the "home ignition zone" or the home and its immediate surroundings has not received fire prevention treatment. In a wildland fire situation, fuel reduction activities that have taken place on public lands in the WUI area can facilitate firefighter effectiveness but may not be sufficient to overcome and/or prevent the occurrence of fire within the home ignition zone. Community fire planning has been ongoing in many Utah communities bordering public

lands because community members acknowledge that reducing the potential for and the consequences from a wildland fire is increasingly important within the WUI lands across the western states. Several of the WUI communities within the proposed treatment area have completed their Utah Community Fire Planning workbooks in collaboration with the Utah Department of Natural Resources Forestry, Fire and State Lands (Utah FFSL). The completion of a community wildfire plan provides continuity between Utah's communities, facilitates information sharing in emergency situations, and enables a community to qualify for grant funding to assist in the completion of identified wildfire prevention treatments in and around home ignition zones. The goals of a community fire plan contain specifics regarding areas identified for fuels treatment, efforts to educate community members to prepare for and respond to wildfire, and the development of a comprehensive emergency response plan. The proposed treatments on BLM-administered public lands would involve collaboration with Utah FFSL and coordination with communities to ensure consistency with the goals and objectives contained in community fire plans.

5. Canyons/Drainage Bottoms

There are several drainages within the collective project boundary in which treatment methods may be modified to protect prospective or existing aquatic or riparian resources. Because canyons and drainages are areas most frequented by wildlife species and because drainages are also valuable components of the watershed, care will be taken to establish vegetative buffer zones at the head of drainages and along ridgetops to enhance raptor habitat and provide for watershed integrity. Trees containing obvious nesting cavities and/or stick nests would be avoided. Steep slopes and riparian vegetation in the vicinity of Muleshoe Canyon, Black Canyon, Cottonwood Canyon, Pole Canyon, Kane Creek Canyon, Buck Hollow and isolated springs would be avoided by mechanical equipment. Vegetation removal, when determined necessary to achieve fuel reduction objectives, would be accomplished through hand-treatment with chainsaws to mitigate water quality, floodplain and riparian impacts. Fuel reduction efforts in primary and other lesser canyons and drainages would focus on reducing pinyon-juniper and invasive non-native plant species. Piles of debris to be burned would not be constructed within fifty feet of the center of the draw or would not be piled in areas that could be impacted by normal flood flows.

6. Cheatgrass and other Invasives

As emphasized in the Moab Field Office RMP, the BLM recognizes noxious weed invasions as one of the greatest obstacles to achieving rangeland health (RMP, page 3-173). Goals and objectives authorized in the Moab RMP include managing for vegetation restoration, including the control of weed infestations and control of invasive and undesirable nonnative species (Moab Approved Resource Management Plan – Vegetation, page 131).

In its comprehensive compilation of the "how to, what with, and why" for restoration of western lands (RMRS-GTR-136, "Restoring Western Ranges and Wildlands, Volume 1), the USDA recommends that any treatment designed to eliminate or effectively control cheatgrass must take into account both live plants and fall and/or spring germinated seeds

(Volume 1, page 255). Herbicides can effectively control cheatgrass even at low application rates, and more recent herbicides have been developed that will control cheatgrass while having little or no impact on dormant perennials. Regardless of the type of herbicide or the application method, weed eradication using herbicides must be consistent with the Final Environmental Impact Statement and Record of Decision (Utah) for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991b) and the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States (BLM 2007b).

Research is ongoing on the best method to achieve optimum control of cheatgrass, and application can depend on the type of herbicide applied. Although in the past it has been recommended that herbicide be applied in the spring after cheatgrass greenup followed by seeding of desired grasses and forbs (RMRS-GTR-136, page 255), new research following the application of the herbicide Plateau® shows that fall treatment can enhance the development of desired species.
(www.westernwildfire.org/pages/researchabtcheatgrass.html).

At this time there has not been a method determined to completely eliminate both the live plants and seeds of annual invasives such as cheatgrass. However, because the weed now infests about 100 million acres of the western United States there are many ongoing tests and research focused on various methods of control. New results may be forthcoming regarding control methods such as biological treatments (soil fungi) and/or the establishment of perennial greenstrips that may be found to be effective in combating the spread of annual invasives. The Moab Field Office RMP states that the DFC of areas determined to be at risk of invasion and those areas where invasive species are present is to control spread and take actions to restore the desired vegetative community (ROD, Appendix S-24).

The Moab Field Office RMP also emphasizes and authorizes the reduction of tamarisk and Russian olive through vegetation treatments to enable the restoration of native riparian habitat (Moab Approved Resource Management Plan – Vegetation, page 132). The watersheds of the Colorado River Basin are now infested with both the Eurasian tamarisk and Russian olive. Over the past several decades, these infestations were found mostly along river corridors but these prolific woody species have now moved into side canyons where springs or even intermittent sources of water provide enough sustenance for both of the species to establish. Tamarisk and Russian olive dominance over native species are well documented and ecosystem effects include increased risk from wildland fire; reduced forage and habitat value for many species of wildlife; degraded aesthetic values (recreational access); increased surface soil salinity levels; decreased water availability; and degradation of biodiversity.

The methods most commonly used throughout the Canyon Country Fire Zone for treating Tamarisk and Russian olive infestation are manual, mechanical, and chemical activities, usually along with or followed by revegetation actions such as seeding and planting. Mechanical mulching of the above-ground biomass accompanied by herbicide treatment of the stump with triclopyr or imazapyr has been used to treat tamarisk in accessible areas

along the Colorado River. Both of these herbicides are authorized for use by the 17 States Herbicide PEIS. Re-application of herbicide is necessary to control re-sprouts of both species following initial treatment, although the recent introduction of the tamarisk leaf beetle has shown promising results in the control of tamarisk re-sprouts. In less accessible areas, hand cutting followed immediately by hand herbicide application to the cut-stump can be effective. This method is most cost-efficient and effective in areas where there are small densities of invasive species.

Russian Knapweed, spotted knapweed, purple loosestrife and other invasive forbs and flowers are also present and spreading throughout the Canyon Country Fire Zone. Herbicide spraying and other methods to combat the spread of these and other noxious and invasive weeds are authorized in the Moab Field Office RMP, with an emphasis on managing for desired future conditions of ecological diversity, stability, and sustainability (Moab Approved Resource Management Plan, Vegetation, page 131).

7. Wildlife Improvement Areas

Treatments in identified habitat improvement areas would be designed with broad goals for each targeted species and would complement the overlying goals and objectives of the project. Habitat improvement may include manual treatments in some areas (hand thinning and piling) as well as mechanical bullhog fuels reduction. Follow-up treatments including prescribed fire, herbicide, or other methods may be necessary to meet specific goals for a particular species. Seeding may also be tailored to specific needs of a species, although monitoring would be essential to assess the potential need for maintenance seeding or other follow-up activities. Habitat improvement may include site-specific strategies such as construction or modification of existing water developments or the construction of small protective enclosures to protect existing water sources. The proposed project as described in Chapter 2 identifies more specifically the targeted species and improvements proposed for this project.

8. Rangeland Health and Livestock Improvement Activities

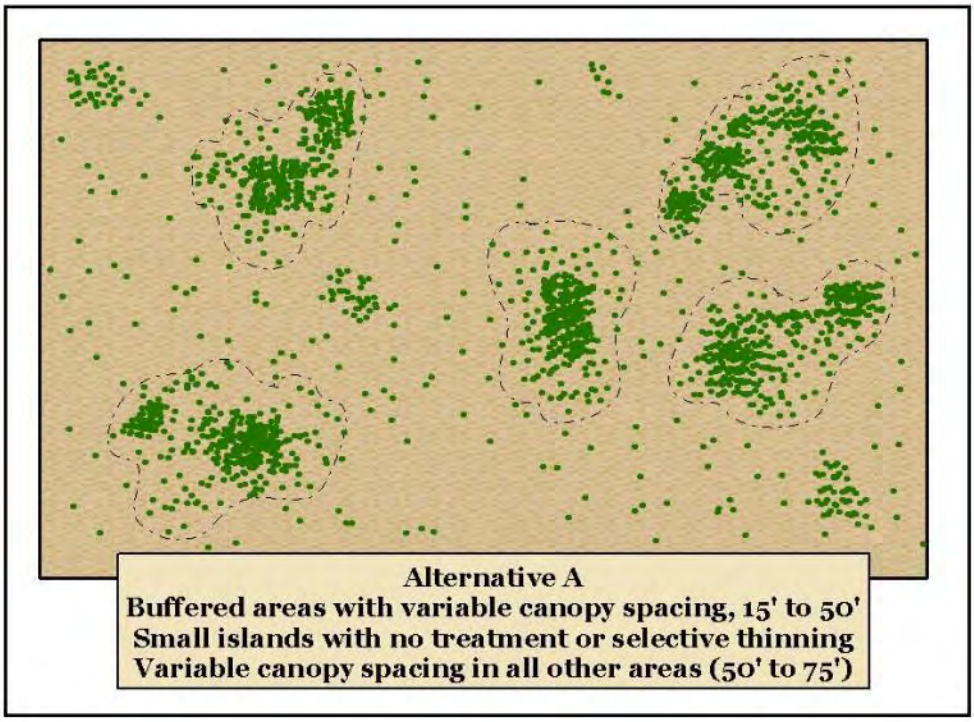
Over the past decade, scientific studies and practical experience have shown that livestock grazing has substantial value in the accomplishment of ecological objectives. Integrating livestock grazing with fuels treatments is becoming an important management tool in achieving rangeland health goals and objectives as well as in improving the general health of ecosystems. Just as activities such as prescribed burning can be an effective tool in reducing vegetation, grazing management schemes can be utilized to increase herbaceous fuels or to reduce a targeted species of vegetation. Results of this type of treatment would mimic the shifting mosaic pattern of vegetation which ecologists describe as central to historic landscape heterogeneity and sustainability (Kay, 1998).

Alternative grazing strategies are designed to capitalize on livestock use to create plant species diversity and intentional forage utilization mixtures. Because continuous grazing does not create highly used, moderately used, and unused areas of vegetation that would mimic the desired landscape mosaic, livestock management can be utilized to impose these disturbance patterns through required rotation.

Livestock management methods such as rapid rotational grazing, water developments, fencing, and herd dynamics (salt and mineral placement, etc.) could be designed for use throughout the project area. Pasture rotational grazing could involve moving herds through a series of paddocks or fields on a seasonal basis and increasing or decreasing the amount of time livestock could access a field. Pasture rotations combined with complete resting of pastures on a semi-annual basis can be designed to increase the amount of lands effectively rested, reduce forage selectivity, and improve livestock distribution.

2.2 Alternative A – Proposed Action

Collective Treatment Area – Approximately 30,000 Acres – See Map (Appendix B)



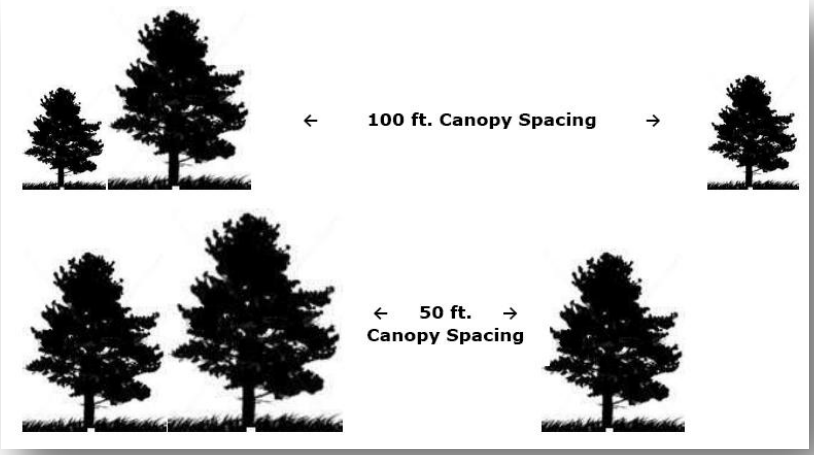
Treatments would be implemented through a combination of mechanical and hand cutting, utilizing a bullhog along with chainsaws and other hand tools. The objectives of this alternative would be to create variable canopy spacing throughout the proposed project area ranging from small groups of untreated areas to wide canopy spacing of 50 to 75 feet. Buffered leave islands with variable canopy spacing ranging from 15 to 50 feet would be located throughout the project area containing an assortment of mixed-density pinyon-juniper groupings. This alternative would include ―feathering" the edges of vegetative islands and along steep cliff edges. The feathering of edges includes undulating edges horizontally and creating diverse heights in the brush retained on site. Feathering of outermost unit edges and the retention of some snags would reduce the straight line visual aesthetic resulting in an open savannah with very light surface fuel

loading. Pinyon and juniper trees would also be removed from sagebrush meadows and grassy areas. All trees would be removed in select areas outside of buffered islands to compensate for tighter canopy spacing within buffers, to limit the potential for spread of high-intensity wildland. Various activities would be continued in phases (see Phase One below) until all targeted vegetation within the collective project area had received treatment. The full treatment could potentially continue throughout a decade with maintenance operations ongoing indefinitely.

Treatment Methods

Treatment methods would be based on fuel reduction designs most likely to achieve project goals and objectives for a specific vegetative type, while combined treatments would have specific but far-reaching goals and objectives. Treatment units that fall within an area one-to-two miles from homes and infrastructure would be considered wildland-urban interface (WUI) units, with a primary objective of reducing hazardous fuels to protect public and wildland firefighter safety and to improve the chances of defending infrastructure in the event of a wildland fire.

The treatment plan would also target the reduction of closed canopy pinyon-juniper woodlands to modify wildfire behavior and restore grass understory for wildlife and livestock forage and habitat. Sagebrush meadows would be evaluated individually to determine the most effective method to improve or maintain the health and productivity of a given community. In addition, the treatment would involve the restoration and protection of a portion of southern Utah's remaining isolated ponderosa pine stands. Reducing the number of encroaching pinyon-juniper trees and reintroducing understory fire is the recommended restoration approach to preserve this valuable resource.



Canopy Spacing

Individual treatment activities could be influenced by a number of factors such as extreme fire seasons, climatic patterns, or conflicts with other projects. Different fuel reduction methods target different components of the fuel bed, and in woodlands that have not experienced fire for many decades, multiple treatments may be required to restore resiliency to an ecosystem (RMRS-GTR-120).

"Feathering" of Edges

Leave Islands

Buffered Leave Islands with Feathering

Restoration efforts with a mixture of mechanical and non-mechanical methods provide an effective means of creating a vegetation mosaic ranging from open woodlands to clumps of trees for wildlife cover, and from grasslands to sagebrush meadows (Brockway et al., 2002).

Work would be conducted by BLM crews with coordination and potential assistance from other federal and Utah state agencies and/or BLM-contracted crews. Contracts utilized for BLM work would include specific language to prevent the pollution of air, soil and/or water through contracted operations; along with a cleanup and/or restoration clause in the event operations or equipment failure or other actions by contractor, contracted employees and/or representatives resulted in the pollution of public lands. Contract language would also define a "hazardous substance," specify a "reportable quantity" of released hazardous substance, and describe notification regulations in the event a reportable quantity of hazardous substance was released.

In addition to equipment inspection guidelines and equipment cleaning measures to prevent the introduction and/or spread of noxious weed material, contract specifications would include federal regulations regarding sanitary facilities for staging areas and/or worker campsites, trash disposal requirements and other pertinent regulations.

If either cultural or paleontological resources were encountered during treatment activities, work at that specific location would be discontinued until field office staff could be contacted. Restoration, fuels reduction, and follow-up maintenance actions in each project unit may include such activities as: Hand cutting with chainsaws; mechanical chipper/shredder (bullhog); pile burning; broadcast burn; herbicide; seeding;

rangeland manipulation techniques; and wildlife and/or livestock improvements. A description and the general purpose for several of these activities are summarized below.

Manual Treatment (Hand Cutting, Piling, Lop and Scatter) -- Manual thinning by hand crews is commonly used in fuels reduction treatments to reduce both canopy and ladder fuels. Thinning from below removes intermediate trees and limbs from targeted trees, an effective method to reduce fire spread. Manual thinning is typically used in areas not suitable for mechanical treatment such as steep, rocky slopes, and in areas with resources that require mitigation such as cultural or riparian. Cut trees and brush from hand thinning is either scattered across the ground to add surface fuels for follow-up prescribed fire, or stacked into piles. Piles of debris to be burned would not be constructed within fifty feet of the center of draws or would not be piled in areas that could be impacted by normal flood flows. Contract stipulations state that pile size will be no larger than six feet by six feet to mitigate potential heat-related soil damage from burned piles. Piles would be burned during peak soil moisture conditions, preferably during periods of light snow cover, to minimize soil sterilization and to decrease mortality risk to nearby live trees. Riparian and floodplain areas would be revisited yearly to apply herbicide or to remove re-growth of undesired plant species.

Mechanical Treatment – A mechanical brush cutter, chopper or mower, sometimes called a ―bullhog," reduces selected trees and shrubs to ground level while minimizing disruption to soil and root material. Mechanical treatments provide an effective means of more rapidly restoring pinyon-juniper woodlands to a grassland ecosystem than can be achieved by other treatments such as prescribed fire alone (Brockway et al., 2002). A bullhog is both efficient and economic in that it reduces fuels in a single treatment. Bullhogs have been used Utah-wide in many fuels reduction treatments over the past decade, and research results from these treatments are providing valuable information for future treatments. For example, recent studies are showing that the shredded materials remaining following bullhog treatment may help reduce erosion and in some cases may add nutrients to soils (SageSTEP News, 2008).

Several fuel reduction designs were discussed, with the intent to determine a design that would address multiple resource concerns including wildlife, cultural, rangeland health, and watershed resources. Each of the designs would also meet the overlying goals and objectives of fuels reduction and the long-term restoration of a sustainable, dynamic ecosystem. Treatment discussions focused on a ―best" combination of designs such as varied canopy spacing, buffers, edge feathering, and buffered ―leave islands" in

consideration of the many resources found in the proposed project area (see illustrations for examples of treatment alternatives).

In general, mechanical treatment would be tailored to meet specific resource goals and bullhog use would be determined by both topographical and vegetative conditions. Use of mechanical equipment would be discontinued at the discretion of the BLM during periods of precipitation when soil moisture content could increase the potential for deep ruts and/or excess soil compaction.

Prescribed Fire – Low-intensity as well as high-intensity fire, set and carefully monitored by fire crews, is an economic and ecological treatment method for the removal of surface and ladder fuels. High-intensity fire is utilized for tightly controlled stand-replacement fires, usually in pinyon-juniper, that may be conducted on lesser acreage units with a goal of mixed-severity results. Prescribed fire is normally conducted in the early spring and late fall and only under specific conditions dictated by humidity, wind speed, moisture levels, and time of day. A detailed burn plan delineates weather and fuel moisture conditions required to meet resource objectives. A test fire is typically conducted prior to full ignition to ensure resource objectives can be met. Ignition of a burn would be conducted by hand (drip torches using a diesel/gasoline mixture), aerial ignition, or by truck-mounted terra torch (utilizing a gasoline/alumagel mixture).

During the burning of debris, natural and man-made barriers and/or an established wetline can be used as control lines. Smoke management during burning would comply with Utah Department of Air Quality (DAQ) regulations, which are in place to provide for maximum smoke uplift and dispersal to reduce localized haze and smoke inversion.

Prescribed Fire in Ponderosa

Burning would be limited to periods of time that meet current DAQ clearing indices. To prevent cumulative air quality impacts from simultaneous treatment projects that may be conducted in the area by other agencies, project burning would involve interagency notification and cooperation.

Herbicide Treatment – Whether or not cheatgrass or other non-native invasives move into an area following prescribed fire or other fuel manipulation activities depends on the original vegetation as well as other factors. In areas where invasive annuals are present prior to treatment, fuel reduction and restoration activities may inadvertently promote the spread of nonnative invasive species. Increased light levels resulting from the removal of

fuel, changes in soil nutrients and hydrology, prescribed fire, and even minimal amounts of soil disturbance may provide conditions that favor invasive species. Herbicide treatment has proven to be a valuable option for controlling annual species competition prior to seeding in restoration treatments. For example, specific herbicides have been identified that are effective in controlling cheatgrass prior to seeding without damaging most of the perennial native species typically found in the southwest. In this proposed restoration treatment, herbicides may be applied selectively in specific areas when necessary to control cheatgrass or other invasives prior to seeding.

Because the sprouting of Gambel oak, in particular, is stimulated in response to thinning and/or fire, reduction of Gambel oak may be necessary to decrease competition with seeded herbs. Herbicide treatment of oak is usually designed to retain the shrubs while allowing reintroduction of understory herbs (RMRS-GTR-136, Chapter 17, Page 218, 2004). The reintroduction of fire following restoration treatment would then keep the growth of new sprouts within desired levels.

The original Vegetation Treatments on BLM lands in 13 Western States Environmental Impact Statement and 1991 Utah Record of Decision, as well as the Moab Field Office RMP authorize the use of herbicide application in treating tamarisk, Russian olive, and other riparian invasive and non-native species. Imazapyr (Arsenal®) and/or triclopyr (Garlon®) have been used in treating tamarisk and Russian olive in the Moab Field Office for many years. Treatment by removing aboveground stems followed by foliar application of herbicide to the cut stems has proven to be effective in the control of these species in isolated stands.

As mentioned above, the use of specific herbicide active ingredients and formulations on BLM lands in Utah was authorized by the 17 States Herbicide PEIS in September, 2007. The PEIS identifies potential impacts to the natural and human environment from the use of herbicides, incorporates standard operating procedures and mitigation measures to ensure the protection of resources, and approves for use on western BLM lands specific herbicide active ingredients including several that were not analyzed and authorized in the Vegetation Treatments on BLM lands in 13 Western States Environmental Impact Statement and 1991 Utah Record of Decision.

Cheatgrass

Standard operating procedures (SOPs) are the management controls and performance standards intended to protect and enhance natural resources potentially affected by vegetation treatments that include the use of herbicides. In herbicide treatment applications, the BLM Canyon Country Fire Zone would follow SOPs for herbicide use identified in the 17 States Herbicide PEIS (see Appendix C) to ensure that risks to human health

and the environment from treatment actions are kept to a minimum. In addition to using the SOPs identified in Appendix C, the BLM would also implement mitigation measures (see Appendix C) described in the PEIS to alleviate potential adverse environmental effects as a result of vegetation treatment activities using herbicides. The use of a specific list of herbicide active ingredients and formulations is approved in the PEIS contingent upon uses and application rates as specified on individual herbicide product labels. Application of active ingredients is allowed only where state registration permits the use of these ingredients. The BLM would comply with all Utah state registration requirements for the use of herbicides. Herbicides could be applied manually with hand-held devices or with broadcast sprayers from an ATV.

Seeding – Units within the entire project area may be seeded following or prior to treatment with both native and selected non-native grasses, forbs and browse species. Seed selection would be determined through collaboration with resource specialists and from monitoring results in similar vegetative communities. Seed selection would also be based upon the most current data regarding the establishment of species likely to promote successional changes toward the desired vegetative community. Seeding would be accomplished with a broadcast spreader or harrow dragged behind an ATV or tractor, through the use of a rangeland drill, or by aerial methods. Monitoring of treatments including documentation of seeding success in the sagebrush parks would be utilized in planning for future sagebrush/grassland treatments.

Drill Seeding

Seeding treatment in units that have been identified by resource specialists as those that would benefit from seeding would be designed and implemented with consideration given to existing pasture locations within grazing allotments. Pastures that encompass units receiving seeding treatment would be rested for a period of two growing seasons or until management objectives were met, to allow plant species to establish prior to the reintroduction of livestock.

While the long-term goal of seeding is to improve understory and vegetative diversity to benefit wildlife and range habitat, minimizing impacts to the permittee in a landscape-level treatment covering multiple pastures is also a consideration. Utilizing existing pasture boundaries or constructing permanent and/or temporary fences within existing pastures would provide the greatest chance for seeding success while minimizing impacts to permittees. To further minimize adverse effects, all units identified for seeding that are situated within a particular pasture would be seeded simultaneously, while seeding throughout the life of the project would be staggered from year to year. Using a staggered seeding implementation schedule for multiple units would ensure that the total acreage restricted from livestock for a given period of time would be minimized.

Treatment Collaboration
A memorandum of understanding (MOU) was developed between the Department of Interior, USDA Forest Service, State Foresters and the National Association of counties to prioritize the annual selection of fuels treatment projects in both the wildland-urban interface and outside the wildland-urban interface. In conformance with the guidelines developed within the MOU, areas that have the highest risk for catastrophic fire have been identified by cooperating agencies in southeastern Utah and prioritized for completion over the next several years to meet the goals of the HFRA.

In the past several years, the BLM Canyon Country Fire Zone has worked closely with the UPCD on both restoration and emergency stabilization and rehabilitation projects. As mentioned above in this document, the focus of the UPCD is land health, and the partners work together to combine resources, increase effectiveness, and provide solutions to conservation issues. Proposals for projects related to healthy ecosystems are presented to a regional UPCD team and entered into a statewide database for review and potential funding following regional team meetings. Funding can provide critical assistance for a variety of projects such as habitat manipulation (fuels reduction), seed procurement, and providing equipment and/or personnel to assist in project implementation. The BLM Canyon Country Fire Zone has benefitted from collaboration with UPCD in the past and will be submitting a proposal to enlist future UPCD support for several portions of the Black Ridge project.

Monitoring
BLM monitoring projects are ongoing from Canyon Country Fire Zone treatments in similar vegetative communities in the Moab, Monticello and Price field offices, and treatment results are utilized in both design and methodology for proposed projects. Because restoration is a relatively new science, treatments may deviate from the predicted or desired outcome even in a carefully planned and implemented treatment. Treatment monitoring is therefore essential to improve future project planning as well as to contribute to the growing database of monitoring results. Partnership between agencies is a critical step in adaptive management of forests and woodlands in southeastern Utah and the Canyon Country Fire Zone has taken the lead in an effort to combine datasets such as past fire occurrence and fuels treatments with newer treatment data from cooperating agencies in southeastern Utah to create a comprehensive look at collective activities on a landscape scale.

Joint research studies have taken place in several other project areas within the Moab and Monticello Field offices. The BLM and the University of Colorado (CU) are collaborating on research studies to evaluate different types of fuels management treatments (mechanical, manual and prescribed fire) to measure potential effects on soils, water quality and vegetative recovery. Research collaboration supports the BLM's ongoing efforts to better understand the ecological processes occurring in pinyon-juniper stands and assists in the design of future treatments in this type of ecosystem. Research and monitoring results from the Black Ridge project would be incorporated into management decisions regarding future resource treatments in the Canyon Country Fire Zone.

Monitoring of treatments including documentation of seeding success in the sagebrush parks would be invaluable in planning for future sagebrush/grassland treatments. Research and monitoring results would be incorporated into management decisions regarding future resource treatments that could include maintenance prescribed burning, additional seeding, reintroduction or adjustment of grazing seasons or numbers, additional mechanical and hand-cutting treatments, and/or other actions. Management decisions requiring treatments not previously analyzed could initiate further environmental assessment.

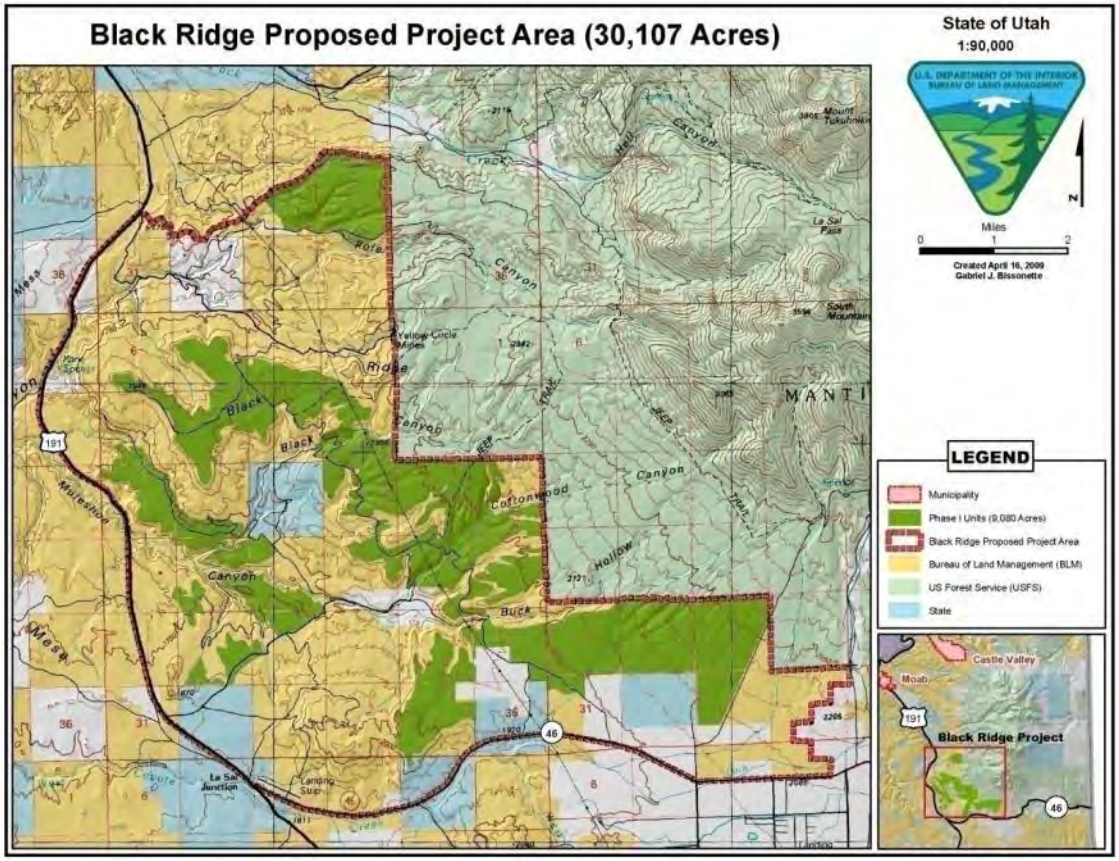
Phase One Treatment Area - Approximately 9,100 Acres

The Phase One restoration and fuels reduction treatment would involve vegetative manipulation over approximately 9,100 acres (green-colored area on map below) of BLM-managed public lands within the 30,000 acre proposed Black Ridge project area. Activities in the Phase One proposal include approximately 6,040 acres of maintenance treatments within previously chained areas and closed canopy pinyon-juniper woodlands (units 12-23), approximately 1,340 acres of sagebrush/grassland treatment (units 3-8), and an estimated 1,700 acres of old growth pinyon-juniper (units 1, 2, 9, 10 and 11). Additionally, areas would be targeted for specific activities including small pockets of ponderosa forest, canyons and drainages, and areas with existing cheatgrass. Wildlife improvement areas as well as rangeland and livestock improvement actions are also included within the proposed action.

Individual treatment methods would be identical to those identified above (pages 23 to28) for the collective proposed project area. Various activities would be continued in unit increments until all targeted vegetation within the Phase One project area had received treatment. It is anticipated that the vegetative thinning and seeding for the first units in Phase One of the treatment could take two to three years for completion. The timing and implementation of specific treatments are dictated by budget and contracting constraints.

1. Restoration (Previously Chained Areas and Pinyon-Juniper Reduction)

Approximately 6,040 acres of old chainings and re-growth would be treated to remove slash, new growth, and flammable brush. Activities would include use of a bullhog in the majority of the chained areas, which have experienced significant re-growth of vegetation since the original chaining treatment. In other areas where re-growth has been lighter and where existing slash is minimal, vegetation may be cut and scattered and then burned at a later date. In areas such as ridges and steep drainages that are not accessible by equipment, manual cutting and piling may be utilized to achieve the desired feathering effect. Many of the treated acres would be seeded with a mix of native and non-native grasses, forbs and shrubs to promote a diversity of understory vegetation.



2. Sagebrush/Grassland Treatment

Approximately 1,340 acres of sagebrush meadows (overall combined acreage in Phase One proposed project area) would be treated mechanically (bullhog) to remove encroaching pinyon-juniper, overly-mature sagebrush and other non-desired brushy species. The intent would be to protect the integrity of the sagebrush meadow with a goal of restoring a mixed-age class of sagebrush and a more diverse understory to benefit sagebrush-dependent wildlife species. Some of the treated acres may be seeded with a mix of native and non-native grasses, forbs and shrubs to promote a diversity of understory vegetation.

3. WUI Treatment

Phase One would include treatment on public lands adjacent to the WUI communities of Pack Creek, Brown's Hole, and the northern portion of La Sal. These WUI communities are at risk in the event of a wildland fire because their location would put them in the fire's path, and also because there are many homes within the WUI built with flammable construction materials (log homes, framed homes with wood siding, etc.). In addition, some of the private lands within these WUI's have limited ingress and egress, having only a single road with little or no turnaround to facilitate fire fighting activities.

Fuel reduction on public lands in the immediate vicinity of homes and infrastructure or in the defensible zone (approximately one-eighth to one-quarter of a mile) would involve mosaic-patterned thinning of excessive vegetation to reduce the canopy and remove ladder fuels. This type of reduction would create both a fuel break and a defensible space from which firefighters could combat a wildland fire. Diurnal wind patterns in this area result in a more ―fire-prone" side of the communities from which fire would be most likely to threaten private infrastructure. Light thinning of any dense groups of trees and pruning lower limbs of remaining trees would occur throughout this fire prone area within one-quarter to one and one-half miles from the community.

Remaining slash and/or surface fuels from manual thinning would be removed through broadcast or pile burning. Prescribed fire (broadcast fire) is normally conducted in the early spring and late fall and only under specific conditions dictated by temperature, humidity, wind speed, moisture levels, and time of day. A detailed burn plan delineates weather and fuel moisture conditions required to meet resource objectives. A test fire is typically conducted prior to full ignition to ensure resource objectives can be met. Ignition of the burn would be conducted by hand (drip torches using a diesel/gasoline mixture), aerial ignition, or by truck-mounted terra torch (utilizing a gasoline/alumagel mixture).

Pile burning is usually conducted throughout the winter months, preferably when a light snow covers the ground and fuel moistures prevent potential scorch of adjacent living trees. During the burning of debris, natural and man-made barriers and/or an established wetline can be used as control lines. All smoke management requirements associated with any prescribed fire activities (broadcast or pile) would comply with Utah DAQ regulations, which are in place to provide for maximum smoke uplift and dispersal to reduce localized haze and smoke inversion. Burning would be limited to periods of time that meet current DAQ clearing indices. To prevent cumulative air quality impacts from simultaneous treatment projects that may be conducted in the area by other agencies, any project burning would entail interagency notification and cooperation.

4. Ponderosa Forest

Treatment would focus on the removal of smaller trees and shrubs as well as pinyon and juniper trees growing in the understory of ponderosa pine forests. Activities could include mechanical, manual cutting with lop and scatter or piling, pile burning and/or herbicide. Some areas would be treated through a low intensity understory burn either as an initial treatment or as a maintenance treatment to sustain desired stand conditions. Goals for treatment in these small ecological units would center on returning the forest to irregularly structured, uneven-aged stands with a component of large-diameter trees that can withstand and benefit from the eventual reintroduction of prescribed surface fire.

5. Canyons/Drainages

Heavy equipment would not be used to reduce fuels in riparian areas. Some areas may be treated by hand crews to thin, pile, and burn hazardous fuels and/or thin, pile, burn, and chemically treat tamarisk or other invasive non-native species. Specifically, Cottonwood Creek has a dense, well-developed riparian zone due to adequate perennial stream flow. Because this is also the main water source for the Brown's Hole community, it is critical to protect the riparian integrity while reducing the threat of a high-intensity fire. The goal of treatments in drainages like Cottonwood Creek would be to create small fuel breaks at strategic locations to impede the spread of a wildfire up through riparian/canyon drainage areas. A resource advisor would be consulted in situations where fuel removal in riparian areas may benefit and/or restore impaired areas (i.e. clearing of brush and dead debris, removal of tamarisk or other invasive non-native species). Piles of debris to be burned would not be constructed within fifty feet of the center of the draw or would not be piled in areas that could be impacted by normal flood flows.

6. Cheatgrass and other Invasive Species

Herbicides as approved for use in the 2007 17 States Herbicide PEIS may be utilized to reduce the density of invasive, non-native, or other noxious weed species in various areas of the proposed action. Specifically, the use of Plateau® herbicide may be utilized prior to seeding in areas with a cheatgrass monoculture or in sagebrush/grassland areas that may be at risk of encroachment from patches of adjacent invasives. Other vegetation of specific concern includes tamarisk and Russian olive (riparian areas) and Russian knapweed. Herbicides may be used as the primary treatment or in coordination with mechanical treatments to reduce the presence or spread of invasive and noxious weeds.

7. Seeding

See seeding section in Collective Treatment Area above (page 28). In the Phase One treatment, some pastures that have seeded portions would be closed for at least two growing seasons. Cattle would be kept out of the pastures with the use of existing pasture barriers (fences and topographic barriers) in most areas. In the Mud Springs, Brown's Hole and Lackey Fan Pastures, new fencing could be constructed around seeded treatment units.

8. Wildlife Habitat Improvements

Thinning would be implemented to create and maintain a mix of forage interspersed with hiding/security and thermal cover to maintain or improve the current habitat for mule deer. Pile burning and/or prescribed fire would be used to remove decadent sagebrush and other vegetation to allow regeneration of understory vegetation and to impede forest succession.

Within Restoration Areas (see 1. above) and Sagebrush/Grassland Treatment areas (see 2. above) wildlife habitat improvements may include leave islands centered around larger, older trees and dead snags to facilitate raptors and owls. Large, aging single trees (>12-14" in diameter) and old snags would be left standing for raptor use. Leave islands would be designed to offer a mosaic mix of size and age class of both pinions and junipers where possible, to offer deer and elk thermal and escape cover.

To ensure migratory bird populations are not impacted, vegetation disturbing activities in affected areas would be avoided during migratory bird nesting season when possible (May 1 through July 31). Because raptors have an extended nesting season, raptor nesting surveys would be completed prior to project implementation as workloads and funding allow.

Water Guzzler - Utah Division of Wildlife Resources

Habitat improvements may be implemented throughout the project area to improve habitat for resident deer, elk, wild turkey, and other game and non-game species. Improvements would involve planting trees, shrubs, grasses, legumes, and/or forbs to establish new habitat or to bolster existing habitat for big game and wild turkey use. Additional improvements may include water developments (ponds, windmills, solar pumps, ground level concrete pit ponds, or guzzlers) and enclosures, primarily designed to benefit wildlife. Partners could include the Utah DWR, UPCD, the Wild Turkey Federation, Sportsmen for Wildlife, the Mule Deer Foundation, and the Rocky Mountain Elk Foundation.

9. Rangeland Health and Livestock Improvement Activities

Two stock ponds within the Phase One treatment area are in need of repair. The Black Canyon stock pond (T. 28 S., R. 23 E., Section 10, SWNW) is not holding water, is eroding whenever there is a precipitation event and is contributing to the sediment loading in the watershed. The Kane Canyon stock pond (T. 28 S., R. 23 E., Section 4, SENW) is also washed out and contributing sediment load. (See Appendix D for map with stock pond locations.) Both of these stock ponds would receive maintenance and repairs by heavy equipment during the ongoing proposed project. Ponds would be cleaned of sediment and head dams re-built within the original footprint of each pond. Minimal disturbance would be anticipated in connection with these repairs although archaeological surveys would be implemented prior to maintenance activities in areas not previously cleared.

10. Other Enhancements or Modifications

The road crossing of San Juan County road #174 at Cottonwood Wash is in need of maintenance and improvement. The stream flows across the road at this site, and the entire crossing is usually wet and muddy. Continual travel across this crossing has caused rutting and erosion in the road bed and sedimentation downstream of the crossing. As part of the proposed action the crossing would receive minimal maintenance (no widening or culvert placement) to create a more stable surface for crossing and to decrease the amount of downstream sedimentation. Gravel and cobble rock would be transported to the site and spread along the eroded portion of the road. (See Appendix D for location map of road crossing.)

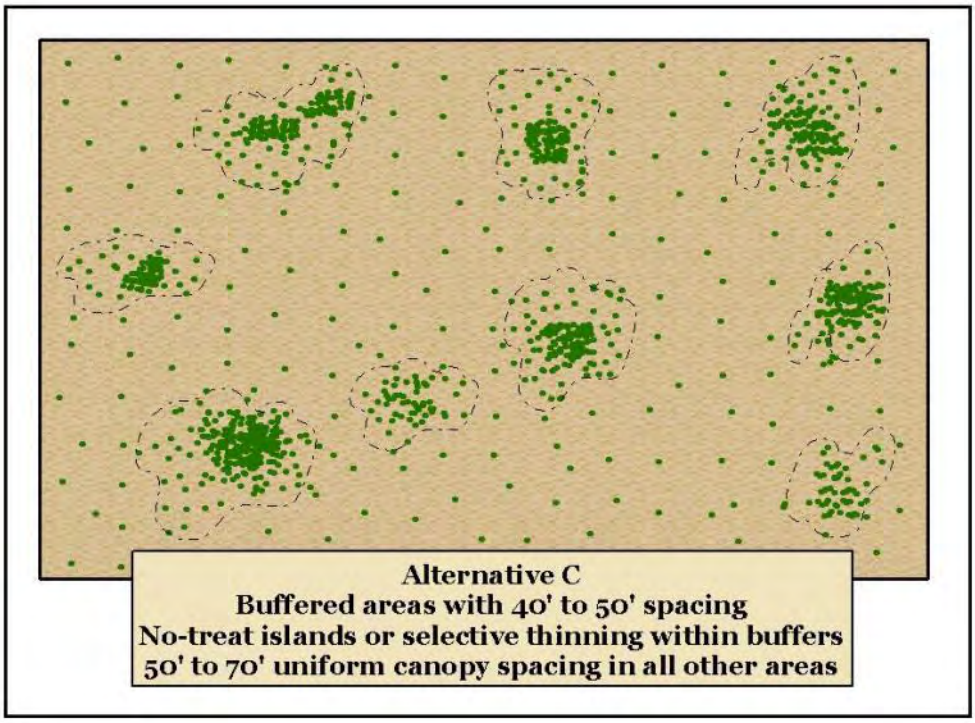
2.3 Alternative B – No Action

No management action involving fuels treatment activities would be implemented to reduce fuel loads or to change current watershed, soils, or vegetative condition. Suppression of wildland fire would continue under the current policy (see page 68), and management of other resources in the area would not change. Future reactive actions such as emergency stabilization and rehabilitation could be applied in response to wildland fire, but no proactive treatments would be implemented to preclude a severe wildland fire.

2.4 Alternatives Considered, but Eliminated from Further Analysis

2.4.1 Alternative C

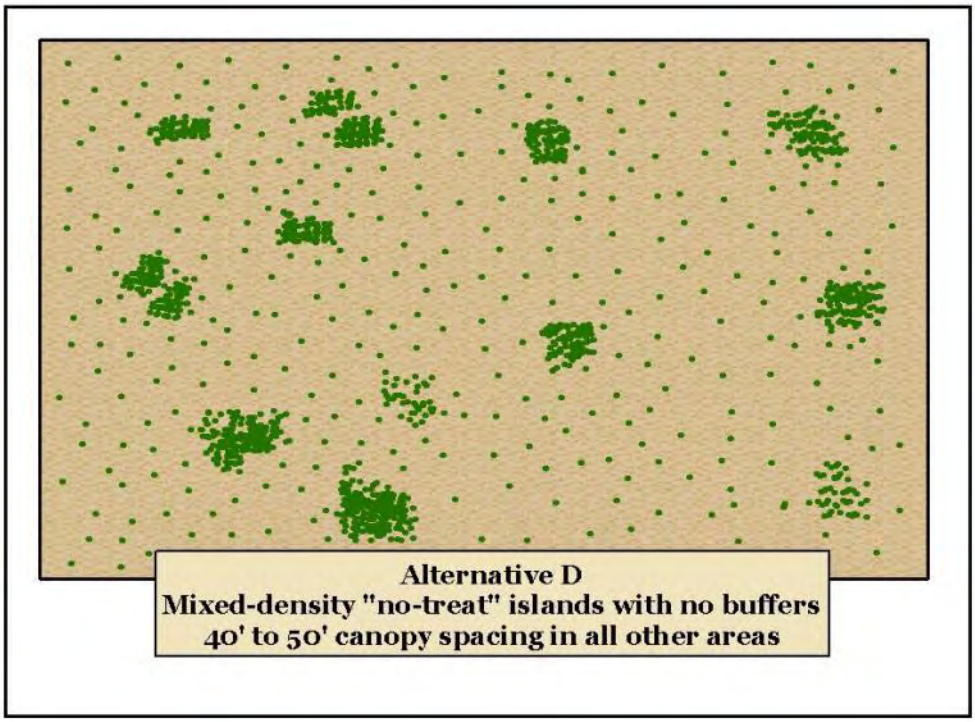
As in Alternative A, the objectives of this alternative would be to create uniform canopy spacing of 50 to 75 feet throughout the proposed project area. In addition, buffered areas would be created containing either no-treatment islands within the buffer or selective thinning within the islands. Buffers would be smaller than in Alternative A and goals would include thinning the pinyon-juniper within each buffered area to approximately 40 to 50 foot canopy spacing surrounding leave islands. Objectives of this alternative would include the enhancement of natural processes and the reduced potential for high-intensity fire. Various activities would be continued in unit increments until all targeted vegetation within the project area had received treatment, although areas with existing sagebrush and/or native grasses would be avoided and trees within these areas would remain.



This alternative was eliminated from further consideration because of a combination of factors. The threat of high-intensity fire would be reduced and the pinyon-juniper canopy would be opened up somewhat, which could enhance seeding results. Buffered areas may also provide some wildlife cover, although wildlife and/or livestock concentrations in vegetative islands could result in increased soil erosion and/or damage to soils. Uniform canopy spacing as proposed in this alternative has been utilized as a design in other mechanical treatments previously implemented in the Canyon Country Fire Zone. The BLM has determined that tailoring treatment within a project area in consideration of specific on-site parameters such as topography (rocky outcrops, cliff edges), vegetation (grassland meadows, sagebrush flats) and other resource concerns such as cultural and/or recreational, while utilizing less uniform canopy spacing results in a more visually appealing project area that still accomplishes goals and objectives. In addition, uniform canopy spacing leaves both pinyon and juniper in existing grassland and sagebrush areas which leaves room for future pinyon-juniper expansion into these areas with an accompanying loss of grassland and sagebrush species.

2.4.2 Alternative D

The objectives of this alternative would be to create uniform canopy spacing of 40 to 50 feet (as compared to 50-75 feet in Alternative A) throughout the proposed project area. No buffered areas would be created, although there would be many ~~"n~~o-treat" islands throughout the project area.



The chief objective of this alternative would be the reduction of fuels, although leave islands may also be marginally beneficial for wildlife cover and there would be a somewhat reduced potential for high-intensity fire due to the inability of fire to spread between vegetative islands. The visual result of this treatment model would be a savannah-type sage and grasslands interspersed with small islands and uniformly-spaced individual pinyon-juniper trees of mixed sizes and ages of pinyon-juniper.

This alternative was also eliminated from further consideration. The 40' to 50' spacing in the project area is the minimum canopy spacing for fire reduction potential. The threat of high-intensity fire would be minimally reduced and the pinyon-juniper canopy would be opened up somewhat, which could enhance seeding results. Although leave-islands may provide some wildlife cover, concentrations of animals in vegetative islands could result in increased soil erosion and/or damage to soils. As explained in Alternative C, uniform canopy spacing has been utilized as a design in other mechanical treatments previously implemented in the Canyon Country Fire Zone. The BLM has determined that tailoring fuel reduction activities within a project area with consideration given to specific on-site parameters such as topography (rocky outcrops, cliff edges), vegetation (grassland meadows, sagebrush flats) and other resource concerns such as cultural and/or recreational and utilizing less uniform canopy spacing results in a more visually appealing project area that still accomplishes goals and objectives. In addition, uniform canopy spacing leaves both pinyon and juniper trees in existing grassland and sagebrush areas which leaves room for future pinyon-juniper expansion into these areas with an accompanying loss of grassland and sagebrush species.

2.4.3 Alternative E

Consideration was given to smaller treatment areas focusing primarily on the WUI areas surrounding the communities of Pack Creek, Brown's Hole, and La Sal. The goals and objectives of Alternative E would be to reduce the potential for the spread of high intensity fire into the communities through the selective thinning of flammable vegetation on public lands adjacent to the communities. Because this alternative would be limited to treatment around smaller, select areas it would not address watershed management or the health and productivity of the lands surrounding the WUIs. This alternative was eliminated from further analysis because integrated treatments that consider the whole health or "holistic" perspective of land management are the primary focus of fire and fuels management as authorized in the Moab Field Office RMP.

2.4.4 Alternative F

Fire management actions to reduce the potential size and intensity of wildfires in the Canyon Country Fire Zone have been analyzed for past projects with goals and objectives similar to the proposed action. The results of a particular analysis in previously-chained, over-stocked pinyon-juniper woodlands recommended an overlapping pattern of prescribed fire as the most effective treatment design to reduce fuel loads and to allow for new growth and improved biodiversity. For the purposes of this EA, overlapping prescribed fire treatments were considered as an alternative but eliminated from further analysis because: (1) Fuels in the Black Ridge area are currently more dense and

flammable than those studied in the above-mentioned analyses; (2) The Black Ridge area is predominantly pinyon-juniper with very small sagebrush islands and little understory, which would not contribute to the efficient spread of prescribed fire; (3) If conditions became favorable for prescribed fire that might spread efficiently, there would also be a high probability for fire to spread beyond the project area into adjacent forested lands and potentially into WUI areas; and (4) If conditions contributed to a prescribed fire that would spread efficiently, the current dense, closed-canopy pinyon-juniper woodland would likely burn with extreme temperatures that could potentially adversely affect resources. Severe, high-intensity fire would result in the loss of desirable native vegetation such as sagebrush/grasslands and other vegetative communities critical to wildlife. Treatments based on overlapping prescribed fire have been conducted in recent years in comparable woodland vegetation areas adjacent to the Moab Field Office and in other areas surrounding the Canyon Country Fire Zone. These treatments have failed to accomplish goals and objectives, as fire has been unable to spread efficiently through the treatment areas, even under conditions which would have been expected to show some fire-carrying capacity.

Resources commonly affected by alternatives are addressed in Chapter 3 and potential impacts common to all alternatives are identified in Chapter 4 (Environmental Impacts).

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter presents the potentially affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the impact area as identified in the Interdisciplinary Team Analysis Record Checklist found in Appendix A and presented in Chapter 1 of this assessment. The resources described in this chapter are common to each of the alternatives presented in Chapter 2, as are the goals and objectives of the proposed project as outlined in Chapter 2. This chapter provides the baseline for comparison of potential resource impacts and/or consequences that are described in Chapter 4.

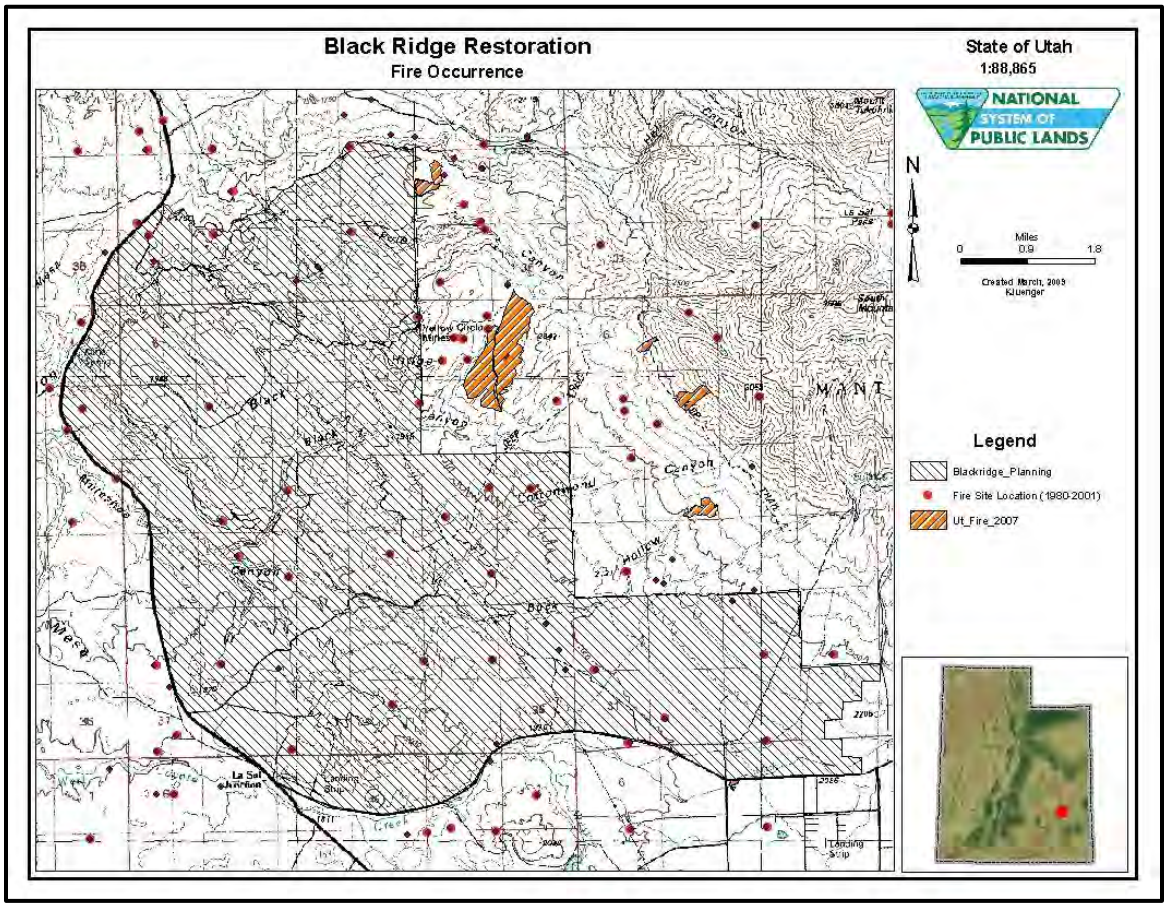
3.2 General Setting

San Juan County is located on the Colorado Plateau in the southeastern corner of Utah. The largest county in Utah, San Juan County encompasses over five million acres, 72 percent of which is managed by federal or tribal agencies. Agriculture has been an integral part of the economic base of San Juan County since the late 1800's, although food production among Native American tribes occurred as early as 200 A.D. Farming and ranching activities have decreased in the past twenty years and many of the areas cultivated or used for rangeland are no longer in production. Because the county covers such an expansive area, it includes a diversity of elevations, landforms, and vegetation from high desert to timbered mountains. The average growing season is June 1st through October 1st and average annual precipitation varies widely between 1.5 and 14.9 inches

per year. Temperature averages range from 44 degrees F. in winter months (November-March) to 77 degrees F. in summer months (April-October).

The area proposed for treatment analyzed in this EA encompasses Black Ridge and several other ridges and drainages located in the foothills of the La Sal mountain range south of Moab, Utah. The project area is comprised of BLM-administered public land between the communities of Pack Creek on the northern end and La Sal on the south, and is bordered by USDA Forest Service lands on the east, and Utah highway 191 on the west. The elevation varies between approximately 4,500 and 6,500 feet throughout the proposed project area and geologically the majority of the lands are within the Cedar Mountain formation overlying the Brushy Basin formation.

Annual precipitation in the Black Ridge area averages just over twelve inches, with an average yearly snow depth of 1-3 inches. Temperatures range from lows of ten degrees to just over eighty degrees Fahrenheit.



Fire occurrence in the vicinity of Black Ridge varies from year to year depending on the amount of moisture associated with lightning-producing thunderstorms. Pinyon-juniper woodlands are the primary fire carrier in the area, with fire intensity a direct result of stand density and weather conditions. Although data is incomplete, available records show at least 45 small fires have occurred within two miles of the Black Ridge project

perimeter in the past thirty years, and approximately 35 small fires have occurred within the proposed treatment area during the same timeframe.

Drought stress can increase vulnerability to insects and disease, and persistent low fuel moistures contribute to tree flammability. Combined factors can raise the probability of high-intensity fires. A severe wildland fire can create unstable slopes, increased erosion and/or sedimentation, charred ground, and loss of wildlife forage/habitat and forage for livestock.

In the early 1960's, the BLM reduced pinyon-juniper woodlands in many areas across the Black Ridge project area through the use of an anchor chain-type treatment in which trees were upended and root balls exposed. Slash created from the chaining was left on site and much of it remains today adding to the fuel load problems. Maintenance of the chaining has not occurred since it was implemented and as a result, pinyon and juniper trees have re-established and become the dominant vegetation in some of the treatment units. In other areas that had not been chained, pinyon and juniper trees have increased in density leading to an increased fuel hazard and displacement of ground cover such as grasses and shrubs. Soils surrounding the closed canopy rows of pinyon-juniper are generally barren of vegetation and prone to disturbance from weather and other erosional forces. Lastly, areas that were once open sagebrush communities have experienced pinyon-juniper encroachment which is leading to a loss of vegetative diversity and wildlife habitat.

The goal of treating vegetation is to restore ecosystem health by reproducing the natural variability, stability, and diversity of the vegetative communities within the project area. In addition, successfully completed treatments enhance public and firefighter safety by providing an increased range of suppression strategies. Anchor chain fuel reduction projects are a conventional, economical type of treatment used in the past and still utilized in present-day by the BLM and other agencies to remove or thin trees and shrubs prior to re-seeding an area. A large chain is generally pulled between two tractors to uproot and break off trees and shrubs to release understory vegetation. Success in this type of treatment can be depend on the variety, maturity, and density of vegetation, as small junipers may be reduced more effectively than flexible, immature pinyon trees which may re-sprout following chaining (Restoring Western Ranges and Wildlands, Volume 1, Chapter 9, page 68-70). In the case of the Black Ridge treatment, initial implementation consisted of a one-way chaining where the trees were knocked over by bulldozers using a chain dragged between the two machines.

The following picture is a recent Google Earth© satellite image illustrating a very small segment of the expansive pinyon-juniper density in the proposed Black Ridge project area.

3.3.0 Critical Elements of the Human Environment or Other Resources

3.3.1 Critical Elements or Resources Present But Not Affected

3.3.1.1 Air Quality

In 1998 the Environmental Protection Agency (EPA) issued the *Interim Air Quality Policy on Wildland and Prescribed Fires* to address potential public health and welfare impacts from wildland and prescribed fires. The policy directs each state to develop a smoke management program to mitigate future air quality impacts and requires Federal land agencies to comply with the program.

The Utah Smoke Management Program is a cooperative effort between the Utah DAQ and the agencies that are involved in the management of prescribed fire, wildfire, and wildland fire use to meet land management objectives. Approval for ignition of prescribed fires is granted by the DAQ and approval can occur conditionally when the National Weather Service Clearing Index is between 400 and 500. Clearance to burn is routinely approved when the Clearing Index is above 500. The approval to burn is based on fuel type, tons of emissions, proximity to sensitive receptors, downwind receptors, distance from other burning, existing air quality, and the number of requests to burn within the airshed. Effects to visibility related to smoke from prescribed fire are regulated through Protection of Visibility requirements found at 40 CFR 51.300 (EPA).

The proposed project area falls within Utah Airshed 15, which encompasses southeastern Utah including the cities of La Sal, Monticello, Blanding and Bluff. Air patterns in the general area usually run from the southeast to the southwest with smoke resulting from prescribed fire and/or burning of piles expected to dissipate in a northerly direction. The areas of highest population near the proposed project would be La Sal, Old La Sal, and Pack Creek, Utah. The closest major travel route in the area is Utah Highway 46, which runs east from the junction with Utah Highway 211 through the towns of La Sal and Old La Sal and continues east toward Paradox, Colorado (23 miles).

The area is an attainment area, meaning that there are no exceedances of National Ambient Air Quality Standards (NAAQS). Air quality is not routinely monitored in this area. The use of wood and/or coal burning stoves contributes to particulates that affect air quality depending on air movement and weather patterns. Coal-fired power plants, coal mining, oil and gas development, and vehicles contribute to particulates in the air depending on weather and moisture conditions.

Areas of special concern, including some Federally-mandated Class I areas, are monitored for Air Quality Related Values (AQRV), which include visibility. There are no designated Class I federal areas located within the area proposed for burning.

The smoke produced from prescribed fire and pile burning can pose threats to human health and impair visibility, which is why burning is closely regulated under state and federal laws. Fuels will burn more efficiently when most of the fuel is combusted in the flaming stage (DeBano and others, 1998) and the majority of smoke released will be composed of carbon dioxide and water. This type of smoke is considered to be a ―greenhouse gas," but is not considered a pollutant and is therefore not regulated. Smoke from smoldering fires in which fuels are burning inefficiently are composed of regulated pollutants such as particulates, carbon monoxide, and nitrogen and sulfur oxides (RMRS-GTR-198, page 62). Strict adherence to applicable plans and regulations during burning operations would mitigate potential impacts from the proposed project. Emission reduction and dispersion techniques as outlined in the Utah Smoke Management Plan (SMP, page 18) would also be incorporated into the burn plan to minimize smoke impacts and to protect public health, public safety and visibility.

Because of their location further downslope from the mesa top, residents in the towns of La Sal and Old La Sal may notice a temporary weak inversion layer of smoke in the evening hours depending on climatic conditions. If westerly winds were prevalent during the burning period, smoke could settle along Highway 46 (between the towns of Old La Sal, Utah and Paradox, Colorado) and in the lower canyons during the evening hours. Smoke would be expected to dissipate overnight and would not adversely impact public health, public safety, or visibility. If fire and weather conditions indicate that smoke inversion conditions are possible, caution and information signs would be posted along the highway, and residents would be notified. Effects from prescribed fire would likely be short-term and insignificant, especially in contrast to those that could be expected from a wildland fire.

High intensity wildland fires can be an extreme source of air pollution during the combustion period, depending on fuel type and fuel moisture. Pollution levels also depend on the duration of the fire and dispersion conditions. The proposed action could have an indirect beneficial effect on air quality by reducing the probability that a high-severity, high-intensity wildland fire would occur in the Black Ridge area.

3.3.1.2 Cultural Resources and Native American Concerns

Following the BLM regulations (43 CFR Part 8100) and other federal laws including the National Historic Preservation Act (NHPA) of 1966 and implementation regulations (36 CFR Part 800), as amended, the BLM is required to identify and evaluate cultural resources within the area of potential effect for each phase of the proposed project. By definition, an historic property is a "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places," and includes "artifacts, records, and remains that are related to and located within such properties" (36 CFR 800.16(l)(1)). An Archaeological Clearance Report was prepared for Phase One of the Black Ridge project (9,100 acres) in 2009. Information documenting the archaeological inventory and compliance with the NHPA is on file in the Canyon Country Fire Zone office.

Historic properties identified and evaluated as eligible under the National Register of Historic places would either be avoided or encroaching vegetation hand-treated during project implementation. This would result in no adverse effect to the historic property(ies) pursuant to 36 CFR Part 800.

As required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and the National Historic Preservation Act (16 USC 1531), local Native American tribes were notified of the proposed action for Phase One in July of 2008. Tribal groups are requested to identify traditional cultural properties or any other areas of traditional cultural importance to be considered within proximity of the project. The Navajo Nation responded to the request, although no properties of religious and/or cultural significance were identified. If the decision were made to approve the landscape-level Black Ridge project (30,000 acres), local Native American tribes would be notified as part of the individual NEPA process for each phase of treatment.

Because cultural resources would be avoided in the proposed project and there would be no adverse effects, potential effects to historic properties from fuel reduction activities were not analyzed. It should be noted, however, that an indirect beneficial effect to cultural resources would be realized as a result of decreased hazardous fuels and a subsequent reduction in the number and severity of wildland fires. High-intensity crown fires can be extremely damaging to archaeological sites, especially rock art panels (exfoliation) and flammable artifacts (wood, leather, bone, etc.). Many archaeological sites have likely experienced wildland fire in the past, especially in grass and forb fuel regimes; however, these sites have adapted to much cooler and quick-moving types of wildland fire rather than the high-intensity crown fires that would be expected in the Black Ridge area if it were not treated.

3.3.1.3 Threatened, Endangered (T&E) or Candidate Plant Species

The BLM requirements for management of federally listed and proposed species come from the Endangered Species Act of 1973 (ESA), as amended (USFWS 1988). BLM requirements for these species and their habitat are found in BLM Manual 6840, Special Status Species Management.

―Federal endangered" comprises plant species in danger of extinction throughout all or a portion of their range. A total of 599 endangered plants and 147 threatened plant species have been identified in the United States. ―Federal threatened" species are plants likely to become endangered within the foreseeable future throughout their range. ―Federal proposed" endangered or threatened are those plants for which a proposed regulation has been established, and ―federal candidate" are those species being considered for listing as threatened or endangered. Jones' cycladenia is the only Threatened and Endangered (T&E) plant species in the Moab Field Office. This member of the dogbane family grows on Cutler formation in Chinle soils in the Castle Valley and Professor Valley areas.

A ―sensitive species" is any species that is under status review by the U.S. Fish and Wildlife Service whose numbers are declining so rapidly that federal listing may become necessary or which occurs in typically small or widely dispersed populations or inhabits a unique or specialized habitat.

BLM ―special status species" include those species listed or proposed for listing as threatened or endangered under the ESA, delisted species in the five years following their delisting, and plants designated by the BLM as sensitive species. BLM sensitive species are plants not listed on federal or state lists as threatened, endangered, candidate or proposed, but designated by the Utah BLM State Director for special management consideration. The goals of BLM's sensitive species policy are to maintain species and habitat components that are vulnerable; to ensure that sensitive species are considered in land management decisions; to prevent a species listing as endangered; and, to prioritize necessary conservation of species and habitat. The BLM's special status species policies set forth the procedures by which these species will be managed to ensure their recovery or promote their conservation so that protections afforded under the ESA or BLM policy are no longer warranted.

To meet the mandates of BLM Manual 6840, ongoing efforts by the BLM Utah State Office have resulted in statewide surveys to determine population size and to gather biological data about sensitive status species that may occur on BLM lands. Surveys were completed in 1991, 1995, and 2001-2002 that cover the area of the proposed action. Surveys were conducted to determine the distribution and abundance of special status plant species. Based on those surveys, there are no occurrences in the proposed project area of plant species or habitat that are included on the current list of Utah BLM special status species.

3.3.1.4 Geology/Mineral Resources/Energy Production

A recent rise in the price for uranium resources worldwide has heightened interest in uranium exploration in southeastern Utah. Of the total uranium reserves estimated to be locatable in the four corners region, approximately 57% could potentially be found in the

Morrison formation (Johnson and Thordarson, 1959; Gloyn et al., 1995). The Morrison formation comprises a large part of the geology of the proposed project area.

Most of the southern half of the Moab Field Office area has had some type of historic uranium mining activity, although most mines were closed by the end of the 1990's. Areas such as Black Ridge where historic uranium mining has occurred are rated as having high occurrence and development potential.

The Moab Field Office has recently processed two uranium exploration notices that fall within the boundary of the proposed project area. The first one is located in T. 27 S., R. 23 E., SWSE of Section 30 and T. 27 S., R. 23 E., NWNW of Section 31. This area is located near the Black Ridge road junction with highway 191. The total proposed surface disturbance is 1.5 acres as the drilling will mostly occur on old existing mine roads that would not require improvements for access. As of winter, 2009, the company has not proceeded further on this notice and the notice will expire in October of 2010. If future activity takes place within the area of the proposed uranium exploration, the company would be notified of the proposed fuel reduction project and coordination would follow if and when fuel reduction activities occurred in close proximity to the area of exploration. The area of the proposed uranium exploration is within the collective treatment area but is not targeted for Phase One treatment, and it is anticipated that fuel reduction activities would be minimal in the exploration area due to the sparse vegetation. There would be no impact to the proposed exploration from fuels reduction activities.

The second project notice is located in T. 28. S., R. 23 E., NE of Section 8, where there is a proposal to re-drill five existing drill holes to test for uranium. The proposed total surface disturbance area would be one acre and the proposed access would be along an existing road. The proposed exploratory drilling area falls within Unit 12 of the area targeted for reduction in Phase One of the proposed fuel reduction project. Unit 12 is one of the pinyon-juniper overgrowth areas that was chained several decades ago and presently contains pinyon-juniper regeneration as well as ground slash from the old chaining. If future uranium extraction were to take place that coincided with implementation of fuels reduction activities, the BLM Canyon Country Fire Zone would coordinate closely with resource staff and company representatives to mitigate any potential impact to mining operations. With ongoing coordination, fuels reduction actions would be expected to have no effect on mining operations.

3.3.1.5 Paleontology

Because the occurrence of paleontological resources is closely tied to the geologic units or formations, the occurrence of paleontological resources can be broadly predicted through geologic mapping. The Potential Fossil Yield Classification (PFYC) system is utilized by the BLM to classify geologic units based on the relative abundance of fossils and potential effects to those fossils from management actions. The PFYC system assists in determining the potential for discovery of paleontological resources and provides direction for mitigating permitted surface-disturbing activities on BLM-administered public lands. Because fossils are found more frequently in some geologic units than in others, the PFYC system is a reflection of the relative abundance of fossils in general

geologic areas with a higher class number indicating a higher potential of occurrence. The five classifications in the PFYC system range from Very Low Potential Class 1 areas to Very High Potential Class 5 areas.

The majority of the proposed project area falls within the Navajo, Entrada, and Brushy Basin members of the Morrison formation [Jurassic]; the Burro Canyon and Dakota sandstone formations [Cretaceous]; and older alluvium and Eolian deposits [Quaternary] (see Appendices E and F for geologic and paleontological sensitivity maps). The PFYC system was utilized to assess paleontological sensitivity for the geologic units within the proposed project area, and classifications were determined to be medium and high in sensitivity (classes 4 and 5) throughout the area proposed for fuel reduction.

The Morrison formation is a large sedimentary rock sequence in the western United States and Canada, covering approximately 600,000 square miles. While it is centered in Wyoming and Colorado, the Morrison formation also has outcrops in Utah, although only a small portion is actually exposed. Some of the sedimentary rock in the Morrison formation is marine in origin, but the majority of the sediments were deposited along rivers, streams, lakes, mudflats, swamps, and alluvial plains covering the western interior of North America during the Late Jurassic. The non-marine sediments are comprised of mudstone, sandstone, siltstone and limestone and are light, greenish-gray or red. Most fossils occur within the greenish siltstone beds and lower standstones, although formations are buried beneath windblown sediments and would only be evident in areas where bare rock is exposed.

The Burro Canyon formation is closely similar to the Brushy Basin member of the Morrison Formation in that they were both very favorable to life and consequently often contain paleontological resources. The Burro Canyon differs from the Brushy Basin unit in that it contains a layer of very hard, coarse-grained sandstone of varying thickness (Anderson, 1997), but is mostly made up of sandstone, siltstone and mudstone formed from river deposits. The thickness of the Burro Canyon formation is highly variable but averages about one hundred feet.

Similar to the Burro Canyon formation, the Dakota sandstone layer is about one hundred feet thick and is mostly light brown sandstone combined with thin beds of shale and coal deposited by freshwater rivers, streams, and shallow lakes. Both of these formations were deposited during the Cretaceous Period (about 95 million years ago). This region hosted abundant plant and animal life and was slowly buried beneath marine shale. The Dakota sandstone is not widely exposed in the four corners area or within the proposed project area.

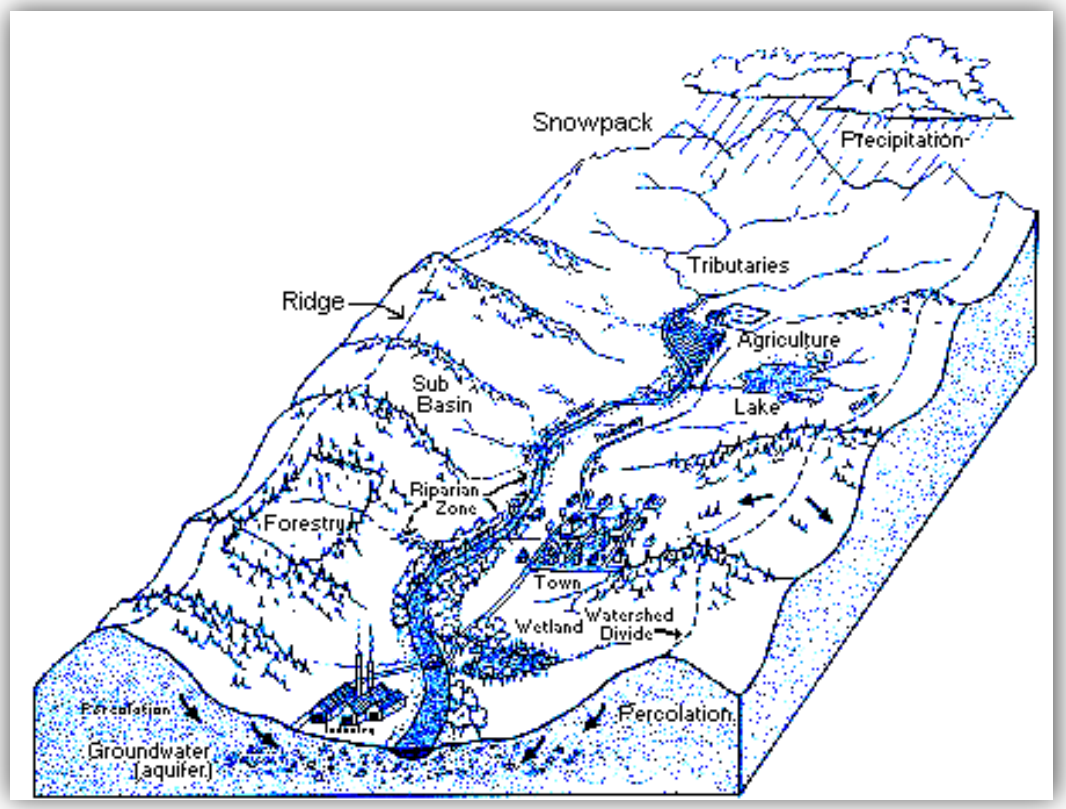
The primary purpose of the PFYC system is to assess potential effects from surface disturbing activities. The amount of exposed bedrock is considered, as well as assessment of general conditions within the proposed project area. The proposed action would not penetrate the protective soil or alluvial layer, and there would be no surface disturbance to bedrock level. In addition, bedrock in the area of the proposed action is likely to be deeply covered by sediment and would not be exposed by potential erosion

following vegetative removal prior to the establishment of enhanced vegetative cover. It has been determined that there would be no effect to paleontological resources within these formations from the proposed action.

3.3.2 Critical Elements or Resources Present and Brought Forward for Analysis

3.3.2.1 Watersheds

A ―watershed" can be defined as an area of land where all of the water that is flowing from it drains to a shared destination. A watershed includes the geographic area that captures precipitation, filters and stores water, and influences water release into streams or other water systems. Every geographic point has an associated watershed, and small watersheds are combined to define larger watersheds. Topography is the major aspect defining a watershed; each watershed boundary is defined by the highest elevation or ridgeline surrounding a stream channel to the lowest point of land where water flows out of the watershed. The United States Geological Survey (USGS) has divided and subdivided the United States into successively smaller hydrologic units which are classified into regions (largest), sub-regions, accounting units, cataloging units, sub-basins, watersheds and sub-watersheds.



Each hydrologic unit is identified with a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the level of classification. The proposed project area is located within the Upper Colorado Region, within which there is one sub-basin and two watersheds. The proposed project area falls within the Upper Colorado-Dolores

Subregion (HUC #1403); Upper Colorado-Dolores Accounting Unit (HUC #140300); Upper Colorado-Kane Springs sub-basin (HUC #14030005).

Activities can change the characteristics of downstream locations including soil permeability, vegetation type or cover, water quality, quantity and/or rate of flow, and floodplain stability. Because a watershed can provide water for drinking, recreation, and agriculture as well as habitat for wildlife species, actions that impact a watershed can also affect a variety of other resources. For the purposes of this EA, the resources identified as potentially impacted by the proposed action that may affect or may be affected by watershed condition including floodplains, water quality, wetlands/riparian, and soils are listed as sub-headings under the watershed resource.

Watersheds – Collective Treatment Area

As stated above, the proposed treatment area is within the Upper Colorado-Kane Springs subbasin (HUC #14030005). The collective treatment area falls within the Hatch Wash/Kane Springs watershed in the subbasin. Several of the small communities within the proposed project area have water supplies that are wells and/or springs located on BLM-administered public lands or with recharge areas on BLM lands. There are small public water supply systems within or close to the proposed project area including Hole n' the Rock and Pack Creek Ranch. Pack Creek Ranch has filed a water source protection plan with the State of Utah that includes adjacent BLM lands.

Since the year 2000, the proposed project area has experienced intermittent drought conditions from extreme to exceptional (Utah Climate Center 2004).

Watersheds – Phase One Treatment Area

Phase One of the proposed project area generally falls within three sub-watersheds: Kane Springs Creek, Muleshoe Canyon, and West Coyote Creek. Cottonwood Creek, portions of Muleshoe Creek, Buck Hollow, Kane Creek and West Coyote Creek are perennial streams within these watersheds. Several streams and springs located on BLM lands are diverted for irrigation and domestic purposes on private landholdings. The average annual rainfall is between ten and eleven inches with high intensity summer storms that can be more erosive; although seasonal precipitation in 2008-2009 was below normal (i.e. winter of 2009 received only 21% of normal precipitation).

3.3.2.1.1 Floodplains

Floodplains are defined as any normally dry land area that is susceptible to being inundated by water from a natural source and usually consists of alluvial sediment that has been carried and deposited by overland flows. A floodplain should have the ability to transport water and sediment without causing major damage to streambanks and/or general stream channel geometry. Floodplains play an important role in ecosystem health because they can influence the lag time between peak precipitation events and peak runoff events and can also serve as temporary "storage areas" for sediment that has eroded from a watershed during a peak precipitation event.

Federal agencies are required by Executive Order 11988 (1977) to avoid to the extent possible long- and short-term impacts associated with the modification of floodplains. Each agency is tasked with taking action to minimize impacts from floods to human safety, health, and welfare, and to preserve the natural and beneficial values of floodplains. When federal actions are determined to have potential impacts to or within a floodplain, agencies are tasked with developing measures to minimize the impacts and restore and preserve the floodplain.

Floodplains Collective Treatment Area
The ephemeral, intermittent, and perennial stream channels within the project area contain floodplains which have the potential to be affected by watershed conditions such as increased sedimentation, erosion, and subsequent instability.

Floodplains Phase One Treatment Area
The environment potentially affected by the Phase One proposed action would be identical to the resources affected for the collective treatment area.

3.3.2.1.2 Water Quality
Healthy watersheds capture precipitation and runoff, store water in the soil profile and release it slowly back into landscape surface waters. Primary recharge areas generally occur along mountain fronts where groundwater accumulates and then flows down-gradient. Groundwater recharge areas can be vulnerable to surface pollution if they are in an area where there is a lack of fine-grained soil or bedrock filtering layers.

"Water quality" refers to the physical, chemical, and biological characteristics of water in reference to a particular use. Some of the physical characteristics of water quality include sediment concentrations, turbidity, and water temperature. R317-2 of the Utah Administrative Code provides the standards for water quality in the State of Utah. Streams are assigned designated beneficial uses with associated water quality standards (domestic, recreation, wildlife, agriculture), with special reservations made for waters specifically determined by regulation to be High Quality Waters (there are no High Quality Waters designated within the planning area). Groundwater occurs in both consolidated and unconsolidated rock aquifers. The main consolidated rock aquifer is known as the N aquifer, and includes the Wingate and Navajo Sandstones. Water from the N aquifer is generally of good quality and suitable for drinking. Unconsolidated rock aquifers are an important source of groundwater in Spanish Valley and Castle Valley, north of the proposed project area. Recharge is from infiltration of precipitation and stream flow, primarily from the La Sal Mountains.

Water Quality Collective Treatment Area
High levels of salinity are one of the major surface water quality problems in the Moab Field Office area; the issue is of national significance, recognized by the Colorado River Basin Salinity Control Act of 1974. Salinity contributions are from both point sources and nonpoint sources (Analysis of the Management Situation, Moab BLM Field Office). During low flow periods, salt contribution comes solely from seeps, springs, and groundwater flow. During high flow periods, erosion of saline soils becomes a major

contributor to salinity problems. The primary nonpoint sources of salinity are the diffuse overland runoff from saline soils and erosion and transport of saline soils during flow events.

The BLM is a cooperating agency with respect to implementation of salinity control measures on the Colorado River. Salinity contributions have two components, point source and nonpoint source, and vegetation management activities could be considered a nonpoint source contributor in the proposed project area.

Water Quality Phase One Treatment Area

Perennial streams within the proposed project area include Cottonwood and Black Canyon Creeks, with Cottonwood Creek draining into Muleshoe Creek in the south-central portion of the project area. Both Cottonwood and Pack Creeks have perennial flows until irrigation diverts the majority of the water. Beneficial uses designated by the State of Utah for Cottonwood and Muleshoe Creeks include secondary contact recreation (i.e. boating, wading), warm water species of game fish, and agricultural uses including crop irrigation and stock watering.

Cottonwood Creek is spring-fed and flows an average of 20 gallons per minute with low stream temperatures and good water quality. Water quality samples have been collected at several sites within the proposed project area within the past three years, and data show that conditions are good at most sites. Browns Hole residents use water from springs and streams for domestic and irrigation purposes.

3.3.2.1.3 Wetlands/Riparian

A riparian area is generally characterized as an area along a perennial or intermittent stream channel that is influenced by the presence of shallow groundwater. These areas have sufficient groundwater to support vegetation adapted to saturated soils, and they play a significant role in maintaining the chemical, physical and biological integrity of water systems. Riparian-wetland areas may include marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, or estuaries. Riparian areas and wetlands have a high degree of structural complexity and are of great ecological significance because of their value to wildlife, recreation, and livestock production. ―Riparian areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality." (BLM TR 1737-9)

Wetlands/Riparian Collective Treatment Area

Much of the aquatic and riparian environment in the collective treatment area has been impacted by activities including livestock use, wood removal, water diversion, irrigation de-watering, road building and use, and mining exploration. Years of drought in the past two decades and periods of high-severity precipitation events have affected the function of riparian-wetlands throughout the proposed project area. In addition, invasive species such as tamarisk and Russian olive have become established in several of the riparian communities, increasing the risk of high-intensity wildland fire.

Wetlands/Riparian Phase One Treatment Area
Washes containing both intermittent and perennial stream channels run throughout the project area. Most of the perennial stream channels have healthy riparian vegetation along the stream corridor, although there is a segment of Muleshoe Canyon with a ―functioning at risk" rating due to irrigation diversions on private land. The ―functioning at risk" rating in Muleshoe Canyon results from the irrigation diversions having de-watered the stream, which has caused deep, incised channels due to floodplain instability.

3.3.2.1.4 Soils
Soils Collective Treatment Area
The La Sal Mountains are a formerly glaciated range consisting of three mountain masses with drainageways that have developed radially around the range. Rugged, steep slopes at the crest of the mountain masses grade to moraines and outwash fans that are dissected by V-shaped canyons extending to tablelands. The proposed treatment area extends across several of these canyons and along a substantial portion of the tablelands. Soils are varied but surprisingly similar given the large amount of acreage involved.

The majority of soils along Black Ridge are different types of moderately deep to very deep loamy soils interspersed with rocky outcrops formed in residuum and colluviums derived from shale and sandstone. Ustic and Ustollic soils are moderately deep to deep well-drained soils with effective rooting depth and moderate water erosion potential. Rizno-rock outcrops on escarpments and benches contain both shallow and very deep soils that also derived from sandstone and shale. These soils have low water capacity, slight water erosion potential and high wind erosion potential. Bluehon soils are moderately deep and well drained soils that formed from igneous and sedimentary rock. These types of soils occur on the alluvial fan remnants on the west slopes of the La Sal mountain range and also include very cobbly fine sandy loam on the south-facing side slopes. According to the 1991 USDA Soil Conservation Service soil surveys, all of these soil types would benefit from management practices that maintain or improve vegetation. Suggested improvements include managing brush and thinning or eradication of pinyon-juniper.

# Acres	Project Area	Soil Name	Soil Type	Slope
6,019	20%	Ustic Torriorthents-Ustollic Calciorthids complex	Talus slope/Semidesert gravelly loam (Pinyon/Utah Juniper)	10-60%
3,619	12%	Rizno-Rock outcrop complex	Upland shallow loam (Pinyon/Utah Juniper	3-15%
3,030	10%	Bluehon stony loam	Upland stony loam (Pinyon/Utah Juniper)	2-15%
2,352	8%	Ustic Torriorthents-Ustollic Haplargids complex	Talus slope/Upland stony loam (Pinyon/Utah Juniper)	10-60%
1,767	6%	Rocky outcrop-Rizno complex	Desert shallow sandy loam (Blackbrush)	3-15%
8,488	28%	Sandy loams w/varying rock content (very stony to very cobbly)		
4,725	16%	Negligible soil types under 1,000 acres		

Sensitive soils occur on portions of the proposed treatment area including soils with high wind erosion ratings, moderately saline soils, and soils that are rated limited for grazing use due to steep slopes or rocky outcrops. High wind season is generally late spring and early summer.

Many of the stock ponds within the proposed treatment area are in need of repair and/or cleaning, and several ponds are also choked with tamarisk and other vegetative species. At least two ponds have been identified as high priority for repair. These ponds have received high-precipitation events that have caused dam collapse with resulting downstream sedimentation during storms and concurrent impacts to the watershed. At least one other pond is in need of decommissioning and tamarisk removal to prevent potential sedimentation in the future.

Soils Phase One Treatment Area

# Acres	Project Area	Soil Name	Soil Type	Slope
6,019	20%	Ustic Torriorthents-Ustollic Calciorthids complex	Talus slope/Semidesert gravelly loam (Pinyon/Utah Juniper)	10-60%
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8,488	28%	Sandy loams w/varying rock content (very stony to very cobbly)		
4,725	16%	Negligible soil types under 1,000 acres		

Nutrients in pinyon-juniper woodlands and other semi-arid environments such as shrublands and grasslands are generally clustered in association with vegetation, with surrounding areas of exposed soil. As is the case in the area proposed for treatment in Phase One of the proposed project, exposed soils are frequently nutrient depleted and eroded. Juniper trees actually extract nutrients from spaces between trees and concentrate them beneath the tree canopy (Klopatek, 1987). The western landscape evolved with wildfire as a natural process that recycled nutrients, improved soil productivity and contributed to overall watershed health (Dombeck et al., 2004). Because outdated range management techniques, fire suppression, and WUI expansion up to the border of public lands has disrupted the historic fire regime, soil productivity has declined and nutrient levels are poor in many areas proposed for treatment.

Two stock ponds have been chosen as high priorities for repair and cleanout as part of the proposed activities for Phase One treatment to prevent further soil erosion and watershed sedimentation (see Range Improvements, Phase One Proposed Action, page 34). An additional pond has been identified for decommissioning and tamarisk removal to restore a dry wash channel.

Portions of the project area contain biological soil crusts of varying thickness and maturity. The biological soil community is scattered within the proposed project area, with well-developed crusts prevalent in open areas where soils are shallow, with bedrock near or at the surface. Biological crusts--consisting of soil cyanobacteria, lichens, and mosses--increase the stability, fertility (nutrient cycling) and water infiltration of soils in regions that receive little precipitation and are susceptible to surface disturbance such as trampling by feet or with vehicle tires. Crustal organisms contained in the layers of biological soil in the area are metabolically active when wet. Cyanobacteria are also mobile, and can move through disturbed soils to reach needed light levels.

3.3.2.2 Invasive, Non-native Plant Species

The expansion of invasive species along with the build-up of hazardous fuels across public lands are a major threat to ecosystem health and one of the greatest challenges in managing vegetation on public lands administered by the BLM. Because the spread of invasive plant species is one of the factors leading to the degradation of watersheds, the improvement of watersheds and water resources through vegetation treatments to control populations of non-native and invasive species is of primary importance in land use planning. In the year 2000, the BLM estimated that approximately 36 million acres of BLM-administered public lands are infested with weeds, spreading at a rate of 2,300 acres each day (17 States Herbicide PEIS, Page 66).

Invasive, Non-native Species (Vegetation) Collective Treatment Area

The 30,000 acres within the project area encompass a variety of vegetative communities. Specifically, there are sagebrush and grassy meadows, some with encroaching pinyon-juniper; many acres of previously chained pinyon-juniper with ground-accumulated slash; single stands of scrub oak and other brush and some in combination with pinyon-juniper woodlands; closed canopy pinyon-juniper woodlands of varying ages; riparian areas containing Fremont cottonwood, willows, and a few invasives such as tamarisk and Russian olive; and very small pockets of mid-age to old growth ponderosa pine. Cheatgrass and other invasive weed species such as Russian knapweed have infested several areas, although there are not large areas with monocultures of invasives as a dominant species at the present time.

The primary pinyon-juniper woodland component within the treatment boundaries is dominated by all ages of pinyon-juniper stands which, in many areas, exhibit a closed canopy with little understory development. Suppression of wildland fire along with some past influences of livestock grazing management practices have altered the natural fire regime of the planning area. As mentioned above, several areas within the proposed project boundary were chained over the past fifty years with minimal or no maintenance treatments conducted on the chained areas.

The sagebrush areas along Black Ridge are predominantly Wyoming big sagebrush *(Artemisia tridentata)* currently at risk from pinyon-juniper encroachment. Sagebrush provides critical food and habitat for sage grouse and other obligate species, and is also critical forage for deer and elk. Healthy sagebrush steppe, consisting of dry, open areas with few trees, is rapidly diminishing in southeastern Utah and all of North America.

The invasion of cheatgrass, the expansion of pinyon-juniper into sagebrush areas, and increasingly severe wildland fires are all contributing factors to the decline of this important ecosystem.

Invasive, Non-native Species (Vegetation) Phase One Treatment Area
Cheatgrass and other invasive weed species such as Russian thistle and Russian knapweed have infested several areas, although they are not dominant species in most areas selected for treatment. Units three through eight are all sagebrush units that have the potential to be invaded by cheatgrass and other non-native species.

3.3.2.3 Rangeland Health Standards and Guidelines

In 1997, *Standards for Public Land Health and Guidelines for Recreation and Livestock Management for BLM lands in Utah* were approved by the Secretary of the Interior and adopted as decisions in all BLM land use plans. These standards relate to all types of public land use and describe the natural resource conditions to sustain public land health. Assessments are periodically conducted to determine where conditions are meeting established BLM standards related to soil, watershed, riparian/wetlands, floodplains, vegetative and wildlife species diversity, and water quality resources.

Specific guidelines for livestock and recreation management have been developed within Utah to identify management actions and/or best management practices to implement rangeland health standards. The Utah Rangeland Health Standards include four separate standards to be met by BLM:

1. Upland soils that exhibit permeability and infiltration rates that sustain or improve site productivity;
2. Riparian and wetland areas that are in properly functioning condition, with stream channel morphology and functions appropriate to the soil type, climate, and landform;
3. Desired species are maintained at appropriate levels;
4. BLM compliance with State of Utah water quality standards, Clean Water Act, and Safe Drinking Water Act, with activities on BLM land supporting the beneficial uses described by the State of Utah Water Quality Standards for surface and groundwater.

Rangeland Health Collective Treatment Area
The proposed project area encompasses all of the Black Ridge grazing allotment and a small portion of the Hatch Point and Kane Springs grazing allotments. The Black Ridge allotment is bordered on the east by USDA Forest Service lands, with Pack Creek on the north and the Hatch Point allotment to the south. Recent assessments of the Black Ridge allotment show a downward trend between 1985 and 2008 of crested wheatgrass and other palatable species. Rangeland health assessments reflect a moderate departure from the expected soil stability, hydrologic function, and biotic integrity. Soil loss is occurring due to an increase of pinyon-juniper and a concurrent reduction in the herbaceous biotic community. Based on water quality data available within and downstream of the allotment, the Black Ridge allotment is currently meeting Utah Rangeland Health Standards for water quality.

The Hatch Point Allotment is a very large grazing area stretching across five watersheds and a variety of soils and vegetation types. The portion of the allotment that falls within the proposed project area contains portions of Muleshoe Canyon and Muleshoe Creek and Buck Hollow. The Hatch Point Allotment was assessed in 2009 and is currently meeting the upland soils standard for Utah Rangeland Health, although standards for riparian and floodplains are only partially being met. Portions of the Muleshoe Creek riparian area are rated as functioning at risk due to stock use and irrigation diversions.

Rangeland Health Phase One Treatment Area

In the early 1960's, the BLM reduced the pinyon-juniper woodlands for rangeland health improvements along portions of Black Ridge through the use of an anchor chain-type treatment in which trees were upended and root balls exposed. Anchor chain fuel reduction projects are a conventional, economical type of treatment used in the past and still utilized in present-day by the BLM and other agencies to remove or thin trees and shrubs prior to re-seeding an area. A large chain is generally pulled between two tractors to uproot and break off trees and shrubs to release understory vegetation. Success in this type of treatment can depend on the variety, maturity, and density of vegetation, as small junipers may be reduced more effectively than flexible, immature pinyon trees which may re-sprout following chaining (Restoring Western Ranges and Wildlands, Volume 1, Chapter 9, page 68-70). In the case of treatments along Black Ridge, initial implementation consisted of a one-way chaining where the trees were knocked over by bulldozers using a chain dragged between the two machines.

Analysis of many treatments over the years has shown that one-way chaining of trees often knocks over trees during the single pass of the bulldozers, but because roots may still be intact the trees often do not die from the treatment. In a two-way chaining type of treatment, trees are knocked over on the first pass and then ripped out of the ground on the second pass, killing most of the trees. In the Black Ridge chaining, a large majority of the pinyon-juniper trees were not killed by the one-way chaining and over the years a thick growth of vertical branches has grown from each horizontal tree trunk. Soils surrounding the closed canopy rows of pinyon-juniper are generally barren of vegetation and prone to disturbance from weather and other erosional forces. These old chainings have not received maintenance treatments over the years and any improvement to rangeland health has been lost over the years.

Units 12 through 23 in the proposed Phase One treatment area are all old chainings totaling approximately 6,000 acres. The chained units are in somewhat varying condition, but in general would need treatment to meet Utah Rangeland Health standards. Additional rangeland health information on the area proposed for treatment in Phase One can be found in 3.3.2.1 Watersheds, 3.3.2.1.1 Floodplains, 3.3.2.1.2 Water Quality, 3.3.2.1.3 Wetlands/Riparian, and 3.3.2.1.4 Soils.

3.3.2.4 Livestock Grazing

There are a total of 84 allotments within the Moab Field Office area of which 77 are available for use by domestic livestock. 64 of these allotments are currently grazed by cattle, six are grazed by sheep, and others are mixed. Livestock use is managed through

Allotment Management Plans (AMPs) and/or grazing permits, which establish terms and conditions regarding grazing numbers, duration of use, and timing of livestock use. Livestock use is measured through animal unit months (AUMs), which generally equate to the amount of forage necessary for the sustenance of one cow, one horse, or five sheep for a period of one month.

Livestock Grazing Collective Treatment Area

The proposed Black Ridge project area falls primarily within the Black Ridge and Hatch Point grazing allotments with a small portion on the eastern edge of the Kane Springs allotment. Three of the Black Ridge Allotment pastures (Mud Springs, Black Ridge, and Cottonwood) and four of the Hatch Point pastures (Bliss, Brown's Hole, Thompson Flat, and Lackey Fan) are within the proposed project area. The dates of use for the Black Ridge Allotment are from November 1 through February 28 and from May 1 through June 9. Portions of the Hatch Point Allotment are grazed between October 15 and June 15 (cattle) and from November 15 through May 31 (sheep). The BLM is currently conducting a reassessment of the Hatch Point allotment to update the grazing management plan. Potentially, this allotment may be split to involve two different permittees. Six of the 13 pastures within the Hatch Point allotment contain no developed water sources, forcing stock to rely heavily on the stream corridors for water.

Portions of both grazing allotments have received previous fuel treatments including chaining, prescribed fire, and other activities designed to improve forage conditions, although over the years as the pinyon-juniper tree cover has increased, the grasses have decreased and soil erosion has intensified.

Livestock Grazing Phase One Treatment Area

A recent assessment of soil, water, and climate in the Hatch Point allotment (Ann Marie Aubry, BLM Hydrologist, June, 2009) recommended several management actions to be taken in this allotment to address watershed conditions (soil, riparian and water quality): (1) Construction of a grazing exclosure to assess biotic soil potentials; (2) Development of a grazing rotation that excludes stock from riparian areas by early spring; and, (3) Construction of water developments in dry pastures. The proposed watershed restoration portion of this project could be incorporated into the Hatch Point grazing management plan to identify any additional issues that need to be considered or management strategies which could be implemented to ensure the success of the proposed treatments. Future proposals may include requests for funding to help construct new pasture fences, water development or other resource management activities which would enhance and protect the vegetative communities and their long-term sustainability.

Two stock ponds have been chosen as high priorities for repair and cleanout as part of the proposed activities for Phase One treatment to prevent further soil erosion and watershed sedimentation (see Range Improvements, Phase One Proposed Action, page 34). An additional pond has been identified for decommissioning and tamarisk removal to restore a dry wash channel.

3.3.2.5 Woodland/Forestry

Woodland/Forestry Collective Treatment Area

The proposed treatment area consists of all ages of pinyon-juniper including thick closed-canopy stands as well as groups of young trees that are moving into and replacing sagebrush and grasslands. All of the tree species in the proposed project area are susceptible to insect depredation and disease. Because stand density within these woodlands directly affects the ability of individual trees to produce enough food to survive, more dense stands have higher stress levels per tree than more open stands. These densely packed woodlands become vulnerable to individual tree mortality, especially in drought years. Several species of bark beetles also naturally occur in these woodlands, attacking trees through the bark to feed on the cambium layer between the wood and the bark. The natural defensive mechanism of the tree is to exude sap from a wound, successfully preventing further invasion. If a tree is stressed by over-crowding as well as drought, sap production is reduced and the tree has a greater chance of mortality from beetles. Tree mortality occurs when the insects girdle the tree trunk and sever the tree's ability to transport water and nutrients. In more open stands, individual trees are more able to withstand beetle attack because they are healthier and have more resources available for defense.

It has been well documented that pinyon-juniper woodlands have been rapidly expanding since the late 1800's in the Intermountain West. These semi-arid woodlands have displaced shrub steppe communities, influenced wildlife habitat, and altered ecological processes including fire (Chambers et al., 2005). Much of the wooded portion of the proposed collective treatment area consists of densely packed pinyon-juniper with little variation in age or tree height. Most of this area has beetle-killed trees scattered throughout, and trees that have not been affected in the past are at risk. Beetle-killed trees present a high fire risk, especially before needles drop, as the damaged trees can act as tinder for surrounding woodlands.

The BLM pinyon-juniper woodlands in the Black Ridge area and adjacent Forest Service lands are accessed by people from surrounding communities for firewood, pine nuts, Christmas trees, fence posts, and similar types of woodland harvest.

Woodland/Forestry Phase One Treatment Area

The approximately 9,100 acres proposed for treatment in Phase One contain woodlands similar to those in the collective treatment area, with several units identified for treatment adjacent to WUI communities. Two-thirds of the acreage in Phase One consists of units

in which chaining treatments for rangeland health have taken place. These previously chained areas now contain multiple stands of young pinyon-juniper interspersed with downed slash, older trees, and re-growth of trees that were not killed in the initial treatment. Many of these units are also utilized for local firewood gathering and other types of woodland harvest, and slash created in the fuel break areas would likely be highly desirable for wood collecting areas.

Units 15 and 17 may contain pockets of relict Rocky Mountain ponderosa pine woodlands with encroaching pinyon-juniper. Until late in the nineteenth century, ponderosa pine forests were plentiful in the western United States. Fire was an ecological key that shaped the composition and structure of these forests in that relatively frequent, low-intensity surface fires reduced litter, burned smaller trees, and reduced ladder fuels. Historically, most fires burned the understory and created uneven-aged groups of trees. The remnants of these larger forests are now scattered over several states in isolated stands such as those found along the high mesa Black Ridge drainages. Old-growth ponderosa pines and open-grown younger stands that could eventually develop into large old pines are diminishing across the west (Arno, 2008). Surviving old-growth ponderosa pines are valuable not only in supporting a unique wildlife habitat, but also in that tree rings can provide an index of climatic variations over the life of the tree. Relict trees can assist researchers in better understanding historic climate patterns, forest structure, and progression (Arno, 2008). The expansion of oak, pinyon, and juniper into the understory of lower elevation ponderosa pine are likely to have created conditions that will require restoration treatments before fire is reintroduced into the ecosystem (RMRS-GTR-202, pp. 14).

3.3.2.6 Vegetation

Vegetation Collective Treatment Area

The vegetation composition within the proposed treatment boundary is dominated by 40-50 year old pinyon-juniper stands which, in many areas exhibit a closed canopy with little understory development. Several small areas were treated in past years with chaining activities designed to reduce the amount of pinyon-juniper moving into sagebrush and grasslands. Lack of maintenance of the previous vegetation manipulation projects, along with past influences of livestock grazing management practices have altered the natural fire regime of the planning area. The benefits of the original treatments are becoming insignificant because of the current decline in productivity, vigor, and diversity of plant composition. There are a few scattered meadows of sagebrush and grasses interspersed within the closed-canopy pinyon-juniper as well as pockets of ponderosa along the southern mesa top project boundary. Small areas of cheatgrass area scattered throughout the proposed project area and the noxious weed Russian knapweed lines several sections of roadway.

Vegetation Phase One Treatment Area

Within the approximately 9,100 acre area proposed for Phase One activities, six units (units three through eight; approximately 1,350 acres) are sagebrush communities with encroaching pinyon-juniper. Many of the sagebrush communities are in fair to good condition, but all have significant pinyon-juniper encroachment.

Sagebrush/grassland communities are found on a variety of soils at inconsistent elevations throughout the proposed treatment area. Common shrubs within this community include rabbitbrush, mountain snowberry, and broom snakeweed. Native grasses include blue grama, western wheatgrass, sand dropseed, and Indian ricegrass. Crested wheatgrass has been seeded in this community type in several areas.

Twelve units (units twelve through twenty-three; approximately 6,050 acres) are previously chained areas with thickly re-sprouting pinyon-juniper stands and chaining debris scattered along the understory.

3.3.2.7 Fish and Wildlife (Including Special Status Species)

Fish and Wildlife Collective Treatment Area

The expanse of the 30,000 acre proposed collective treatment area and the numerous vegetative communities within the proposal unquestionably contain a wide variety of wildlife and wildlife habitat. Not only is the Black Ridge area identified as crucial winter deer and elk habitat, but the area is also frequented at least a portion of each year by migratory birds, many species of raptors and bats, wild turkeys, and various small mammal species. Black Ridge falls within a Utah State Wildlife Action Plan (WAP) focus area for southeastern Utah. A WAP focus area reflects a perceived need for a wildlife conservation strategy to prevent wildlife from becoming endangered. WAP goals and objectives focus on proactive measures including fuel reduction and other vegetation management actions to conserve and restore land and water and reduce the establishment of invasive species. Although threatened and candidate species and existing or potential habitat may be present within the 30,000 acre treatment area, these species and habitat would be analyzed separately and specifically for each phase of the treatment as they are planned for implementation. Therefore, for the purposes of this EA, T&E species will be considered in general for the collective area and analyzed specifically for the Phase One portion of the EA.

Federally Endangered, Threatened and Candidate Species

The proposed collective project area encompasses habitat that may offer *foraging and minimal breeding habitats* for the Mexican spotted owl (MSO), a federally listed threatened species. Of these habitats, approximately 200 acres contain *potential breeding habitat* according to the Willey-Spotskey Mexican Spotted Owl Habitat Model, 1997. These habitats are found within the Kane Springs and Muleshoe Canyons. The remainder of the project area is modeled as *potentially suitable foraging habitat* for the MSO. There is no critical habitat as designated by the U.S. Fish and Wildlife Service (USFWS) for MSO within the project area. Within the project area all riparian reaches have been evaluated for their potential to offer southwestern willow flycatcher (SWFL) nesting and only two small areas have been identified as *suitable for nesting*. One suitable patch of riparian is found at the headwaters of the Kane Springs drainage and the second is found within the Cottonwood Creek drainage. There is no suitable or potentially suitable habitat for the Colorado River Basin endangered fish or the black footed ferret.

The MSO was listed as a sensitive species by the Utah Division of Wildlife Resources (UDWR) in 1987, and was federally listed as threatened in 1993. Following federal listing a team was appointed to develop the Mexican Spotted Owl Recovery Plan, which was completed in 1995 and identified eleven district habitat recovery units. The Moab Field Office is within the Colorado Plateau recovery unit. The Recovery Plan provides a basis for management actions to be undertaken by land management agencies to remove recognized threats and recover the owl. A proposed rule officially designating critical habitat for Mexican Spotted Owl was published in July 2000 and became effective March 5, 2001.

The Mexican Spotted Owl Recovery Plan described owl habitat as deep, steep-walled canyons and hanging canyons. Nesting and roosting in Utah occurs in caves and on ledges in forested canyon habitat. These canyons are typically surrounded by terrain that does not support breeding owls. Habitat models developed by Spotskey and Willey, 1997 and 1999, have identified canyons with potential breeding habitat statewide. These models use the most current knowledge of habitat requirements for the Mexican spotted owl and expand upon the information provided by the 1995 Recovery Plan.

The SWFL was listed as endangered on March 29, 1995, under the ESA of 1973, and critical habitat was formally designated nationwide on July 22, 1997, however, no critical habitat has been designated within the Moab Field Office. The *Final Recovery Plan for the Southwestern Willow Flycatcher* was completed in August of 2002.

SWFLs breed in patchy to dense riparian habitats along streams and wetlands near or adjacent to surface water or saturated soils. These dense patches are often interspersed with small openings, open water, and/or shorter/sparser vegetation, creating a mosaic habitat pattern. Historically, nests were constructed in native willow species but currently SWFL will utilize both native and exotic species, such as tamarisk and Russian olive, which provide desired habitat requirements.

Wildlife including Sensitive Species, Migratory Birds, and Raptors

Utah BLM State Sensitive Species

The Utah Sensitive Species List, May, 2006, and the Utah Conservation Data Center database were used to identify potential habitat for State sensitive species. Below is a list of species that may occur within the proposed collective project area.

Utah BLM Sensitive Species with potential habitat in Project Area

Common Name	Scientific Name	Status	Habitat Status
Gunnison Sage-grouse†	*Centrocercus minimus*	Utah State Sensitive Conservation Agreement Species	Historical Brooding Habitat*
Bald Eagle	*Halieaeetus leucocephalus*	Utah State Sensitive	Winter Foraging Habitat*
Townsend's big-eared bat	*Corynorhinus townsendii*	Utah State Sensitive	High Value Habitat*

Common Name	Scientific Name	Status	Habitat Status
Western red bat	*Lasiurus blossevillii*	Utah State Sensitive	Critical Value Habitat*
Fringed myotis	*Myotis thysanodes*	Utah State Sensitive	Substantial Value Habitat*
Lewis's Woodpecker†	*Melanerpes lewis*	Utah State Sensitive	Primary Breeding Habitat *
Bobolink†	*Dolichonyx oryzivorus*	Utah State Sensitive	Primary Breeding Habitat *

** Utah Natural Heritage Division sensitive species database*
† Utah Partners in Flight Priority Species

The Gunnison sage-grouse prefers sagebrush and sagebrush/grassland habitats. It feeds mainly on sagebrush and other plant material, although insects are also consumed. The distribution of the species has declined across its native range and currently is not known to occupy the project area, although this area was historically used for brood rearing. Habitat loss appears to be the major threat to the Gunnison sage-grouse.

Both bald and golden eagles may winter in the area, generally arriving around November 1st and leaving by March 31st. Eagles typically feed on carrion and are found near large water sources and where livestock or wildlife is congregated in the winter. Neither of these species of eagle has a strong affinity to the Black Ridge area but may be found in the area feeding on carrion.

A number of wildlife species utilize the pinyon-juniper habitat type for all or portions of their lifecycles. The Utah Comprehensive Wildlife Conservation Strategy (CWCS) lists the ferruginous hawk as a Tier II species with pinyon-juniper as its primary habitat. Tier II species are considered to be ―species of concern" for which there is ―credible scientific evidence to substantiate a threat to continued population viability" (UDWR, 2005). Other Tier II species that utilize pinyon-juniper habitat as either primary or secondary habitat include the Allen's big-eared bat, fringed myotis, Townsend's big-eared bat, cornsnake, desert night lizard, and western banded gecko.

Townsend's big-eared bats occupy many types of habitat, but the species is often found near forested areas. Caves, mines, and buildings are used for day roosting and winter hibernation. Western red bats are normally found near water, often in wooded areas with roosting usually occurring in trees. Western red bats usually migrate south to warmer climates for the winter. The fringed myotis is uncommon, but distributed throughout Utah in colonies of several hundred individuals. It usually inhabits caves, mines, and buildings, most often in desert and woodland areas. The loss of roost habitat (caves, abandoned mines, and rock crevices) is the major threat to bat populations in Utah.

Migratory Birds

The Migratory Bird Treaty Act, as amended, was promulgated for the protection of migratory birds. All raptors observed in Utah are protected by the Migratory Bird Treaty Act and some birds are also protected by the Endangered Species Act (ESA), the Bald

and Golden Eagle Protection Act, and/or are included in the 2005 UDWR Utah Natural Heritage Program Species of Greatest Conservation Need. A draft Memorandum of Understanding between the Forest Service, the BLM and USFWS provides direction for the management of migratory birds to promote their conservation. The direction includes identifying species listed in the USFWS Birds of Conservation Concern (BCC) that are likely to be present in the area of a proposed action. The Utah Partners in Flight (UPIF) working group completed a statewide avian conservation strategy identifying ―priority species" for conservation due to declining abundance distribution, or vulnerability to various local and/or range-wide risk factors. One application of the strategy and priority list is to give these birds specific consideration when analyzing effects of proposed management actions and to implement recommended conservation measures where appropriate.

The UPIF Priority Species List and the Utah Conservation Data Center database were used to identify potential habitat for priority species that could utilize habitat within the project area. Migratory birds that rely on sagebrush and/or pinyon juniper habitat during some portions of their life cycle may be found throughout the collective Black Ridge area.

Utah Partners in Flight Priority Species*

	DWR Habitat Value†	Breeding Habitat	Winter Habitat
Lewis's Woodpecker	Primary Breeding	Ponderosa Pine	Oak
Gunnison sage-grouse	Suitable Historical	Shrubsteppe	Shrubsteppe
Bobolink	Prime Breeding	Wet Meadow	Migrant
Virginia's Warbler	Wintering	N/A	Migrant
Gray Vireo	Prime Breeding	Pinyon-Juniper	Migrant
Brewer's Sparrow	High Habitat	Shrubsteppe	Migrant
Broad-tailed Hummingbird	Critical/High	Riparian	Migrant
Three-toed Woodpecker	Wintering	N/A	Sub-Alpine Conifer

** Utah Partners in Flight Avian Conservation Strategy Version 2.0. †Utah Conservation Data Center*

Raptors

There are several raptor species that may utilize the general area; pygmy, flammulated, and great-horned owls, peregrine falcon, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, and golden eagle. Red-tailed hawks and golden eagles typically utilize cliff habitats, while peregrine falcons use cliffs exclusively. Other raptors and owls will utilize trees, snags and tree cavities for nesting. Many raptor species have a strong affinity to their nesting site or territory and protection of occupied as well as unoccupied nests is important because not all raptors breed every year and may utilize several nests within a nesting territory over a span of years.

Red-tailed Hawk

General Wildlife

Snags are important habitat for both nesting birds and bats while small mammals, reptiles and insects utilize downed logs. Pinyon-juniper, sagebrush, ponderosa pine and Gambel oak provide nesting, feeding, foraging, and roosting habitat for a variety of wildlife species. Bird diversity tends to be higher in ponderosa pine forests that have some Gambel oak component (Rosenstock, 1998), and small mammals tend to prefer large Gambel oaks (Chambers, 2002). Wildlife species dependent on ponderosa pine forests are usually adapted to a variety of forest conditions, from open stands for feeding to dense stands for protection and thermal cover (Ffolliott, 1997).

More specifically, ponderosa pine forests provide important habitat for species such as Abert's squirrel, red-tailed hawk and Western bluebird. Abert's or tassel-eared squirrels make almost exclusive use of ponderosa pine for cover, nesting, and food (Keith, 1965), feeding on the tree's seeds and buds in the warmer months and eating the inner bark of twigs in the wintertime. Abert's squirrels have been found elsewhere in the ponderosa forest of the Manti-La Sal range, so it can be assumed that there may be a squirrel population within the ponderosa areas proposed for treatment (personal communication, Barb Smith, Manti-La Sal National Forest).

Both mule deer and Rocky Mountain elk frequent Black Ridge for forage, and the area is considered critical habitat during the winter months. Mule deer occupy most ecosystems in Utah, but are characteristically found in shrublands with rough, broken terrain and abundant browse and cover. Mule deer winter diets consist primarily of browse in the form of sagebrush, bitterbrush, mountain mahogany, and other shrubs, as well as a small amount of grasses and trees. Rocky Mountain Elk is a generalist, feeding on forbs and grasses during the spring and summer and grasses and shrubs throughout the fall and winter.

Fish and Wildlife Phase One Treatment Area

The environment potentially affected by the Phase One proposed action would be identical to the resources affected for the collective treatment area with the following additions:

Federally Endangered, Threatened and Candidate Species

Though only *minimally significant* for prime spotted owl habitat (according to the Spotskey habitat model), a small portion of the southeastern corner of the proposed Phase One area has MSO habitat within Muleshoe Canyon

In 2007, Muleshoe Canyon was evaluated for MSO habitat suitability by Southwest Research, and much of the canyon was determined as *suitable for MSO occupancy and nesting* as it offered *potential and prime foraging and potential breeding habitat*. All suitable habitats were surveyed according to USFWS protocol in 2007/2008. No MSOs were detected in the area. Approximately 1.6 miles of the Muleshoe Canyon surveys are within the proposed Phase One project area. Surveys conducted in 2007/2008 included approximately 1,300 acres of potential foraging and limited potential breeding habitats

within the project area. Of this, 1,063 acres are modeled as foraging and 219 acres are modeled as breeding, according to the 1997 Willey-Spotskey habitat model.

Five units (3-5) of the Phase One portion of the proposed project are located within the 1,300 acre survey area (see Appendix F). Within these units there are approximately 38 acres of nesting habitat and 300 acres of foraging habitat that may be directly impacted by the sagebrush/grass treatments and possible ponderosa treatments if ponderosa are identified in the area. Seeding and weed control may be implemented to increase vegetative diversity and discourage weed invasions.

The portions of the Kane Springs drainage with modeled MSO habitats that are found within the proposed project area are considered *not suitable* for nesting occupancy during evaluation by Southwest Research in 2002. This evaluation concluded that all suitable nesting habitats in Kane Springs Canyon are located to the west of Highway 191, outside of the proposed Black Ridge treatment area.

Of the two patches that offer SWFL nesting habitat, one patch (22 acres) of *suitable but isolated breeding habitat* is found along the Cottonwood drainage (0.66 miles) within the Phase One project area. This patch offers dense willow growth, standing pools of water, and cattails. The dense willow canopy is up to 15 feet in height, and the patch is approximately 2,000 feet long and greater than 100 feet wide. A dense understory exists throughout the patch, which is continuous and has standing water. Although somewhat isolated in pinion/juniper foothills, this patch was surveyed in 2008 and no SWFLs were detected. This patch of SWFL habitat is located entirely in Unit 11 of the Phase One portion of this project, which has been identified as a WUI treatment area and a canyon/drainage treatment area (see Appendix F).

Wildlife Including Sensitive Species, Migratory Birds, and Raptors

Migratory birds, raptors and sensitive species discussed above for the collective treatment area all have the potential to utilize habitats within the Phase One treatment area during various times of the year for different lifecycle purposes.

Bat species may utilize trees and snags for roosting and open areas above sagebrush for foraging. The Phase One treatment area contains a variety of habitats for migratory birds. Sagebrush obligates such as brewer sparrows, vesper sparrows and gray flycatchers may be found in sagebrush treatment areas while pinyon jays, juniper titmouse, bushtits, gray vireos, Virginia warblers, ash-throated flycatchers, gray flycatchers and black-throated warblers may be found in the proposed pinyon-juniper treatment areas.

Wooded ponderosa areas offer habitats for species such as western tanagers, Steller's jay and pygmy nutcrackers. Riparian area may have species such as yellow warblers, white-breasted nutcrackers, plumbeous vireos and broad-tailed hummingbird.

In the area proposed for Phase One, raptor nesting would be expected to be minimal in sagebrush/grassland areas due to the limited amount of large trees and snags, but foraging activities may take place in sagebrush parks. Areas with pinyon-juniper communities

may offer marginal nesting opportunities but areas with larger trees, snags, ponderosa pine and riparian areas may offer nesting and foraging potential for many raptor species.

General Wildlife

According to the UDWR, Utah's wild turkey populations are flourishing (http://wildlife.utah.gov/news/05-11/turkey.php) and the division is still actively trapping birds for relocation within the state. Merriam's turkeys prefer ponderosa pine mixed with aspen and oak trees while Utah's Rio Grande turkey population frequents streamside habitat and cottonwood river bottoms. Water is an important factor in the improvement of turkey habitat, specifically in arid pinyon-juniper woodlands. The National Wild Turkey Federation (NWTF) has funded a regional habitat program for turkeys and sixteen turkey water guzzlers that have been placed in areas throughout the state. The Black Ridge area is an area of interest for future placement of guzzlers, and the BLM will be coordinating with UDWR and NWTF in this effort.

The sagebrush and pinyon-juniper treatment areas offer critical habitat for deer and elk during crucial winter months. ―Crucial winter range" is considered to be the portion of a local deer and elk range where approximately 90 percent of the local population is located during an average of five winters out of ten from the first heavy snowfall to spring green-up. Winter range habitat primarily consists of shrub-covered, south-facing slopes and is often considered a limiting factor for mule deer and Rocky Mountain elk in the intermountain west.

Because of learned behavioral use patterns passed on from one generation to the next, deer migrate for the winter into the same areas every year, regardless of forage availability or condition. These are generally areas lacking in snow depth, which allow for easier movement, within pinyon-juniper and sagebrush vegetation types. These vegetation types provide deer with both escape and thermal cover. Sagebrush is their primary forage during the winter season.

3.3.2.8 Recreation

Recreation Collective Treatment Area

The Black Ridge area is used extensively by recreationists both in four-wheel drive vehicles and in off-highway or all-terrain vehicles. The area receives moderate dispersed camping activity with increased camping during spring OHV season and fall hunting season. Recreationists drive on the network of designated un-paved roads in the area (see Appendix G for map of OHV designated roads), although the Black Ridge vicinity continues to be an area within the Moab Field Office where resource damage occurs from off-road travel on undesignated routes.

The area of the proposed action is also within the boundaries established by the Utah Department of Natural Resources, Division of Wildlife Resources, as available for hunting of deer, elk, black bear, cougar, turkey, pheasant, quail and other upland game species such as white-tailed ptarmigan and rabbit. The following chart indicates the current dates open for hunting of various species:

Species	Season	Additional Season(s)
Black Bear	4/11-5/31 and 8/22-9/30	10/31-11/22
Cougar	Varies	
Deer and Elk (Various hunts)	8/1 through 11/9	
Pheasant	11/7 through 12/6	
Quail	11/7 through 11/22	
Upland Game Species	8/22 through 2/28	

Recreation Phase One Treatment Area
The environment potentially affected by the Phase One proposed action would be identical to the resources affected for the collective treatment area as stated above.

3.3.2.9 Visual Resources

Visual Resources Collective Treatment Area
The BLM uses a Visual Resource Management (VRM) system to inventory and manage visual resources on BLM-administered lands. The primary objective of VRM is to maintain the existing visual quality of BLM lands and to protect unique and fragile resource values. The Moab Field Office RMP established VRM class designations for the field office area that balance resource actions with visual resource values and viewer sensitivity. The VRM system uses four classes to describe the degrees of landscape modification allowed on BLM-administered public lands. Determination of classes is based on a description of an area in terms of visual quality, viewer sensitivity to the landscape, and the distance from which a viewer would observe an area. The classes (VRM I through IV) provide safeguards for the protection of scenic attractions and scenic settings by requiring resource uses and management activities to meet VRM objectives of the area in which a use or activity is proposed.

The area of the proposed action includes both VRM Class II and VRM Class III areas. Class II management objectives allow minor changes to the landscape while retaining scenic quality. While management activities may be seen, changes to the landscape should repeat the basic elements of form, line, color and texture found in predominant features. Activities that take place in VRM Class III areas may attract attention but should not dominate the view. As with Class II objectives, changes to the characteristics of a Class III area should repeat the basic elements of the natural features in the landscape.

The method utilized to determine whether proposed projects conform to VRM class objectives involves a contrast rating system that evaluates the visual resource effects of a proposed project. Contrast ratings are generally acquired from specific viewpoints along commonly traveled routes or other popular or often-visited sites. These viewpoints are known as Key Observation Points (KOPs) and enable an evaluator to rate the degree of visual contrasts based on form, line, color and texture between the existing landscape and how it would look following project implementation. Contrast ratings are used to determine how the proposed project compares to VRM objectives for that area.

The primary public view of the proposed project area would be from major travel routes, wildland/urban interface boundaries, and recreation/hunting use areas. As seen from a distance such as the view from Highway 191, the landscape of the Black Ridge area generally presents a uniform appearance of a long, high, rolling mesa-type formation interspersed with gullies, rocky outcrops, and sagebrush/grassland flats. Across the greatest percentage of the view, colors are distinctly light-dark contrasts between the dark green of unbroken pinyon-juniper vegetation with succinct sandstone outcrops. Scattered throughout the dark green are visible sagebrush meadows of mixed sizes. The landscape that would be affected by proposed vegetation treatments does not currently exhibit an extraordinary range of visual diversity. Key observation points would include the crest of Highway 191 just north of Kane Creek, the Muleshoe crossing of Highway 191, the crest of Utah Highway 46, and the Black Ridge radio tower.

When viewed more closely, a large percentage of the proposed overall project area contains dense closed-canopy stands of pinyon-juniper. When traveling along one of the un-paved roads throughout the area it is difficult to see through, over, or beyond the pinyon-juniper growth. In the southern-most portion of the proposed treatment area there are a few small stands of old-growth ponderosa. The old-growth stands or ―yellow pines" as they are called, are an important component of the proposed project area both visually and aesthetically.

Visual Resources Phase One Treatment Area

In the portions of the proposed treatment area where public lands interface with communities (WUI), the viewshed varies somewhat between closed canopy pinyon-juniper woodlands and pinyon-juniper, sagebrush flats, and grasslands that are more open in some areas. Each of the communities is generally situated in a valley, with private lands extending into the distance and public lands located over ridges or beyond the nearest viewshed.

Chained areas that are proposed for restoration within the Phase One project area have old, horizontal trees with multiple-branched ―trees" growing from them. From a distance and also from roads near the project area, the chainings may resemble vigorous pinyon-juniper woodlands although in reality they are overly-crowded monocultures with extreme fuel loads. Soils surrounding the closed canopy rows of pinyon-juniper are generally barren of vegetation and prone to disturbance from weather and other erosional forces.

3.3.2.10 Fuels/Fire Management

As described in Chapter 1.3, the 22 Fire Management Units (FMUs) within the Canyon Country Fire Zone are discussed in the FMP in relation to wildland fire management goals for each unit. The proposed action falls between FMU 16 – Dry Valley and FMU 17 – La Sal. Both of these FMUs are described primarily as a diverse mixture of open and closed pinyon-juniper woodlands with extensive sagebrush parks and grasslands and some areas of cheatgrass. FMU 17 includes several areas that were previously chained and have been unmaintained over the years with a resulting component of ground slash and pinyon-juniper re-growth.

FMU 16 has a history of moderate fire occurrence with an average of nine fires and eleven acres burned each year. A cheatgrass fire in 1987 burned over 1,300 acres, although most wildland fires are small unless the amount of fine fuel is above normal. Suppression objectives emphasize firefighter and public safety as the first priority for all actions, and that large fires should be avoided to minimize loss of desirable forage species. The FMP states that all fires should be confined or contained at 500 acres, 90% of the time, under low- to moderate-intensity burning conditions as determined by the fire danger operating plan. High- to extreme-intensity fires (typically occurring between June 15th and August 15th) should be confined or contained at 100 acres or less 90% of the time. No areas were identified as potential wildland fire use areas for this FMU. The FMP recommends fuel management strategies such as prescribed fire and mechanical and/or other types of treatment to reduce hazardous fuel conditions, and advocates treatment in vegetative communities with condition class two and three to improve forage in elk winter and spring ranges and for livestock grazing (Canyon Country Fire Zone FMP, pages 71-79). The Pack Creek and Brown's Hole communities are within this FMU. Pack Creek completed a Community Wildfire Protection Plan in March of 2004 with corresponding fuel modification efforts implemented on Forest Service, State, and BLM lands surrounding the community.

FMU 17 also has a history of moderate fire occurrence with an average of eight fires and 89 acres burned each year. Approximately 100 acres burned in the 1997 Ray Mesa pinyon-juniper fire, prior to suppression efforts. Suppression objectives for this FMU are similar to those of FMU16 with low- to moderate-intensity fires confined or contained at 500 acres or less 90% of the time. High- to extreme-intensity fires in this FMU should be confined or contained at 300 acres or less 90% of the time with wildland fire in old chainings allowed to burn up to the full acreage size of the chaining. The FMP recommends fuel management strategies such as prescribed fire and mechanical and/or other types of treatment to reduce hazardous fuel conditions, and also advocates treatment in vegetative communities with condition class two and three to improve forage in elk winter and spring ranges and for livestock grazing. The LaSal WUI is within this FMU as well as extensive private landholdings and both oil and gas facilities. La Sal completed a Community Wildfire Protection Plan in March of 2004 and corresponding fuels modification has been ongoing for several years on BLM lands south of the community.

Fuels/Fire Management Collective Treatment Area

Past management practices combined with an aggressive fire suppression program and several continuous years of drought have influenced the natural fire regime within the proposed project area. Although there is a lack of historic evidence regarding fire regimes in pinyon-juniper woodlands, some data suggests that prior to major European-American settlement, pinyon-juniper woodlands experienced a mixed-severity fire regime with low and moderate fire as well as high-intensity, stand-replacing fires (Swetnam et al., 1992). Fires would have typically started by lightning strike and burned in large patches, creating a mosaic of open grassland meadow and sagebrush. Throughout the area, historic low and moderate-intensity fires prevented the build-up of

high density fuels by periodically clearing away brush, small trees, and dead and downed trees. When high intensity stand-replacing fires did occur, closed-canopy woodlands would have existed in small islands interspersed with grasslands, resulting in fewer acres burned and less damage to soils and other resources.

Wildland fires that occur in current day closed canopy pinyon-juniper dominated woodlands will typically be stand-replacing fires depending on the amount of grass and litter in a particular stand (RMRS-GTR-42-vol. 1, pp. 13, 2000). Soils are usually nearly bare for a few years, at which point annuals become established. Fires in sagebrush grasslands may also be stand-replacing depending on fuel quantities. Sagebrush species such as Wyoming big sagebrush may be highly susceptible to injury from fire and may take many years to recover to pre-burn dominance. Stand-replacing fires in sagebrush would be similar to pinyon-juniper areas with bare soils and annual species dominance after the first few years. The invasive annual, cheatgrass, is preferential to burned areas and may proliferate in areas post-fire that had little to no growth prior to wildland fire. The fine fuel resulting from cheatgrass dominance will then burn readily, further reducing shrub cover and altering the fire regime of areas that were previously intact sagebrush steppe ecosystems.

Fuels reduction activities including manual, mechanical, biological and herbicide are authorized in the Moab Field Office RMP as well as the Utah LUP Amendment. The RMP identifies major vegetation groups in the Moab Field Office, defines the DFC for each of the major groups including pinyon-juniper and sagebrush/grasslands, and recommends actions including fire and fuel management to help achieve DFC. The RMP also adopts the Utah LUP Amendment and carries forward the direction and guidance approved by the Utah LUP Amendment (Moab ROD and Approved Resource Management Plan, page 58). The Utah LUP Amendment identifies major vegetation groups, defines the DWFC for each of the major groups, and authorizes fire and fuel management actions designed to accomplish DWFC (Utah LUP Amendment, Chapter 2, Table 2.1, page 2-5).

In defining ―fuels reduction," the characteristics that comprise vegetative fuels include crown fuels (live and dead material in the canopy of trees), surface fuels (grass, shrubs, litter, and wood in contact with the ground), and ground fuels (duff, buried wood, etc.). Some of the vegetative components that may contribute to an increase in the number or intensity of crown fires are the continuity and density of the tree canopy combined with fuel moisture levels and wind. Shrubs and small trees also contribute to crown fires both by increasing the intensity of fire on the ground and by serving as ―ladder fuels" that carry surface fire to the canopy. Surface fuels can also carry fire when vegetation is dead or has low moisture content. Because of the potential for surface fires to ignite ladder fuels and result in a crown fire, surface fuels must also be considered when planning treatments. The relationship between surface and crown fire has been researched and described (Scott and Reinhardt, 2001), with specific methods identified to help determine stand-level fuels treatment prescriptions.

In vegetative communities such as pinyon-juniper, effective treatments have limited crown fires by first reducing volatile surface fuels and then thinning trees or pruning to elevate the fuel base to above the ground surface. In designing a specific fuel treatment prescription, techniques for reducing crown fire occurrence and severity may include (1) increasing canopy base height, (2) reducing canopy bulk density, (3) reducing forest canopy continuity and (4) reducing surface fuels.

Fuels/Fire Management Phase One Treatment Area

Presently, the dominant vegetation in the Phase One area is pinyon-juniper ranging from new growth up to trees over twenty feet in height. Scarce meadows are scattered throughout the heavily wooded area, specifically in units three through eight, containing grasses, sagebrush and other woody shrubs. Scientists agree that the current fire regime in pinyon-juniper woodlands has been greatly altered in that closed-canopy woodlands are difficult to ignite because of the lack of understory vegetation, and fires do not carry except under specific conditions. However, under these specific conditions (lack of fuel moisture, high temperatures, wind, etc.), exceptionally crowded woodlands can experience a high-severity, stand-replacing wildland fire that can cause irreparable damage to resources. A high severity fire in the Phase One area would have the potential to destroy all of the pinyon-juniper, sagebrush meadows, and also the small stands of ponderosa in Units 15 and 17. High intensity fire could jeopardize the health and safety of the public and firefighters, could result in erosion, loss of grazing land, impaired wildlife habitat, impact municipal water supplies and water quality for Brown's Hole, and present an increased chance for invasive species introduction and spread.

3.3.2.11 Socio-economics

Socio-economics Collective Treatment Area

San Juan County is located in the far southeastern portion of Utah within the Colorado Plateau. At 5.2 million acres, it is the second largest county in Utah and the second largest in the United States and 72 percent of the county is managed by federal or tribal agencies. San Juan County had a population of 14,457 in 2007 with a per capita personal income of approximately $17,000, a 4.8 percent increase from 2006. The average annual growth rate of San Juan County was 3.6 percent between 1997 and 2007. Agriculture has been an integral part of the economic base of San Juan County since the late 1800's, although food production among Native American tribes occurred as early as 200 A.D. Farming and ranching activities have decreased in the past twenty years and many of the areas cultivated or used for rangeland are no longer in production.

Because the county covers such an expansive area, it includes a diversity of elevations, landforms, and vegetation from high desert to timbered mountains. The average growing season is June 1st through October 1st and average annual precipitation varies widely between 1.5 and 14.9 inches per year. Temperature averages range from 44 degrees F. in winter months (November-March) to 77 degrees F. in summer months (April-October).

Public knowledge about wildfire risk and forest health has increased over the past decade and has generated public and political interest in the reduction of hazardous fuel loads on public lands. Most ecologists and local and federal agencies agree that reducing

hazardous fuels on public lands is essential to the protection of communities. Very few communities or local governments, however, have zoning in place to guide building requirements that would reduce the flammability of structures or landscaping. While federal agencies such as the BLM are focusing the majority of hazardous fuels reduction projects in areas where public lands are adjacent to private property, this does not take into account the continuous spread of development in rural areas. The Black Ridge area is a good example of this national trend in that several newly established as well as proposed developments have been created adjacent to BLM lands in the past decade.

Cost data collected in recent research indicates that there is economic evidence to support the use of fuels treatments for cost-effective wildland fire hazard reduction. Based on cost-savings from reduced suppression costs, these research results show a range of social as well as ecological benefits from fuels reduction treatments. The most costly of treatments is mechanical reduction while the lowest cost fuel treatment has shown to be wildland fire use for resource benefit.

Socio-economics Phase One Treatment Area

The Pack Creek community approximately 15 miles south of Moab, Utah has grown from a single ranch extending throughout a small riparian valley to a group of secluded subdivisions with homes scattered along the riparian area and into the foothills of the La Sal mountain range. Approximately 40 homes and/or lots as well as the Pack Creek Guest Ranch with the main ranch and ten cabins are now part of the community.

Brown's Hole is a collective of individually-owned parcels (40+ acres) located twenty miles south of Moab at the 6,000 foot level of the La Sal mountain range. A portion of the community is off-grid with both solar and hydroelectric power generated for the homes, and although development is currently sparse there could be dwellings and other infrastructure added in the future. The community is bordered by BLM and Forest Service lands.

The town of La Sal, Utah is the most populated of the three small WUI communities adjacent to the collective treatment area. La Sal is situated in the foothills at the south end of the La Sal mountain range. According to 2000 census figures, the population of La Sal is 339 with 96 households, 72 families and 7.4 people per square mile. Although the other communities situated near BLM public lands in the proposed project area are somewhat smaller in population than La Sal, the La Sal community with a small general store and local churches is generally representative of other small communities scattered throughout San Juan County.

4.0 ENVIRONMENTAL IMPACTS

4.1 Introduction

This chapter provides a summary of the environmental impacts of the proposed action alternative and the no action alternative. The issues evaluated here reflect the resources

described in Chapter 3, Affected Environment, and were determined by the resource specialists to be the key issues related to the proposed action.

4.2 Direct/Indirect Impacts

A combination of high temperatures, low relative humidity, winds, and/or lengthy periods of drought could create the potential for a severe, high-intensity wildland fire in the pinyon-juniper woodlands on Black Ridge. Critical ecosystem elements as well as cultural, recreational, watershed, and wildlife resources may be at risk from an uncharacteristically intense wildland fire. The existing excessive fuel load would also greatly increase the risk for wildland fire to spread into adjacent canyons, which could potentially adversely impact cultural and recreational sites located on nearby mesas and in adjacent canyons.

Potential impacts to the resources of concern identified in the analysis and planning stage of the proposed project are considered below. The use of specific herbicide active ingredients and formulations on BLM lands in Utah was authorized by the 17 States Herbicide PEIS in 2007. The 2007 PEIS identifies potential impacts to the natural and human environment from the use of herbicides, incorporates standard operating procedures and mitigation measures to ensure the protection of resources, and approves for use on western BLM lands specific herbicide active ingredients.

The 2007 17 States Vegetation Management PER analyzes potential effects of vegetation treatment methods (fire, mechanical, manual, and biological), considers reasonably foreseeable hazardous fuels reduction activities, and provides a cumulative impact analysis for the use of herbicides in conjunction with other vegetation treatment activities.

Impacts may be direct or indirect and may include both beneficial and detrimental (adverse effects). Direct impacts may be caused by an action occurring at the same time and place as the proposed action, while indirect impacts may result from the proposed action but may occur later in time. Direct and/or indirect effects to resources from the proposed action are identified below by treatment activity within each resource potentially affected for both the 30,000 acre landscape-level treatment (Collective Treatment Area) and the 9,100 proposed Phase One treatment (Phase One Treatment Area).

4.2.1 Alternative A – Proposed Action

4.2.1.1 Watersheds

Studies show that the treatment of small or isolated tracts of vegetation without assessment of the broader landscape will most likely be ineffective at reducing the extent and severity of wildland fire (RMRS-GTR-120). Because multiple vegetation groups and varying fuel conditions comprise a large fire, a ―firesafe" landscape must have hundreds to thousands of acres of strategic fuel treatments to be effective (Finney, 2003).

The USGS is predicting drought conditions may persist for several decades (Gray et al., 2003). Any surface disturbing activity could have greater and longer-lasting impacts on watersheds during drought conditions. Impacts from drought following fuels reduction activities could potentially include reduced soil health, reduced vegetative health, impaired water quality and increased wind and water erosion. Preliminary monitoring results from treatments throughout the Canyon Country Fire Zone over the past five years show increased vegetative vigor in most areas and very little wind or water erosion. Although seeding success can be dependent to some extent on the amount of moisture received following treatment, monitoring results show that vigorous establishment of desired understory species in treated areas is evident in as little as six months time. Therefore it is anticipated that the risk of adverse impacts to soil and vegetative health and overall watershed health from the proposed fuel reduction would be negligible while the potential for beneficial soil and vegetation effects would be expected to be high.

Watersheds Collective Treatment Area

Manual Treatment

Effects from manual treatment would include a reduction in vegetation cover and potential exposure of soils. Indirect short-term effects could include an increase in erosion and stormwater runoff, although impacts would generally not be significant unless an extreme high-intensity precipitation event occurred immediately following treatment, for which there is a very low probability.

Mechanical Treatment

The wood chips and surface mulch remaining following mechanical mastication would slow surface runoff, stabilize soils, and in some instances conserve site nutrients and water. The stabilization of soils and rebalancing of the vegetative composition through removal of the overstory would have long-term beneficial watershed effects including soil stabilization and a return to a more historic fire regime.

Prescribed Fire Treatment

Prescribed fires of low to moderate burn severity rarely cause adverse effects to hydrologic systems (RMRS-GTR-42, Volume 4, page 117). Because the effect of fire on watershed systems depends largely on the geography of the area burned, the characteristics of the watershed itself, and the severity of the fire, prescribed fire in small areas in flat terrain would have little effect on water resources. Annual streamflow discharge from watersheds can increase by varying magnitudes as a result of high-severity wildland fire. Loss of vegetative cover combined with decreased litter accumulations and water-repellent soils following burns are accepted reasons for streamflow increases (RMRS-GTR-42, Volume 4, page 110). Streamflow responses to a controlled prescribed fire, however, are smaller in magnitude because they do not generally consume extensive amounts of litter and other decomposed matter on the soil surface. There would be a slight potential for detrimental watershed effects subsequent to prescribed fire activities if a large precipitation event (e.g. a flash flood-type event) occurred in a unit of the proposed project immediately following treatment. Studies show that flood peak flows can increase dramatically following even a low-intensity prescribed fire, altering stream characteristics and potentially damaging natural resources.

Prescribed fire activities, however, are implemented during the autumn and early winter months of the year when the chances for high precipitation events (other than snow) are very low.

Herbicide Treatment

The use of specific herbicide active ingredients and formulations on BLM lands in Utah was authorized by the 17 States Herbicide PEIS in September of 2007. The PEIS identifies potential impacts to the natural and human environment from the use of herbicides, incorporates standard operating procedures and mitigation measures to ensure the protection of resources, and approves for use on western BLM lands specific herbicide active ingredients. The PEIS states that vegetation treatments to control populations of non-native species on public lands generally result in the restoration of the ecological functions of the watershed encompassing the treated lands. Treatments would be expected to benefit desired plant communities by improving vegetative vigor, density and resiliency, which would enhance water quality by decreasing the potential for erosion and increasing filtering capacity.

The post-treatment return of the area to a fire regime and condition class that could support low-intensity fires would have a beneficial effect on water quality in that hydrologic cycles and streamflow regimes would not be severely impacted by shorter interval low-intensity fires.

Watersheds Phase One Treatment Area

Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.1.1.1 Floodplains

Removal of vegetation could have a temporary effect on surface runoff by increasing the potential for frequency and magnitude of peak flow compared to pre-treatment conditions. Effects would depend to a certain extent on site gradient and physical characteristics, but overall would be expected to be minor and short-term unless an unusually extreme precipitation event occurred immediately following treatment.

Floodplains Collective Treatment Area

Manual Treatment

Effects from manual treatment would include a reduction in vegetation cover and potential exposure of soils. Indirect effects could include an increase in erosion and stormwater runoff, although impacts would generally not be significant unless an extreme high-intensity precipitation event occurred immediately following treatment.

Mechanical Treatment

Mechanical reduction of fuels has the potential to impact floodplains by increasing storm water flows from mesa top areas into canyons and/or from soil disturbance to canyon edges. The extent and duration of the potential effects would be dependent upon the amount of disturbance (extreme high precipitation event), and the amount of time the treated area has had to revegetate (approximately 1-3 years). The long-term beneficial

effects of the proposed treatment would restore and preserve the natural resource values of floodplains through the creation of a healthy, resilient, and more diverse vegetative community.

Prescribed Fire Treatment
Low-intensity prescribed fire would not be expected to adversely affect floodplains, as low severity fire is less likely to affect surface area than high-intensity fire. Erosion and runoff are often unaffected on level areas after a low severity prescribed burn, and steep slopes would not receive prescribed fire treatment.

Herbicide Treatment
It is generally accepted that vegetation treatments meet an identified need for reducing the risk of wildland fire while improving ecosystem health. Herbicide treatments would reduce invasive, non-native species and noxious weeds with an intended effect of controlling population density and spread. Because wildland fire could affect the hydrologic function of the area, indirect beneficial effects to floodplains would be anticipated from the proposed treatment goals and objectives of reducing the incidence of high-intensity wildland fire.

Floodplains Phase One Treatment Area
Manual Treatment
Manual treatment would occur on less than twenty percent of the total acreage proposed for treatment and would involve minimal soil disturbance. Manual treatment seldom results in exposed soil, eliminating the risk of water flow alterations. Piled materials would heat soils directly under the footprint of the pile when burned, although mitigation in the proposed action (size of piles and burning conditions) would prevent adverse effects to soils and subsequent erosion potential.

Mechanical Treatment
All mechanical work conducted in Phase One units with existing closed-canopy pinyon-juniper woodlands could potentially contribute to an increase in sediment movement if an extreme, high-intensity precipitation event occurred immediately following treatment. Because these densely wooded units have already experienced soil erosion in tree interspaces, an extreme event could increase this erosion potential. However, mechanical treatment covers the ground with chips and mulch which can contribute to holding soils in place during high precipitation storms. This mulched material in addition to floodplain and water quality mitigation actions outlined in the proposed action would minimize potential impacts. The majority of the treatment units within the Phase One proposed action are previously chained areas with an established herbaceous cover. These units would not be expected to contribute to an increase in sediment movement during an extreme precipitation event.

Prescribed Fire Treatment
Effects would be similar to those listed above for the collective treatment area.

Herbicide Treatment
Because herbicides would only be applied in very specific instances, and then only when identified by resources specialists and/or monitoring results, potential effects are theorized from treatments in similar areas and situations. Direct and indirect effects to the timing or magnitude of flood peaks or changes in flow regimes (i.e. from intermittent to perennial) would not be expected from herbicide treatment. A small increase in water availability due to decreased transpiration by remaining vegetation in some riparian areas could be possible. Increases or decreases in stream or spring discharge due to vegetation removal would be short term and would be expected to diminish quickly due to vegetative re-growth. In specific areas where the removal of tamarisk is identified for treatment activity, long-term effects could include the recovery of the associated floodplain area from the desiccating effect of tamarisk. Long-term effects of tamarisk treatment could include partial recovery of streambanks where channel widths have been constricted from tamarisk growth.

4.2.1.1.2 Water Quality
Because the potential for severe fires would be reduced there would be less impact to sensitive riparian, wetland, and floodplain areas around impaired water bodies. As a result, these areas would regain their ability to filter dissolved and suspended solids, resulting in a more stable base flow through improved infiltration of surface flows.

The reduction of invasive and non-native vegetation in riparian areas can improve water quality. Tamarisk trees have deep, extensive root systems that draw excess salts from the groundwater. These salts eventually end up on the ground as part of the deep piles of leaf litter found under each tamarisk. Surface soil salinity increases under these leaf piles to the point that many native plants are unable to germinate and tamarisk monocultures are the eventual result.

Water Quality Collective Treatment Area
Manual Treatment
Manual treatments would occur on only a small portion of the total treatment area, and would involve very minimal soil disturbance or vegetation removal, so no short-term effects to water quality would be expected. The removal of invasive, non-native tree species would lead to increased herbaceous ground cover which would have long-term beneficial effects to water quality by increasing infiltration, decreasing surface runoff and erosion, and reducing sedimentation.

Mechanical Treatment
Ground disturbance associated with mechanical treatment may cause short-term increases in runoff resulting from vegetation removal on upper benches. Soil compaction may also affect runoff, although compaction effects would be reduced by the deposition of mulch and shredded materials. There is potential for an increase in water yield from removal of the forest canopy due to an increase in snowpack accumulation followed by more rapid snowmelt. In the longer term, increased cover of perennial grasses and shrubs would enhance watershed function (increased infiltration and reduced runoff).

Detrimental water quality impacts to creek drainages could result from wind and water erosion if organic cover does not adequately recover following treatment. However, monitoring results from previous treatments in the general area show average to above-average seeding success, which would indicate sufficient vegetative cover to alleviate long-term water quality impacts. Mulch and surface litter from treatment activities would trap sediment and allow for greater water infiltration, which would decrease short-term wind and water erosion. If successful, the proposed treatment would establish beneficial plant species composition as well as rooting depth, which would increase both soil fertility and resistance to compaction. Improved soils would support the hydrologic function and contribute to watershed health.

Minor impacts to the quality of groundwater could be possible from mechanical treatment due to changes in infiltration patterns from vegetation removal and mulch dispersal. Altered infiltration rates in low-mulch areas could cause short-term increases or decreases in chemical levels in aquifers depending on the type of sediment or bedrock below a specific treatment area. These effects would only occur until vegetation re-established, at which point long-term benefits to groundwater would be realized. Long-term benefits could include a return to a low intensity fire regime with an associated reduction in altered infiltration rates due to the absence of high-intensity fire.

Recent studies have been completed that analyze the response of shallow groundwater levels to fuels reduction treatments. Results from these studies show that although many connections and relationships occur between vegetation and groundwater, the effect to shallow groundwater levels from fuel reduction is minimal (Price, L., 2007).

Prescribed Fire Treatment

The effects of high-intensity fire on water quality can include increased runoff, erosion, and higher stream temperatures. Because the proposed prescribed fire activities would be low-intensity contained fires, there would be short-term minimal effects to water quality. Any potential water quality impacts would be weighed against the risk of potential high-severity wildland fire that would result in large-scale sediment delivery and long-term water quality impacts.

Herbicide Treatment

As stated in the 17 States Herbicide PEIS, several herbicide active ingredients have been identified as groundwater contaminants (e.g. 2,4-D, Glyphosate, picloram, simazine). The BLM authorizes use of herbicides only under adherence to herbicide product labels with regard to application restrictions associated with groundwater protection. Other standard operating procedures and mitigation measures are in place to assure that effects to surface water would be minor and that herbicide concentrations in surface water would not exceed safe levels for human health.

Water Quality Phase One Treatment Area
Manual Treatment
Effects would be similar to those listed above for the collective treatment area.

Mechanical Treatment
There are no riparian areas targeted for mechanical treatment in this project. Mulched materials that would remain following chipping of vegetation adjacent to the riparian area may reduce overland flow that could carry sediment to the stream. In addition, a buffer area of natural vegetation consisting of live woody trunks, fallen trees, brush and leaves along the streambanks would filter sediment. The buffer areas would trap sediment in the organic matter and prevent sediment from entering the stream. The riparian buffer would be effective in preventing sediment accumulations in all but the most extreme precipitation events.

Prescribed Fire Treatment
Potential effects from prescribed fire in the proposed Phase One area would be identical to those listed above for the collective treatment area.

Herbicide Treatment
Potential effects from herbicide treatment in the Phase One area would be identical to those listed above for the collective treatment area.

4.2.1.1.3 Wetlands/Riparian Zones
Although wetlands and riparian zones would not be disturbed by most treatment activities, areas that receive treatment could be reseeded or replanted to stabilize and restore vegetation and to help areas recover from conditions that favor invasive species. Treatment in riparian areas would most likely be limited to the removal of individual tamarisk and/or Russian olive trees unless a particular riparian area had serious pinyon-juniper encroachment. The method most commonly used in the Canyon Country Fire Zone to treat these non-native riparian plants is manual cutting followed by treatment with an herbicide approved for use in an aquatic ecosystem. All vegetation removal activities have the potential to disturb soils from trampling and cutting actions. The removal of trees can potentially cause erosion and increased sedimentation, although the root systems of individual trees would remain intact and would help to alleviate erosion until native species could recover.

Wetlands/Riparian Zones Collective Treatment Area
Manual Treatment
The removal of individual trees by hand with chainsaws would be less likely to affect wetland and riparian areas than other means of removal. Hand treatments would target the overstory of selected trees and would cause little soil disturbance or disturbance to more desirable plant species. In the long term, successful control of undesired species would lead to improved riparian conditions. The growth of desirable vegetation could benefit habitat for species of concern while improving hydrologic characteristics and promoting bank stability.

Mechanical Treatment
Mechanical treatment would not be conducted in wetlands and riparian zones.

Prescribed Fire Treatment
A limited amount of pile burning would be the extent of prescribed fire treatment proposed for riparian areas. Particular care would be taken when pile burning near riparian areas because of the potentially severe negative effects of escaped fire. Adverse effects would not be expected from the proposed burning with mitigation activities implemented that are included in the proposed action. The removal and burning of vegetative debris may release some nutrients onto the soil which could contribute to vegetation growth in pile burn sites.

Herbicide Treatment
The original Vegetation Treatments on BLM lands in 13 Western States Environmental Impact Statement and 1991 Utah Record of Decision, as well as the Moab Field Office RMP authorize the use of herbicide application in treating tamarisk, Russian olive, and other riparian invasive and non-native species. Imazapyr (Arsenal®) and/or triclopyr (Garlon®) have been used in treating tamarisk and Russian olive in the Moab Field Office for many years. Treatment by removing aboveground stems followed by foliar application of herbicide to the cut stems has proven to be effective in the control of these species in isolated stands. Both of these herbicide active ingredients are low in toxicity, and are degradable by soil microorganisms. Strict adherence to SOPs would also mitigate potential effects of herbicide treatment.

Successful treatment of invasive, non-native species in select riparian areas throughout the collective treatment area would likely result in small decreases in soil salinity, improved native riparian habitat, and potential increases in groundwater once the species have been eliminated. Root systems of treated invasives remain in the ground, which can provide short-term beneficial bank stabilization while natives re-establish.

Wetlands/Riparian Zones Phase One Treatment Area
Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.1.1.4 Soils
Regardless of the method utilized to remove vegetation, treatments could result in short-term negative effects. Potential effects could include increased rates of erosion and reduced water infiltration, which could lead to soil loss and reduced soil productivity. All vegetation removal activities have the potential to increase surface water runoff as a result of vegetation removal, which could lead to streambank erosion and sedimentation in wetlands and riparian areas (Ott, 2000). However, under normal precipitation patterns it is most likely that before it could reach stream channels or the groundwater table, the large majority of excess soil moisture would be utilized on-site by remaining vegetation.

The proposed repair and cleaning of stock ponds would decrease the sediment load in the watershed, as both ponds are eroding and continuously washing out during precipitation

events. The proposed upgrading of the road crossing at Cottonwood Creek and San Juan County road #174 would decrease downstream sedimentation from mud, rutting and erosion during wetter months.

The use of ATVs for seed dispersal could create some short-term impacts to soils. Harrowing could have the highest short-term impacts resulting from the loss or disturbance of crusts and soil structure, which may cause low soil aggregate stability and increased potential for short-term (1-2 years) wind and water erosion. Because vegetation would be expected to increase in both diversity and quantity over several growing seasons following completion of the project, the negative impact to soil crusts would be offset by increased vegetation and soil stabilization. Depending on climatic conditions and other potential disturbances in the area, vegetative re-growth could begin to stabilize soil as soon as the first growing season following treatment.

In the long term, the proposed project would move the area toward a more desirable fire condition that would decrease the size, severity and duration of wildland fires. Less severe wildland fire would result in fewer impacts to soil characteristics such as temperature and chemical and physical structure. Revegetation activities would improve soil resources in the long term and reduce the potential for erosion by fostering a healthy, resilient understory. A decrease in potential destruction of biological soil crusts from severe fire would result in increased fixation of atmospheric nitrate and a reduction in erosion.

Following a successful treatment, fire regimes would be expected to return to a more natural pattern with fewer indirect soil impacts common to high-intensity fire such as stream sedimentation and fugitive dust from wind erosion.

Soils Collective Treatment Area

Manual Treatment

Direct soil disturbance from hand crews is expected to be minimal. Implementation of the proposed design would reduce the risk of erosion and sediment delivery in both the long and short term because the remaining trees and newly established groundcover following treatment would decrease the risk of erosion.

Mechanical Treatment

Short-term impacts could include soil compaction and increased erosion as a result of vegetation removal. Adverse effects would be reduced through mitigation included in the proposed action; avoiding wet soils and steep slopes.

Use of the chipper/shredder could result in the displacement, compaction or disturbance of the top two to three inches of soil in the areas of the proposed action with less than 30% slope. Use of a brush cutter could also reduce erosion through elimination of secondary operations such as piling and slash burning, as the machine allows for individual selection of trees and in most cases can make a single pass to complete one full treatment. The shredder would eliminate the need for hand-cutting in areas where numerous small trees exist and where the soil would benefit from chipped mulch.

Benefits of a brush cutter include the efficient reduction of wood and brush by cutting selected trees at ground level, avoiding disturbance to soil and root materials. Brush cutters leave a layer of shredded wood fibers that can biodegrade rapidly while providing a protective shield from wind and water abrasion. Litter cover from lop and scatter as well as bullhog treatments has been shown to create a short-term stabilizing effect on surface soils. Although advanced monitoring data is lacking for high desert pinyon-juniper sites, the most current research available does not show significant differences in soil erosion rates prior to and after a fuels reduction treatment. However, the lower percentages of bare soil following treatment could create significantly less soil exposure (Brockway et al., 2002). Exposed soils are frequently nutrient and/or resource depleted and may function as source areas for soil erosion. It is expected that the increases in soil surface cover from the deposition of mulch combined with the establishment of herbaceous vegetation from the proposed seeding treatment would reduce soil erosion potential within the mechanically treated areas. Overall, the treatments would create a general improvement in the health/stability of soil resources within the proposed project site. Mulched soil cover in mechanized areas and a rest from livestock grazing for at least two consecutive growing seasons in all seeded areas would both stabilize soils and reduce erosion in the overall area. Combined with increased herbaceous vegetation from the seeded portion of the project, these direct benefits should translate into more stable soil conditions within the majority of the area.

Mechanical devices such as a bullhog have the potential to reduce soil permeability from the effects of mulch on soil structure and bulk density. However, a temporary reduction in permeability would be offset by the potential long-term beneficial effects from the project. Soil water-holding capabilities would be enhanced within most of the proposed project area due to the establishment of an increased protective soil covering of plant litter materials from the planned seeding treatment. In the Southwest, artificial seeding of herbaceous plant species on degraded watershed sites has been studied for nearly a century. Thames (1977), Cox et al., (1984), Oechel (1988), Roundy (1995), and others found that a variety of perennial grasses and forbs can be successfully established on sites needing rehabilitation. The presence of pinyon-juniper usually indicates the availability of adequate moisture for most of the commonly seeded species (Restoring Western Ranges and Wildlands, Volume 1, p.37). Through the long-term creation of a more stable ecosystem on Black Ridge and one that is more consistent with a natural fire regime, the general area would be more resilient when wildland fire occurs. Because wildland fire can be a landscape-scale disturbance that may change the hydrologic dynamics of an entire watershed, the soil stabilization and water-holding capability results that would be expected from the proposed treatment could have long-term beneficial impacts to the watershed.

Because biological soil crusts that may be growing in the bare soil interspace of the dense woodlands are poorly adapted to compression disturbances, both mechanical and manual treatment could break sheaths and filaments and reduce the soil organism function. Adverse affects could include decreased soil nutrients and stability as well as a reduction in organic matter and diversity. Mechanical treatment may also affect soil crusts through

crust burial. Crusts tolerate shallow burial by extending sheaths to the soil surface, but can be killed by deeper burial. A portion of existing crusts would be deeply buried by mechanical mulch and could be destroyed. In addition, the breakdown of mulch could consume certain nutrients from existing soil. However, in areas where crusts have received only shallow burial, re-growth could begin to stabilize soil within the first year following treatment depending on weather and other disturbances. The restoration of deep crust thickness can take up to 50 years, and mosses and lichens can take up to 250 years to recover. (http://www.soilcrust.org/crust101.htm) The loss or disturbance of crusts and soil structure can result in low soil aggregate stability and increased potential for short-term (1-2 years) wind and water erosion. Because vegetation would be expected to increase in both diversity and quantity over several growing seasons following completion of the project, the short-term adverse effects to soil crusts would be offset by long-term positive impacts of increased vegetation and soil stabilization.

Prescribed Fire Treatment

Loss of vegetative matter in the surface horizon from the proposed burning of slash piles as well as prescribed burning of debris on slopes greater than 30% would subject soils to increased wind and water erosion. Actual burning of stacked piles would be conducted during peak soil moisture conditions, preferably during periods when light snow cover existed in the area, to reduce nitrogen loss in soils. Potential damage to soils from heating during the burning of slash piles would be offset by the benefits of long-term increased vegetative production. Because this area receives sporadic precipitation, there would be an expected short-term loss of some soil microorganisms, soil nutrients, and remnant grass and shrub species from the burning of slash; however, impacts are not considered significant because of the low percentage of soils affected (less than 2% of total surface soils). Assuming an estimated maximum of twenty burn piles per acre with each pile covering an estimated 36 square feet, charred soils after piles were fully burned would cover a small percentage of the total proposed acreage. Because this area receives sporadic precipitation, there would be an expected loss of some soil microorganisms, soil nutrients, and remnant grass and shrub species from the burning of slash; however, impacts would not be considered significant because of the low percentage of soils affected. Wind and water erosion would be offset by the remaining scattered debris and surface vegetation.

Broadcast fires would be low-intensity, producing low soil heating so that ground cover would be scorched, charred or consumed but duff would be left largely intact. Prescribed broadcast burns that have an extreme effect on soil properties are extremely rare, as light to moderate fire usually has little to no effect on the physical properties of soil. It would be expected that low-intensity broadcast burning conducted during fall and winter months would not cause extreme changes in surface soil chemical properties because of the low fuel loading and low fire temperatures.

There would be a low percentage probability that runoff, erosion or sediment delivery would occur the first year following prescribed fire, although until vegetation is reestablished there could be a short-term increase in sediment yield within a treated unit. Because the proposed project is a multi-year undertaking, revegetation of treated areas

would be ongoing as additional treatments were taking place which would reduce potential soil impacts to the collective area.

Fire is a common occurrence in many regions where microbiotic crusts grow and research shows that fire can cause severe damage, but that recovery is possible. The degree to which crusts are damaged by fires depends on the intensity of the fire. Low intensity fires do not remove all of the crust structure, which allows for re-growth without significant soil loss. The presence of shrubs in an area that experiences wildland fire (particularly sagebrush) increases the intensity of fire, decreasing the likelihood of early vegetative or crust recovery (http://www.soilcrust.org/crust101.htm).

Herbicide Treatment

According to the 17 States Herbicide PEIS, none of the herbicides commonly used by the BLM would result in adverse impacts to soils. Of the herbicide active ingredients most often used by the BLM, picloram and tebuthiuron are persistent in soils for a year or more, while clopyralid, glyphosate and 2,4-D are relatively non-persistent in soils. Potential effects to soil and soil organisms from these herbicide active ingredients and the newer list of herbicide active ingredients appear to be minor.

Selective removal of tamarisk in riparian areas would benefit soil condition because tamarisk is known to excrete excess soluble salts in understory soils. Research has shown that following tamarisk removal, soils respond relatively quickly with lowered pH more favorable to native species growth (Bay and Sher, 2008).

Soils Phase One Treatment Area

Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.1.2 Invasive, Non-native Plant Species

Some of the plant communities within the proposed project area and, indeed, much of the acreage of the BLM Moab Field Office has been invaded to some degree by a species or several species of exotic and/or invasive plants or noxious weeds. Invasive vegetation is most prevalent in areas of concentrated disturbance such as the frequency of Russian knapweed along existing roads. Most of the obvious infestations in the proposed project area are small pockets of weeds that have the ability to spread but may not have yet encountered conditions conducive to spread.

Ground disturbing activities associated with the proposed project could increase the size of existing weed communities and could potentially promote the spread of weeds into previously weed-free areas. Post treatment monitoring data would provide information that could initiate weed control activities with follow-up maintenance in infested project units targeted for future treatment.

Invasive, Non-native Plant Species Collective Treatment Area

Manual Treatment

Soil disturbance resulting from tree cutting activities would be minimal because no heavy equipment would be utilized in units specified for hand-cutting. Manual treatments could result in short-term trampling of vegetation and there is a potential that weeds could be transported into the area by vehicles carrying cutting crews. No new roads have been proposed for the project and existing roads in the area are utilized by residents, oil, gas, and mining vehicles, and OHVs. Weed dispersal and introduction would not be measurably different from cutting crews than the potential for weed spread from vehicles normally found on roads in the area. Manual treatments would generally benefit desired plant communities.

Mechanical Treatment

Non-native species such as cheatgrass are adapted to disturbed soils and environments. Because fuel treatments inherently disturb vegetative communities, they can also encourage the establishment of invasives. Treatments also carry the risk of non-native seed introduction from mechanical equipment and/or people. Spread is more likely in particularly aggressive mechanical treatments in which soils are disturbed or exposed.

Mitigation incorporated into the proposed action would reduce the potential for invasive introduction from mechanical equipment and personnel. In addition, mechanical mastication by bullhog is not considered to be an aggressive type of mechanical treatment. In this type of treatment very little soil would be disturbed and no soils would become exposed as a direct result of treatment. Studies have shown evidence that immobilization of nitrogen in soils may occur following mechanical mastication. Nitrogen immobilization may decrease leaching in soils and may also promote native species while inhibiting invasive species (Resh et al., 2007).

Prescribed Fire Treatment

The appropriate application of low-intensity prescribed fire would lower the potential for high-intensity wildland fires throughout the area, which could prevent post-fire weed spread. Monitoring results from similar treatments in the Monticello Field Office show a long-term trend toward re-establishment of desired vegetation following low-intensity prescribed fire (Bissonette, personal communication, 2009).

Figure 1. Cheatgrass growth in treated area following fuels reduction project.

Figure 2. Desirable vegetation one year post prescribed fire treatment.

Herbicide Treatment

Vegetative communities currently infested with invasive or noxious weeds that did not respond to other reduction activities could be treated with herbicide which would reduce the potential for weed spread over the long term. A reduction in weeds would enhance habitat and forage and would reduce the potential for new infestations along Black Ridge. This type of treatment would only be utilized in areas with large weed populations to control establishment and proliferation and would not be applied within riparian corridors. Because desirable plant species and overall rangeland health are goals of the proposed project, the potential impact to non-target plants through herbicide use is expected to be negligible when compared to re-establishment of perennial species following seeding, reduced competition from weeds, and increased diversity and resiliency of grasses, forbs and shrubs.

Invasive, Non-native Plant Species Phase One Treatment Area (See also 4.2.1.3 Wetlands/Riparian Zones)

Manual Treatment

Impacts would be identical to those listed for the collective treatment area.

Mechanical Treatment

Mechanical mastication treatments have the potential to increase surface fire spread and fireline intensity due to fine-wood surface loading from the mulch (Raymond and Peterson, 2005). Spread and intensity can present fire-control issues in the event of a wildland fire following treatment, and in addition hot temperature surface fires can damage soils and any new vegetation. However, even if a wildland fire occurs in a mechanically-thinned area, research shows that the fire would be easier to control than a crown fire in an untreated area (Resh et al., 2007). Consequently, overall impacts from a wildland fire following treatment may be lower in spite of higher surface fuels because less acreage would be expected to burn than in a crown fire situation. The potential effects from wildland fire following mechanical treatment can be minimized by conducting prescribed fire following mechanical activities.

Disturbance caused by the proposed treatment could allow the establishment or spread of invasive plant species. Design and implementation of treatment activities would allow for monitoring, maintenance, and adjustment of treatments. Any increase/spread of existing invasive species or inadvertent introduction of invasive species detected by monitoring results would generate maintenance actions to mitigate impacts.

Prescribed Fire Treatment
Impacts would be identical to those listed for the collective treatment area.

Herbicide Treatment
Impacts would be identical to those listed for the collective treatment area.

4.2.1.3 Rangeland Health Standards and Guidelines
If the treatment proved to be fully successful, the proposed action would conform to Rangeland Health Standards by providing a more reliable forage base for wildlife and livestock and improving vegetative diversity in the Black Ridge area. Reducing the fuel load and continuity would decrease the catastrophic fire potential in the area while also contributing to ecological health by increasing perennial grasses and shrubs and diversifying the age class of trees within the project area. The proposal to repair two stock ponds as part of the restoration activities would increase the number of water sources in the area, increasing livestock dispersal and lessening the potential for overuse of resources at available water sources.

Based on results of future monitoring of soil and fuel moisture, plant diversity, percent cover, and plant vigor; resource specialists could recommend that cattle be removed from

Monticello F.O. Rangeland Following Fuels Reduction Treatment

the project area for a period following the proposed treatment to more fully achieve rangeland health standards and goals.

Rangeland Health Standards and Guidelines Collective Treatment Area
Manual Treatment
Direct and indirect effects would be a combination of those determined for 3.3.2.1 Watersheds (Floodplains, Water Quality, Wetlands/Riparian, Soils).

Mechanical Treatment
An initial decrease in vegetative cover would occur immediately following mechanical treatment, although mulch and debris from the treatment would have a stabilizing effect on denuded soils to prevent erosion. Emergence and development of seeded species may not occur during the first year, but monitoring results from adjacent treatments show that removal of grazing during the first two growing seasons would contribute to the achievement of treatment goals and objectives.

A variety of mechanical control treatments combined with prescribed burning can be effective in reducing excessive fuel accumulations on sites prone to wildfire (Edminster et al., 2000). These actions are essential components of integrated watershed management to maintain watersheds in a good condition (RMRS-P-13, 2000).

Prescribed Fire Treatment
Direct and indirect effects would be a combination of those determined for 3.3.2.1 Watersheds (Floodplains, Water Quality, Wetlands/Riparian, Soils).

Herbicide Treatment
Herbicide treatments have the potential to benefit soil, vegetation, watershed function, and water quality through the restoration of more natural fire regimes and the reduction of growth and spread of weeds. The control of populations of undesirable, non-native species would be expected to be of benefit to the larger ecosystem by aiding in the reestablishment of more desired species and native species.

Rangeland Health Standards and Guidelines Phase One Treatment Area
The desired future condition of the project area would be indicated by sufficient cover and litter to protect the soil surface from erosion and to promote infiltration. A reduced fuel load would result in less potential for large, high severity wildland fire and correspondent soil erosion.

If the treatment proved to be fully successful, the proposed action would also conform to Rangeland Health Standards by providing a more reliable forage base for wildlife and livestock as well as improved vegetative diversity in the Black Ridge and Hatch Point allotments.

Upon completion of the treatment, the existing plant community could achieve a higher cover, variability, and density of vegetation.

Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.1.4 Livestock Grazing
The ecosystems that are now utilized for livestock grazing evolved under the influence of fire. In areas where historic vegetation has been converted to grassland-type vegetation for livestock use, it has been shown that livestock grazing has actually reduced fire

potential. Removal of grazing from an area can lead to the increased likelihood of wildland fire, and prescribed burns may also successfully reduce hazardous fuels but may produce less desirable grazing habitat. Because the proposed treatment has taken these factors into account, the restoration activities included in the treatment (deferred grazing, seeding, and follow-up maintenance) would mitigate both the potential for increased wildland fire as well as grazing habitat impacts.

Implementation of the proposed action would limit forage availability and restrict access to the treated portions of allotments for a short period of time, potentially one to five years. The proposal includes re-seeding with an appropriate seed mix that would likely promote successional changes toward the desired vegetative community. Because of the re-seeding effort, livestock grazing use would be restricted from a treatment area for a minimum of two growing seasons or until management objectives were met.

Depending on which treatment areas were re-seeded, the pastures within the Black Ridge and Hatch Point Allotments may have to be closed for two growing seasons or until management objectives were met. New fencing and water developments may be installed to allow some grazing in seeded units that fall within a larger pasture. The proposal to repair two stock ponds as part of the restoration activities would increase the number of water sources in the area, increasing livestock dispersal and lessen the potential for overuse of resources at available water sources.

Short-term adverse effects would include the possibility that the permittee may need to reduce the number of cattle turned out on the allotments. In the long term it is expected that vegetation would establish and thrive in the treated areas and that grazing would then resume. Beneficial long-term effects from the treatment would be expected as livestock would have a more reliable forage base and improved vegetative diversity within the allotments.

Reducing the fuel load and continuity of heavy fuels would also decrease the potential for high-intensity fire which would benefit livestock. A catastrophic fire event could negatively affect livestock grazing throughout the allotments by reducing the amount of forage and because of grazing restrictions that could be imposed due to potential ESR activities. Decreasing fuel loads in the area would also have a positive impact on ecosystem and rangeland health by increasing perennial grasses and shrubs and diversifying the age class of trees within the project area.

Livestock Grazing Collective Treatment Area

Manual Treatment

Hand-thinning and piling of pinyon-juniper would generally take place in WUI areas, which would have no immediate effect on livestock grazing as livestock would tend to avoid crews. Because slash piles would be burned in autumn, winter, or spring, livestock grazing would potentially be affected in both the Black Ridge and Hatch Point allotments which are grazed in the winter months. The effect on livestock in the area would be minimal and short term. Cattle would avoid areas while the burning is taking place but return when the area is clear.

Mechanical Treatment
Mechanical thinning of pinyon-juniper would open up the closed-canopy areas of the woodlands and create a more mosaic pattern of seral stages across the proposed project area. The reduction of encroaching pinyon-juniper would stimulate the regeneration of sagebrush and grasslands, enrich understory vegetation, and improve habitat. Following treatment and revegetation of the treated area, livestock could be drawn into new areas of the pastures, shifting use patterns and forage consumption.

Restrictions of use following treatment and until vegetation objectives are met could potentially extend beyond the second growing season. However, livestock grazing impacts would not be expected to be serious because of the number of pastures available in this large-acreage allotment. No changes in the number of AUMs authorized within the allotments are proposed.

Prescribed Fire Treatment
Dependent upon fuel moisture and climate conditions, pile burning and/or broadcast burning could take place as early as autumn/winter of the same year of treatment or autumn/winter of the following year. This means that livestock would be excluded from the treatment units until vegetation objectives were met, which could have long-term effects on grazing rotations. In addition, prescribed burning would likely reduce the available cover of grass and forb species in the short term. Following the achievement of project goals and objectives, adjustments in grazing duration and turn-out dates would be evaluated by BLM in collaboration with the permittee. Where possible, livestock grazing impacts would be minimized by timed burning and post-burn vegetation rehabilitation to coincide with pasture rotations and deferments. As in mechanical treatment, livestock distribution and patterns of use could be affected by prescribed fire schedules, resulting in grazing pressure on other areas of the allotment.

There would be the potential for unanticipated damage to range improvements from prescribed fire that could negatively affect the livestock permittee(s) until remediation occurred. However, the burning of rangeland would likely result in increased perennial grass production and grazing capacity as well as increased forage availability. Following fire there are often periods of increased amounts of flowering and fruiting and a significantly enhanced output of grass seed (Daubenmire, 1975).

Herbicide Treatment
Herbicides could pose a risk to livestock from accidental spill, direct spray and/or drift, and from the consumption of herbicide-treated vegetation. Effects could include death, damage to vital organs, decreased growth, decreased reproductive output and calve condition, and/or increased susceptibility to predation. Because herbicide treatment would be limited to areas within pastures to be seeded, livestock would not be expected to be in the treatment area during implementation or for at least two growing seasons following treatment. Therefore, no effects to livestock from herbicide treatment would be anticipated. The after-life of herbicides used on cheatgrass would not persist into the timeline when livestock would return to the allotment.

Livestock Grazing Phase One Treatment Area
The exclusion of livestock from treatment units that contain water sources or water developments could potentially eliminate important water sources for grazing management. This could impact livestock distribution and cause potential overuse in other areas of the allotment that have water sources. For example, the Brown's Hole pasture has very few water sources that are not included within fuel treatment units. Mitigation included in the proposed action would minimize adverse effects both to the resource and to the grazing permittee, as additional fencing, reduction of AUMs, and/or total closure of pastures when necessary would prevent overuse of other areas. In the case of the Brown's Hole pasture example, if units were selected for seeding treatment the entire pasture would be closed for at least two growing seasons and cattle may either be moved to another pasture or reduced in numbers until which time forage was available within the Brown's Hole pasture.

Manual Treatment
Effects from the treatment would be identical to those listed above for the collective project area. Hand-thinning and piling of pinyon-juniper would have no immediate effect on livestock grazing as livestock would tend to avoid crews. Because slash piles would be burned in autumn, winter, or spring, livestock grazing would potentially be affected. The effect on livestock in the area would be minimal and short term. Cattle would avoid areas while the burning is taking place but return when the area is clear.

Mechanical Treatment
Effects from the treatment would be identical to those listed above for the collective project area.

Prescribed Fire Treatment
Effects from the treatment would be identical to those listed above for the collective project area.

Herbicide Treatment
Effects from the treatment would be identical to those listed above for the collective project area.

4.2.1.5 Woodlands/Forestry
Tree removal is the accepted management option for restoring areas affected by the ongoing expansion of pinyon-juniper. Successful tree removal treatments are highly specific to a particular site and can depend on timing, the method used for removal, and other details such as soils and weather patterns. In general, the proposed action would result in the reduction of pinyon-juniper and the eventual elimination of slash debris from cutting and dispersal of live trees and brush.

Allowing permits to be distributed for fuel and other wood harvesting in the thinned and piled areas, as proposed in the project description, could advance the removal of slash debris within the treatment area. A successful project would restore natural ecological

processes, would increase the age-diversity of remaining pinyon and juniper trees, and would provide increased soil moisture availability for remaining trees. The health and vigor of the reduced numbers of pinyon-juniper would provide better defenses against drought and insect depredation.

Woodlands/Forestry Collective Treatment Area

Manual Treatment

Thinning overstory pinyon-juniper with handsaws reduces tree cover while causing less soil disturbance than some other types of treatment. Hand-thinning is both time-consuming and somewhat less cost-effective than mechanical thinning, but is more effective at reducing fuels and allows for greater creativity in designing fuel breaks that may be more visible in WUI areas. Allowing permits to be distributed for fuel and other wood harvesting in the thinned and piled areas could advance the removal of slash debris within the treatment area.

Mechanical Treatment

The proposed action would result in the reduction of pinyon-juniper and the eventual elimination of slash debris from cutting and dispersal of live trees and brush. If insect depredation is ongoing during treatment, research has shown that there would be a potential for short-term effects from beetles attracted to pheromones in the mulched litter that may then spread to live trees. However, in mechanical treatments that have been implemented throughout the Canyon Country Fire Zone over the past five years there has been no evidence that beetle damage has been introduced or spread as a result of mechanical fuel reduction treatments. Damage to pinyon and junipers from bark beetles and disease would decrease in the long term through the reduction of dense areas of trees, reduced competition and increased resiliency of remaining woodlands.

Because mechanical treatment allows for more precise control of vegetation removal, specific areas of diseased trees can be removed and healthy diverse stands can be left un-treated, leaving a mosaic woodland pattern interspersed with sagebrush and grasslands. While there would be a decrease in the actual number of trees available for human uses, long-term beneficial effects would include islands of pinyon and juniper available for human uses (pine nut gathering, Christmas tree cutting) that are more visible and easily accessible because of the open savannah remaining following mechanical treatment.

A successful project would restore natural ecological processes with a subsequent increase in vegetative diversity and productivity. A greater availability of soil moisture and lower evaporation rate would have short-term beneficial effects toward the establishment and success of revegetation efforts and long-term beneficial effects from increased herbaceous cover. Long-term benefits may also be realized from the reduction in numbers of trees and the resulting diversification of age classes, which would promote healthier stands of woodland trees.

Prescribed Fire Treatment

Effects from low-intensity prescribed fire as a follow-up treatment in the understory of remaining pinyon-juniper would depend on the successional stage of the trees in the area

proposed for treatment. For example, an older stand of junipers with little understory diversity would recover differently from fire than a younger stand with a highly diverse understory (Bunting, 1984). Once the canopy has been opened up, prescribed fire could predictably have a long-term positive effect by mimicking historic low-intensity fire patterns and reducing accumulated fine fuel loads. Preventing high-intensity fire would protect large, old-growth pinyon and juniper specimens. There would be a short-term risk of increased fine fuels if fire-adapted annuals were present to spread into a treated site, although the proposed action includes mitigation to alleviate the potential effects from invasive plant species.

Herbicide Treatment

Herbicides could come into contact with non-target vegetation through drift, runoff, wind transport or indirect spraying. Risks would be greater in applications with small buffer zones or if applied from great heights, although effects to non-target plants would be minimal if targeted vegetation were treated selectively. Selective herbicides typically only target certain species and are applied at specific application rates usually in low concentrations that have little to no effect on non-target species such as pinyon-juniper and ponderosa. Application rate is the foremost factor in determining risk, with low application rates less likely to pose a risk to adjacent vegetation (17 States Herbicide PEIS, Chapter 4, page 4-51). The control of populations of invasive, non-native species would be expected to benefit the reestablishment of more desired species, especially in areas where native perennials were established or where seeding treatment of desired species is implemented.

Woodlands/Forestry Phase One Treatment Area

Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.1.6 Vegetation

Many of the treated acres would be seeded with a native and non-native mix of grasses, forbs and shrubs to promote the growth of understory species. Successful reestablishment of understory vegetation would inhibit the spread of noxious weeds and help restore diverse and resilient vegetative communities.

Impacts to vegetation would be localized and would constitute removal of trees, tree limbs, and shrubs, including some loss of trees damaged during removal of the target trees. Mostly young to mid-age pinyon and juniper trees would be removed from the vegetative community while retaining sagebrush and other low-growing plants. Reduction of this age group of trees would be expected to result in a more balanced and diverse mix of vegetation. Trees and groups of trees left standing would continue to grow and would be protected from the adverse effects of a stand-replacing fire as a result of the balance of natural fuel breaks and reduced fuel loads. Removal of the target vegetation (pinyon-juniper, shrubs, etc.) would have a long-term beneficial effect on the functioning of the remaining desired vegetative communities (sagebrush, grasslands, ponderosa forest).

There would be changes in the light and moisture conditions at the ground surface due to tree canopy removal which would result in eventual change in species composition of herbaceous plants and short shrubs and a potential increase in habitat for exotic plant species.

As the trend toward a more desirable fire regime progresses, there would be less risk of losing key vegetative communities from a high-intensity wildland fire. The proposed action would create a more diverse ecosystem by reducing competition stress from the uncharacteristic closed-canopy, uniform age woodlands that now exists in the area. Reducing overall stand densities and reintroducing native and non-native grasses and forbs would promote both the health and sustainability of vegetative communities across the landscape. Reducing the competition stress would also increase the ability of leave-trees to withstand potential threats from insect depredation and/or drought.

Upon completion of the treatment, the existing plant community could achieve a higher cover, variability, and density of vegetation. An initial decrease in vegetation cover would occur immediately following mechanical treatment, although mulch and debris from the treatment would have a stabilizing effect on denuded soils to prevent erosion. Emergence and development of seeded species may not occur during the first year, but monitoring results from adjacent treatments show that removal of grazing during the first two growing seasons would contribute to the achievement of treatment goals and objectives.

Vegetation Collective Treatment Area

Manual Treatment

Hand-cutting can effectively remove encroaching pinyon-juniper from functioning sagebrush communities while causing little or no impact to the sagebrush or surrounding soils. Manual treatments could result in a very small amount of trampling or accidental removal of non-target plants, although the overall adverse effects would be minimal and short-term in duration.

Mechanical Treatment

There would be short-term but serious vegetation disturbance while equipment moved through the project site cutting and shredding trees. The repair of sagebrush-grass communities that are in decline includes protecting sagebrush islands to allow the natural dispersal of sagebrush seed into the surrounding treated landscape. Mechanical mastication can effectively remove encroaching pinyon-juniper from sagebrush and grassland meadows with minimal damage to herbaceous species. Mastication also adds mulch that may facilitate seed burial to establish desired sagebrush and other grasses and forbs.

Prescribed Fire Treatment

Because fire suppression combined with several other land management practices has resulted in an altered natural fire regime throughout the area of the proposed action, the resulting increase in hazardous fuels has an associated risk of high-intensity fire. Use of controlled fire would help to restore desired vegetation and a return to a more natural

ecosystem process. Low-intensity prescribed fire can be effective in controlling some invasive annuals, especially when followed up with herbicide treatment (Asher et al., 2001; Grace et al., 2001).

Herbicide Treatment

The effectiveness of herbicides in managing target plant communities and the potential for disturbance to associated plant communities depends on the method of treatment and the particular chemical utilized for treatment. According to the analyses contained in the 2007 17 States Herbicide PEIS (Chapter 4, pages 4-53 and 4-54), treatments that remove hazardous fuels while simultaneously controlling populations of non-native species would be expected to benefit the long-term health of desirable vegetative communities in which natural fire cycles were previously altered. Herbicide treatments are effective in removing targeted plant species over the short term, and long-term success would be expected when seeding of desirable plant species follows herbicide treatment.

Vegetation Phase One Treatment Area

Manual Treatment

Effects would be similar to those outlined for the collective treatment area.

Mechanical Treatment

Growth of herbaceous plants would be expected to increase in the long term following mechanical treatment because of the reduced competition from woody species for light, nutrients and water (Cox et al., 1982). Units three through eight are sagebrush units in which selective treatment would remove undesirable pinyon-juniper and other brush from existing sagebrush communities. Herbaceous species present in these units prior to treatment would be expected to increase, although in areas where invasive annuals are present there could be short-term adverse effects from the spread of annuals as a result of closed canopy removal. Follow-up treatment in specific areas with herbicide, seeding and/or other methods of invasive species treatment would mitigate short-term effects.

Prescribed Fire Treatment

Prescribed fire would stimulate the growth of grasses and forbs, which generally recover quickly. Long-term positive effects would be expected from follow-up prescribed fire in treated areas because light burns mimic natural fire plant responses and reduce accumulated surface fuel loads.

Herbicide Treatment

The proposed Phase One treatment would be expected to benefit the health of vegetative communities in which natural fire cycles have been altered, such as in cheatgrass-dominated sites. Treatments designed to control a specific population of non-native species would be expected to benefit more desired species and would aid in the reestablishment of native species. Single treatments such as prescribed fire or mechanized activities are often less effective than back-to-back treatments such as mechanical treatment followed by herbicide and seeding; or seeding followed by mechanical treatment and follow-up prescribed fire. Successful landscape-level

treatments designed to promote an overall better mix of vegetation and habitat result in vegetation that is more resilient to disturbance and more sustainable in the long term.

4.2.1.7 Fish and Wildlife (Including Special Status Species)

Treatments could have short-term detrimental effects to habitat for wildlife as smaller mammal and rodent species would be displaced by various activities and be forced to find suitable habitat on adjacent lands. Treatment areas would be limited in size, typically 100 to 500 acres, and because it would be expected that the most mobile animals could easily relocate into suitable habitat adjacent to the treatment areas, impacts to local animal populations would be minimal. Habitat disturbance could also result in the direct loss of less mobile species but, because of the high fecundity of small mammals and reptiles, populations are expected to recover quickly following treatment. Any displacement of mobile species such as rabbits and passerine birds would be short term and insignificant because of the expanse of habitat available on adjacent BLM and Forest Service lands and the limited amount of time each treatment area would be disturbed.

Activities occurring during the spring would have the greatest impacts to reproducing mammalian and avian species. Many mammal species occupy dens or territories to birth and raise their young. Altricial species, such as most rodents and carnivores, are helpless at birth and most remain in their den or parents territory for several weeks or months before they are capable of moving into new areas. Activities that disturb or destroy these birthing territories or dens could cause mortality to young animals from direct contact, exposure, abandonment and predation. Precocial species, such as most ungulates and hare species may be less impacted by disturbances in the spring, as their young are mobile at or shortly after birth and can readily move away from any disturbances, though this may make them more susceptible to predation.

Migratory birds utilizing the project area in the spring for nesting may also be impacted by treatment activities that occur within nesting territories. Impacts to nesting birds could include nest site abandonment, nest failure, chick mortality, and may also cause premature fledging which may also lead to chick mortality from direct nest removal or activities within the nesting territory. These impacts would be specific to that nesting season, as parent birds would re-nest in following years in more suitable locations.

Raptors may similarly be affected by treatment activities. Raptors that nest in trees such as pinion-juniper would be most likely to be impacted, especially if the nesting tree is removed. Many raptors have high nest site fidelity and removing an inactive nest could potentially eliminate a nesting territory. Other common raptors (such as golden eagle, red-tailed hawks, and prairie falcons) typically use cliffs, outcrops or tall trees and snags for nesting. Most treatment activities would avoid removing large trees such as ponderosa as well as snags, and therefore these nest sites may not be directly impacted. Indirect disturbances from treatment activities within the nesting territory of any raptor may also lead to nest site abandonment, nest failure, chick mortality, and may also cause premature fledging which may also lead to chick mortality.

Treatment activities taking place outside of migratory bird breeding and nesting season and raptor nesting seasons may cause temporary, short-distance and short-term displacement that would have minimal to no impacts to birds as they could utilize nearby habitats for foraging and roosting.

Activities during winter months may have negative impacts to mule deer and elk. Much of the project area offers crucial and high value winter habitats for mule deer and elk and is utilized seasonally by local deer and elk herds. Winter range is important, as it offers required high value forage, thermal cover, and also sustains pregnant does during the winter months. These animals are subject to physical stress from cold weather and low forage availability during winter months. Adequate food, cover and safety are required to insure healthy fawns in the spring. Disturbance during this time may cause additional physical stress and abandonment of this crucial habitat which may lead to use of habitat insufficient for supporting these herds. Reduced physical condition, loss of unborn young and mortality may result from additional stress and utilization of habitat unsuitable to provide needed winter requirements.

A successful treatment would return a large portion of the treated area to a habitat favoring early successional wildlife species. Because plant communities are inhabited by wildlife species that are most adapted to them, as plant communities change the wildlife communities also change. Wildlife species such as sage grouse, quail, wild turkeys, grassland songbirds and migrant songbirds require early successional habitats to supply all or most of their needs. If early succession habitats are not available, these animals survive with a lessened capacity or quality of life. Vegetation treatments that expose more groundcover to sunlight set the process in motion for early succession plants to flourish. The benefits to native plant communities from the proposed project and a concurrent return to a more historic fire regime and condition class would likely promote an increase in numbers of wildlife that favor grassland/sagebrush habitat. Gunnison's and greater sage grouse, Brewer's and sage sparrows, sage thrasher and pygmy rabbits would all benefit from the restoration of the ecosystem.

Wildlife species that have adapted to the disturbed habitat condition (i.e. dense pinyon-juniper) may decline. There is limited research on pinyon-juniper fuel reduction and effects to wildlife, although over 70 species of birds are known to nest in pinyon-juniper woodland (17 States Vegetation PER, Chapter 4, page 4-78). Because pinyon-juniper has moved into sites throughout the proposed project area with deeper soils historically supporting sagebrush species, the reduction of the trees would encourage the return of the ecosystem to that of a grassland/shrubland community. Reduction of pinyon-juniper habitat would have a short-term adverse effect on species that utilize pinyon-juniper for habitat.

Reducing the number and diversifying the age classes of pinyon-juniper would not adversely affect wintering big game because sufficient islands of trees would be retained for escape and thermal cover.

Long-term beneficial impacts from the proposed project to wildlife, migratory birds and raptor habitats includes the reduction of catastrophic fire potential, increased native vegetative diversity, increased edge effect, creating mosaic landscapes and an attempt to control the invasion of noxious weeds and cheatgrass. Additionally, the removal of pinyon and junipers encroaching into sagebrush parks secures the future long-term availability of winter range forage for mule deer.

Fish and Wildlife Collective Treatment Area

Manual Treatment

Federally Endangered, Threatened and Candidate Species

There could be short-term, direct impacts to a very small portion of MSO habitats. These habitats are not proximal to any known nesting activity, are located on the outer margins of suitable habitat, are somewhat isolated in nature, and therefore do not have a high probability for nesting occupancy. Due to the small scale of the impacts and low likelihood for occupancy this project would have an insignificant effect on MSO habitat.

There could be short-term, direct impacts to isolated patches of SWFL habitats within the project area. This habitat is not proximal to any known nesting activity, is located on the outer margins of suitable habitat, is somewhat isolated in nature, and therefore does not have a high probability for nesting or migratory occupancy. Due to the small scale of the impacts and low likelihood for occupancy this project would have an insignificant effect on SWFL habitat.

Additionally, there may be long-term beneficial impacts from the proposed project to the habitats for both the MSO and SWFL. The reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass will benefit T&E and wildlife habitats in and adjacent to the project area.

General Wildlife including Sensitive Species, Migratory Birds and Raptors

Manual treatments allow for more precise vegetation control than other methods of fuels reduction. The open savannah structure of the pinyon-juniper vegetative community would be enhanced in areas that are manually treated for fuels reduction, which could have a beneficial effect on migratory birds and raptors and their habitat by improving vegetative diversity, creating a mosaic landscape and adding edge effects. Mitigation included in the proposed action directs cutting crews to be aware of nest locations and to avoid nesting trees and large snags during manual treatment, which would reduce adverse impacts.

Chainsaw noise and human activity associated with manual treatment would disturb animals, although these effects would be short-term and would not be expected to adversely affect the long-term health or habitat of wildlife.

Slash piles that may have portions of unburned materials remaining following burning would facilitate small mammal and rodent populations. Slash piles provide excellent

habitat for small mammals and rodents which, in turn, provide a prey base for raptor and owl species.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer, and elk for this treatment activity.

Mechanical Treatment

Federally Endangered, Threatened and Candidate Species

There could be short-term, direct impacts to a very small portion of MSO habitats. These habitats are not proximal to any known nesting activity, are located on the outer margins of suitable habitat, are somewhat isolated in nature, and therefore do not have a high probability for nesting occupancy. Due to the small scale of the impacts and low likelihood for occupancy, this project would have an insignificant effect on MSO habitat.

There could be short-term, direct impacts to isolated patches of SWFL habitats within the project area. This habitat is not proximal to any known nesting activity, is located on the outer margins of suitable habitat, is somewhat isolated in nature, and therefore does not have a high probability for nesting or migratory occupancy. Due to the small scale of the impacts and low likelihood for occupancy this project would have an insignificant effect on SWFL habitat.

Additionally, there may be long-term beneficial impacts from the proposed project to the habitats for both the MSO and SWFL. The reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass would benefit T&E and wildlife habitats in and adjacent to the project area.

General Wildlife including Sensitive Species, Migratory Birds and Raptors

Mechanical treatment in sagebrush areas would create openings in habitat for potential foraging and nesting use. Mechanical fuels reduction is designed to protect and enhance sagebrush continuity and to increase sagebrush habitat, which would benefit sagebrush obligate species and improve foraging opportunities for wintering mule deer.

The open savannah structure of the pinyon-juniper vegetative community would be enhanced, which could have a beneficial effect on raptors and their habitat. Because some raptors prefer to return to the same territory each year, destruction of inactive nests would be avoided.

The proposed action would not have a significant negative impact on elk, mule deer, or any of the other large mammal species. Large mammals tend to move to more secure areas away from noise disturbance; therefore, displacement would be temporary during the timeframe of treatment only.

Approximately 54% of the mule deer winter habitat in Utah is in pinyon-juniper woodlands. Mechanical removal of large areas of pinyon-juniper would reduce the overall amount of food and thermal cover available for mule deer in the Black Ridge

area. However, the creation of openings and increased light penetration into the understory would improve forb and shrub production over the long term. The adverse effects from the short-term loss of mule deer forage and habitat would be temporary and would be offset by long-term positive impacts of ecosystem restoration including increased forage.

Eventual recovery of the "pre-settlement" ponderosa forest would also have a positive impact on the large mammal habitat by altering existing cover. Distribution and arrangement of trees would be modified to return the project area to a more park-like open forest, and as elk, deer and other large mammals prefer open woodlands to dense, unbroken forested areas they would directly benefit from the project.

Connectivity between leave islands would allow small mammals and rodents travel and dispersal corridors, and the creation of a pinyon-juniper mosaic coupled with increased grassland/sagebrush would diversity wildlife habitat.

Long-term beneficial impacts from the proposed project to wildlife habitats include the reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer and elk for this treatment activity.

Prescribed Fire Treatment

Federally Endangered, Threatened and Candidate Species

According to the USFWS, small-scale natural fires and prescribed burns can actually benefit MSO and SWFL habitat by reducing fuel loads (USFWS "Questions and Answers, Mexican Spotted Owl Critical Habitat Designation," January, 2001). Prescribed fire also creates openings and thins heavy stands of timber, increasing habitat diversity while reducing the chance of catastrophic wildfire.

Prescribed fire during nesting season could potentially destroy nesting territories and cause mortality to young MSOs and SWFL chicks if occupancy occurred. Prescribed fire outside of the nesting season may temporary remove habitat from nesting use or potential use but no mortality would occur. There is no known nesting activity in the proposed project area and therefore no direct impacts to MSOs or SWFLs nesting territories would be expected.

General Wildlife including Sensitive Species, Migratory Birds and Raptors

Because prescribed fire would not be utilized in existing sagebrush communities, no effect to sagebrush obligate species would be anticipated. Prescribed fire used to eliminate ground slash and underbrush in the collective treatment area would be low-intensity and would primarily target areas where pinyon-juniper has been reduced. A long-term beneficial effect to sagebrush obligates would be expected as grassland/sagebrush recovers and suitable habitat expands.

Fire has been an integral part of animal habitat for millennia, and wildlife has adapted to the changing composition, structure, and landscape patterns resulting from fire. Because fire has an historic ecological role in the development of habitat, the exclusion of fire from the environment for over one hundred years has altered the composition and distribution of vegetation. Some species may benefit from new vegetation distribution, while others may move into reduced areas of their historic habitat. For example, research has shown that ferruginous hawk populations are frequenting dense, closed canopy pinyon-juniper while other species may have moved out of their preferred grassland savannah interspersed with small groups of pinyon-juniper. Species that depend on a particular habitat are vulnerable to disturbance as they are unable to move into other types of habitat when change occurs (17 States Vegetation PER, Chapter 4, page 4-74).

As pinyon-juniper woodlands have encroached into grassland/sagebrush communities, several wildlife populations (greater sage-grouse, sage thrasher, sage sparrow, Brewer's sparrow) have been reduced in number. Regardless of habitat type, fragmented habitat can also cause a decline in wildlife numbers because of isolated populations.

Prescribed fire generally leads to an increase in plant nutrient density, palatability, and earlier greenup, and Hobbs and Spowart (1984) observed that winter diet quality for mule deer improved as a result of burning.

Prescribed fire during nesting season could potentially destroy nesting territories and cause mortality to migratory birds and their chicks. Prescribed fire outside of the nesting season may temporarily remove habitat from nesting use but no mortality would occur. Birds may re-nest the following year in nearby suitable habitats if the general location of previous nests had been altered to the point of being unusable.

Long-term beneficial impacts from the proposed project to wildlife habitats include the reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes and an attempt to control the invasion of noxious weeds and cheatgrass.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer and elk for this treatment activity.

Herbicide Treatment

Federally Endangered, Threatened and Candidate Species

The 2007 Vegetation Management PEIS states that the use of herbicides has the potential to create short term adverse effects to listed species and designated critical habitat. Plateau® herbicide is typically used in control of cheatgrass, which would be the predominate concern in treatment areas. In analyzing the potential wildlife effects of Plateau®, the 17 States Herbicide PEIS states the ~~"~~risk quotients for terrestrial wildlife were all well below the most conservative LOC of 0.1, indicating the direct spray of Imazapic (Plateau®) is not likely to pose a risk to terrestrial animals." (4-105). Herbicide treatments as proposed in the project would improve foraging habitat by

increasing plant diversity and structure while helping to deter weed invasions.

General Wildlife including Sensitive Species, Migratory Birds and Raptors
The 2007 17 States Herbicide PEIS analyzed both the potential adverse and beneficial effects to wildlife from herbicide treatment. The decision to authorize and approve the use of herbicide active ingredients were supported by standard operating procedures and mitigation measures to ensure that natural resources are protected during the application of herbicide treatments.

The main risk to wildlife from herbicide use is microhabitat modification, specifically in areas where small mammals and reptiles may utilize existing invasive, non-native grasslands for habitat. Direct and indirect effects would vary by the extent of treatment as well as the method of treatment (aerial vs. ground). Adverse effects would be short-term and limited to the small number of acres treated. Species feeding on animals that have been exposed to herbicides could also be affected, although laboratory studies indicate that the chemicals to be used in the proposed project to treat cheatgrass and/or tamarisk and Russian olive do not appear to bio-accumulate in animals.

Plateau® herbicide is typically used in control of cheatgrass, which would be the predominate concern in these treatment areas. In analyzing the potential wildlife effects of Plateau®, the 17 States Herbicide PEIS states the risk quotients for terrestrial wildlife were all well below the most conservative LOC of 0.1, indicating the direct spray of Imazapic (Plateau®) is not likely to pose a risk to terrestrial animals." (4-105). Herbicide treatments as proposed in the project would improve foraging and cover habitat by increasing plant diversity and structure while helping to deter weed invasions.

Fish and Wildlife Phase One Treatment Area
The BLM initiated informal Section 7 consultation with the U.S. Fish and Wildlife Service for the proposed Phase One treatment. The BLM determined that the activities proposed for Phase One *"may effect,* but are *not likely to adversely affect"* the MSO and SWFL. The BLM received FWS determination concurrence on January 25, 2010 for the Phase One portion of the proposed project.

Manual Treatment
Federally Endangered, Threatened and Candidate Species
Suitable habitats in Muleshoe Canyon have been surveyed according to USFWS protocol and no MSOs were detected. Approximately 1.6 miles (1,300 acres) of the Muleshoe Canyon surveys are within the Phase One project area. Five units (3-5) of the Phase One portion of this project are located within the 1,300 acre survey area. Within these units there is approximately 38 acres of nesting habitat and 300 acres of foraging habitat that may be directly impacted by the sagebrush/grass treatments and possibly ponderosa treatments if ponderosa are identified in the area. There could be short term, direct impacts to a very small portion of MSO habitats. As stated above, these habitats are not proximal to any known nesting activity, are located on the outer margins of suitable habitat, are somewhat isolated in nature and therefore do not have a high probability for

nesting occupancy. Due to the small scale of the impacts and low likelihood for occupancy this project will have an insignificant effect on MSO habitat.

The suitable but isolated SWFL breeding habitat is found along the Cottonwood drainage (0.66 miles) within the Phase One project area in Unit 11, a WUI treatment area. The goal of these treatments would be to create small fuel breaks at strategic locations to help impede the spread of a wildfire up through riparian/canyon drainage areas. Most of the treatments within the SWFL habitats would create a mosaic-patterned thinning of excessive vegetation to reduce the canopy and remove ladder fuels. Though this may eliminate patches of nesting structure within the area, it would create interspersed open areas adjacent to water, an important component of SWFL breeding habitat. There would be short-term direct impacts to a 22 acre patch of nesting habitat, but the overall goal would be to reduce the potential for catastrophic fire.

Treatment during nesting season could potentially destroy nesting territories and cause mortality to young MSO and/or SWFL chicks if occupancy occurred. Treatments done outside of the nesting season may temporarily remove habitat from nesting use or potential use but no mortality would occur. There is no known nesting activity in the project and therefore no direct impacts to MSO or SWFL nesting territories would be expected.

In summary, this project may have short term impacts to MSO or SWFL habitats. The MSO or SWFL habitats within the project area are small, isolated patches on the outer margins of suitable habitat and not proximal to any known nesting territories or populations of MSO or SWFLs. The long-term benefits from this project would include reduction of catastrophic fire potential in the area, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass, a species that rapidly increases fire intervals and intensity and reduces the diversity of native vegetation. The project would benefit MSO or SWFL habitats as well as other wildlife habitats in and adjacent to the project area.

General Wildlife including Sensitive Species, Migratory Birds and Raptors

There would be temporary displacement of wildlife species within the project area while work is ongoing. As discussed in the previous section (Collective Treatment Area), manual treatments allow for more precise vegetation control. Typically, these treatments would occur in sensitive riparian areas, canyons and drainages and along ridges and steep drainages that are not accessible by equipment. Because canyons and drainages offer important wildlife habitat, care would be taken to establish buffer zones at the head of drainages and along ridge tops to protect watersheds and to enhance raptor habitat. Trees containing obvious nesting cavities and/or stick nests would be avoided. Mitigation included in the proposed action directs cutting crews to be aware of nest locations and to avoid nesting trees and large snags during manual treatment, which would reduce adverse impacts.

The open savannah structure of the pinyon-juniper vegetative community would be enhanced in areas that are manually treated for fuels reduction, which could have a

beneficial effect on raptors and their habitat by improving vegetative diversity, creating a mosaic landscape, and adding edge effects.

Long-term beneficial impacts to wildlife habitats from the proposed project would include the reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer and elk for this treatment activity.

Mechanical Treatment

Federally Endangered, Threatened and Candidate Species

The limited MSO breeding and SWFL nesting habitat found within the Phase One treatment area would not be mechanically treated, as these habitats are located in sensitive riparian areas, canyons and drainages, and along ridges and steep drainages that are not accessible by equipment. Therefore, there would be no direct impacts to these habitats from mechanical treatment. Indirect impacts to individuals could occur if these nesting and breeding habitat became occupied and treatment activities occurred during nesting season. Disturbances from treatment activity could cause nest abandonment as discussed in the Summary section above, but currently these areas are considered un-occupied.

Long-term impacts to adjacent MSO foraging habitats would be beneficial by reducing the chance of a catastrophic fire, improving rangeland health, increasing plant diversity, improving sagebrush meadows, and reducing soil erosion. Improved SWFL and MSO nesting habitat would result from opening the canopy and leaving healthy and different age classes of trees. This would also encourage an increase in prey base as the re-growth of understory vegetation would attract insects and rodents.

General Wildlife including Sensitive Species, Migratory Birds and Raptors

There is no known occupancy of Gunnison sage-grouse within the project area; therefore no direct impacts to sage-grouse would occur during project implementation. By reducing trees, protecting sagebrush parks, and planting wildlife forage species the proposed project would improve the quality and quantity of sage-grouse habitat, increasing the potential for immigration from populations to the south.

By conducting treatments outside of the main portion of the nesting season for raptors and owls (typically March through August) as recommended by the Utah Field Office of the USFWS, direct impacts to nesting raptors would be mitigated. Protecting or avoiding surface disturbing activities within spatial buffers of known nesting trees and snags known to contain nest sites, would allow for future nesting use.

If single nest sites were destroyed there would still be suitable habitat to provide alternative sites within the nesting territories. Long-term impacts would be beneficial by reducing the chance of a catastrophic fire, improving rangeland health, increasing plant

diversity, improving sagebrush meadows and reducing soil erosion. Improved nesting habitat would result from opening the canopy and leaving healthy and different age classes of trees. This would also encourage an increase in prey base as the re-growth of understory vegetation would attract insects and rodents.

Deer and elk may be temporarily displaced during the treatment. Since winter work would only be conducted during mild winters, this would ensure the least amount of animals would be affected. In addition, habitat would be available in neighboring areas while work was ongoing. There would be long-term beneficial impacts to deer and elk. By reducing trees, protecting sagebrush parks, and planting wildlife forage species, deer and elk would see an increase in forage while being provided thermal cover in the winter by the islands of remaining pinyon-juniper. Additional forage would help increase survival rates for deer and elk throughout the winter, as well as fecundity rates since females would be healthier while pregnant.

None of the units would receive intensive thinning, but would be approached from a more homogenous perspective incorporating several methods of treatment and leaving both open stands as well as clusters of vegetated/wooded areas.

Long-term beneficial impacts from the proposed project to wildlife habitats include the reduction of catastrophic fire potential, increased vegetative diversity, increased edge effect and mosaic landscapes, and an attempt to control the invasion of noxious weeds and cheatgrass.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer and elk for this treatment activity.

Prescribed Fire Treatment

Federally Endangered, Threatened and Candidate Species

The limited MSO breeding and SWFL nesting habitats found within the Phase One treatment area would not be treated with prescribed fire, as these habitats are located in sensitive riparian areas, canyons and drainages, and along ridges and steep drainages. Indirect impacts to individuals could occur if these nesting and breeding habitats became occupied and treatment activities occurred during nesting season. Disturbances from treatment activity could cause nest abandonment as discussed in the Summary section above, but currently these areas are considered un-occupied.

Long-term impacts to adjacent MSO foraging habitats would be beneficial by reducing the chance of a catastrophic fire, improving rangeland health, increasing plant diversity, improving sagebrush meadows and reducing soil erosion. Improved SWFL and MSO nesting habitats would result from opening the tree canopy and leaving healthy and different age classes of trees. This would also encourage an increase in prey base as the re-growth of understory vegetation would attract insects and rodents.

General Wildlife including Sensitive Species, Migratory Birds and Raptors
Prescribed fire would consume some snags and downed logs, although new snags may result from prescribed fire mortality. It has been found that snag density, even following multiple prescribed fires, is actually within a range that would maintain viable populations of cavity-nesting species.

Both prescribed fire and mechanical treatments may negatively impact particular components of wildlife habitat such as old growth or large trees, snags, and downed woody material. The Phase One project plan incorporates methods that would maintain a variety of stand structures and spatial distributions throughout the project area to provide sufficient habitat for the wide range of species found along Black Ridge.

Other impacts discussed in the Summary section above would also apply to general wildlife, migratory birds, raptors, mule deer and elk for this treatment activity.

Herbicide Treatment
Federally Endangered, Threatened and Candidate Species
Potential effects would be identical to those described above for the collective treatment area.

General Wildlife including Sensitive Species, Migratory Birds and Raptors
Potential effects would be identical to those described above for the collective treatment area.

4.2.1.8 Recreation
Due to vegetation removal, there would be potential for OHV users to create additional cross country damage in the area as a result of the more open savannah that would exist following treatment. An increase in off-route travel could negatively affect natural resources such as soils and vegetation. Impacts would likely be localized and confined to the treatment area, and OHV riders may be discouraged from riding off-road once vegetation has reestablished and grasslands replace areas that were previously bare soils. This area does have the potential for receiving more enforcement presence if additional resources become available in future years, which would also discourage off-road travel. The repair and strengthening of the crossing of Cottonwood Creek at San Juan County Road #174 as part of the proposed action would improve access for hunting and other recreational activities as the road at this crossing has become impassible at times during past precipitation events.

Removing hazardous fuels along designated OHV routes would provide increased sight distance for riders and may reduce accidents. Treatment would result in a long-term difference in recreational experience from riding in and out of scattered pinyon-juniper woodland to an open, unobstructed shrubland until vegetation matures. Opportunities for hunting and target shooting would also be modified, but because the proposed action is expected to have a long-term benefit to wildlife habitat, hunting opportunities would improve as habitat improved and wildlife numbers increased.

Fuel reduction and restoration treatments that improve vegetative diversity and resiliency would have beneficial effects to recreation opportunities by expanding the aesthetic and visual qualities of the treatment area for hikers, OHV users, horseback riders, bikers, and hunters. Reducing the severity of wildland fires on public lands would have long-term beneficial effects because there would less chance of large acreages being denuded by high-intensity wildland fire. Severe wildland fire could cause damage to recreational resources over a large area and the recovery period for this type of fire could require many years. Reducing the risk of this type of fire would, in turn, reduce the risk that recreationists would be displaced from hunting, camping and other backcountry uses of public lands during emergency stabilization and rehabilitation activities.

Recreation Collective Treatment Area

Manual Treatment

Manual removal of hazardous fuels would have little to no effect on recreationists because fuel removal areas are only a small percentage of the overall area proposed for the project. Closures of large areas would not be required, and chainsaw and vehicle noise associated with the project would most often be inaudible or indiscernible from other general noise on roads and trails. There may be changes to the visual landscape noticeable by recreationists, but the areas of manual treatment would blend into the overall treatment landscape once piles were burned and vegetative re-growth occurred.

Mechanical Treatment

Recreationists and other users of public lands in the direct area may be annoyed by the noise, potential dust, and visual intrusions from the use of the bullhog to remove hazardous vegetative fuel. These disturbances may have a negative effect on the visitor experience; however, there is already some expectation of low levels of noise in areas frequented by OHV users. Disturbances would have short-term, minor negative impacts on the recreational experience.

Hunters and hunting opportunities may be temporarily affected by fuel reduction activities conducted in the early fall season. Public awareness of the treatment would be enhanced through news releases and other media announcements to inform hunters of the location of mechanical treatment. Impacts would be short-term and limited to the length of treatment and specific units in a particular phase of project activity. Mechanical fuel reduction projects in pinyon-juniper habitat similar to that of the proposed action (e.g. Shay Mesa, Monticello Field Office) have experienced a rise in both deer populations and hunting recreation activities as early as two years following treatment (Paul Plemons, Monticello Field Office Fuels Technician, personal communication, 2009).

Prescribed Fire Treatment

Prescribed burns could require the closure of areas to visitors during burning activities, and recreationists in the area could see and possibly smell smoke from the burning. Visibility could be reduced during burning, which could have an adverse effect on the recreational experience. These effects would be very short-term and limited in duration to the prescribed burning period. Prescribed burning is most often conducted during late

fall and winter months, which are generally periods of lower travel periods by recreationists in the Canyon Country District.

Herbicide Treatment
There is a slight potential for the closure of small treatment areas following herbicide application (closure would be dependent upon herbicide label recommendations). Closures, if necessary, would be short-term and would have a minor affect on the availability of recreational opportunities. If treatment with an herbicide was followed by seeding to rehabilitate an area, there would be potential for recreational access to be restricted for a season or more to allow for successful revegetation.

Herbicide treatment could be viewed as having a long-term beneficial effect on recreational activities by controlling noxious and invasive weeds and by reducing the chances of a high-intensity wildland fire.

Recreation Phase One Treatment Area
In addition to those effects listed above for the collective treatment area, the proposed activities could obscure existing tracks from previous off-road driving by leaving mulch and shredded materials on the ground, which may inadvertently improve delineation of designated routes. Delineation of designated routes could enhance driving opportunities for motorized users and could potentially reduce resource damage by helping drivers to identify and thereby limit travel to the routes designated.

Manual Treatment
Effects would be identical to those listed for the collective treatment area.

Mechanical Treatment
Effects would be identical to those listed for the collective treatment area.

Prescribed Fire Treatment
Visitors could experience temporary road closures along backcountry routes while prescribed fire activities were being implemented. Closures to the Brown's Hole road, Highway 191, and Highway 46 would not be expected. Other effects would be identical to those listed for the collective treatment area.

Herbicide Treatment
Effects would be identical to those listed for the collective treatment area.

4.2.1.9 Visual Resources
Implementation of the proposed action would comply with the visual quality objectives for the general proposed project area. Design features incorporated into the proposed action such as irregular boundaries and feathering of edges would help blend treatment areas into surrounding landscape patterns. Irregular canopy widths and un-treated islands would also contribute to the overall visual effect of variability in the landscape.

Portions of the project area would be visible in the middle ground and background from Highway 191 and Highway 46. Modification of the Black Ridge landscape during vegetation removal and follow-up activities would alter color, line, form and texture while moving the area to a more desirable FRCC. Long-term expectations would include a visual landscape resembling a more historic fire regime and condition class of grasslands and shrublands with a mosaic of diverse woody vegetation. Scenic quality would be improved by increasing vegetative diversity and age class and allowing for natural ecological change.

Thinning of the existing undergrowth within the ponderosa stands would result in the eventual return to an aesthetic open, park-like ponderosa forest. The proposed action would also increase protection of the remaining old-growth ponderosa or ―yellow pine" stands, thereby preserving the aesthetic value and visual quality of the historic ponderosa forest.

Visual Resources Collective Treatment Area

Manual Treatment

There would be small visual changes to the landscape resulting from manual treatments, but because this type of treatment would be limited in scope, changes would be much less noticeable than other treatment methods. Effects would be minor and short term, lasting only until vegetation reestablishes in treated areas.

Mechanical Treatment

Long-term visual changes would be evident across the landscape in areas that are visible from roads and upper mesas. Mechanical treatment would include leaving remaining pinyon-juniper in a more open savannah-type landscape with small islands of trees. Combined with the expected growth of diverse and resilient grasses and forbs in the open areas, a successful project would have beneficial effects over the current lack of visual variety in vegetation.

Prescribed Fire Treatment

Because natural barriers such as ridge tops and man-made barriers such as roads would be used for control measures during prescribed fire, line and color contrasts associated with firelines would not create a negative visual affect. A short-term impact to the viewshed would result from blackened areas where debris piles were burned, as well as in areas where broadcast burns were utilized to remove scattered slash. Any areas blackened by fire would quickly revegetate and the resulting increase in both diversity and quantity of perennial vegetation would have a positive impact to the visual resource.

Herbicide Treatment

Herbicide treatment would remove and discolor vegetation in the short-term, resulting in a less appealing and somewhat stark visual contrast in the immediate area treated. However, in the long term the treatment of invasive non-native plants through the use of herbicides could improve the aesthetic and visual qualities of the proposed project area as viewed by public land users in motorized vehicles as well as by hikers, bikers, and horseback riders.

Visual Resources Phase One Treatment Area
Manual Treatment
Impacts would be identical to those listed for the collective area of treatment.

Mechanical Treatment
Impacts would be identical to those listed for the collective area of treatment although the Phase One treatment area would likely be more visible from Highway 191 than future phases of the overall treatment. As mentioned above for the collective treatment area, mechanical removal of closed-canopy, dense pinyon-juniper would have positive visually aesthetic effects over the current lack of visual variety in vegetation.

Prescribed Fire Treatment
Impacts would be identical to those listed for the collective area of treatment.

Herbicide Treatment
Impacts would be identical to those listed for the collective area of treatment.

4.2.1.10 Fuels/Fire Management
According to accumulated research results, the most effective strategy in fuel management is thinning of vegetation followed by prescribed fire, piling and burning, and/or mechanical treatment. These activities reduce canopy, ladder and surface fuels and can reduce both the intensity and severity of wildland fire (RMRS-GTR-120, page 27). The proposed action would result in the reduction of regenerative pinyon-juniper and the eventual elimination of chaining debris as well as slash debris from cutting and dispersal of live trees and brush. A successful project would reduce the potential for high intensity wildland fire while restoring natural ecological processes. A subsequent increase in vegetative diversity and woodland productivity would be expected, with greater availability of soil moisture and lower evaporation rates over the long term from a gradual increase in vegetative understory species. The production of understory grasses and forbs is known to decline as crown cover increases in pinyon-juniper woodlands (Arnold et al., 1964). In reducing the overstory, research shows that at least two-thirds of the crown cover must be removed to achieve a substantial increase in the growth of understory vegetation (Fowler and Witte, 1987). Vegetation that has proven to quickly respond to this type of reduction in pinyon-juniper includes various grasses that flourish from reduced competition from overstory junipers. Research results show additional benefits of increased herbaceous biomass from livestock rest following treatment.

Fuels/Fire Management Collective Treatment Area
Manual Treatment
While scattered fuels retain the surface fuel load necessary for future prescribed fire maintenance, the immediate fire threat is reduced because potential flame height and rate of spread are both inhibited by the dispersion of fuels. Piling of hand-cut slash for future follow-up burning similarly reduces the immediate fire threat through redistribution of the fuel load.

Mechanical Treatment

Mechanical mastication treatments do little to affect surface fuels with the exception of compacting and crushing vegetation, and may have the potential to increase surface fire spread and fireline intensity due to fine-wood surface loading from the mulch (Raymond and Peterson, 2005). Spread and intensity can present fire-control issues in the event of a wildland fire following treatment, and high temperature surface fires have the potential to damage soils and new vegetation. The potential to increase surface fire is decreased when mechanical treatment is followed by prescribed fire to remove the resulting fine fuels. However, even if a wildland fire occurs in a mechanically-thinned area, research shows that the fire would be easier to control than a crown fire in an untreated area (Resh et al., 2007). Consequently, overall impacts from a wildland fire following mechanical treatment may be lower in spite of higher surface fuels because less acreage would be expected to burn than in a crown fire situation.

The reduction of closed-canopy pinyon-juniper from this project would decrease the potential for a crown fire, causing fire to move from the tree canopy to the ground through reduction of a continuous canopy. Fire would then spread through perennial grasses, forbs and shrubs, burning at a lower intensity and resulting in safer and more efficient fire control.

Prescribed Fire Treatment

The benefits of altering fuel structure and wildfire behavior through prescribed fire have been observed and reported for many years (Weaver 1955, 1957, Cooper 1960, Biswell and others 1973, Fernandes and Botelho, 2003; RMRS-GTR-120, page 24). Because prescribed fire is not utilized to precisely modify stand structure and composition as in mechanical thinning, there is generally less predictability of post-treatment stand structure. However, prescribed fire does influence multiple fuelbed characteristics including the reduction of fine fuels, large woody fuels and other live surface fuels, which can decrease both the spread rate and intensity of wildland fire by changing the continuity of fuels. Decreasing the horizontal fuel continuity can also limit fires to lower intensities and reduce spot fire ignitions. A prescribed fire of low to moderate severity would be expected to benefit most plant communities in the general vegetative communities found in the proposed project area by facilitating the recovery of desired species.

There are inherent risks associated with the use of prescribed fire including the possibility of promoting the spread of invasive annuals. The monitoring segment of the proposed action would instigate follow-up action if monitoring plots showed a high invasive component. Risks of prescribed fire could also involve fire escaping the established perimeter of the burn and related economic and resource damage. However, compared to the large number of prescribed fires successfully completed over the years by BLM crews in the Canyon Country Fire Zone and other state and federal agencies, escaped fires are rare (RMRS-GTR-120, 2004).

Herbicide Treatment
Accidental spill and herbicide drift from treatments could have a potential negative effect on non-target vegetation in the short term, although SOPs are in place to prevent non-target impacts to adjacent vegetation. The long-term beneficial effects of reducing non-native invasive species and their hazardous fuel component would outweigh the short-term negative effects.

Fuels/Fire Management Phase One Treatment Area
Manual Treatment
Manual treatments would be highly selective and would be used in limited areas where other treatment methods were not feasible. This would result in fewer effects to non-target species than other treatment methods, although treatments could produce small amounts of trampling of non-target vegetation. Overall effects to non-target species would be minimal and short term in duration. When used discriminatively in wetland and riparian habitat to reduce unwanted species, manual treatment would have little, if any, affect on sensitive habitat. As specified in the proposed action, the removal of slash and other project debris to beyond the riparian and floodplain corridor would mitigate potential effects from follow-up pile burning.

Mechanical Treatment
Bullhog mastication equipment would be contracted to remove pinyon-juniper and other undesirable vegetation over approximately 6,000 acres of the total 9,100 acre proposed treatment area. High fuel loads would be targeted with an overall goal of reducing the risk of high-intensity fire while restoring ecosystem health. Mechanical treatment would be selective and would minimize damage to non-target plants in the project area. Woody species typically take about ten years to begin to recover following mechanical mastication, depending on the reproductive success of the species (17 States Vegetation PER, Chaper 4, page 4-45). Growth of herbaceous vegetation would be expected to increase following mechanical treatment as a result of reduced competition with woody species for light, nutrients and water (Cox et al., 1982). Units that receive seeding treatment would be expected to recover more quickly than those areas revegetating naturally.

Prescribed Fire Treatment
Impacts would be identical to those in the collective treatment area.

Herbicide Treatment
Impacts would be identical to those in the collective treatment area.

4.2.1.11 Socio-economics
There are economic objectives to support fuel treatments when compared to the cost of fire suppression on public lands. The cost-effective level of fuels treatment occurs where the marginal cost of treatment plus the expected post-treatment suppression cost is equal to the expected marginal cost of suppression without treatment (Busby, 2002). In the upper Snake River Plain, which has similar vegetation types as the Canyon Country Fire Zone, the average cost of wildland fire treatment was estimated to be $105 per acre. The

average cost for wildland fire suppression is estimated to be approximately $140 per acre (BLM, Moab FMP, 2006). The objective of the proposed action is to reduce fuel loads and change the fuel profile, based on the principle that these actions will enhance natural resources (woodland vegetation, wildlife habitat, watershed integrity) while increasing the safety of wildland firefighters and humans living in the WUI. The economic impact that would result from the reduction of fuel loads in this scenario would be the reduction of suppression costs associated with high-intensity wildland fire. In addition, the proposed treatment would affect the landscape surrounding each of the WUI communities through the modification of fire behavior in the case of a wildland fire. Future fires would be expected to burn at a lower intensity with less severity and a reduced chance of spreading to and through the communities.

A successful treatment on public lands surrounding the WUIs would have a long-term beneficial economic effect on the WUI communities in that a reduced risk of large-scale wildland fire could have the potential to increase property values and encourage a population increase in local communities.

In the southwestern United States, many millions of dollars have been invested to protect human values and key ecosystem elements within and outside the WUI. In addition, a great deal of effort and dollars have been expended on fuel reduction project planning. Regardless of the level of cost, BLM expenditures for labor, materials, and equipment would contribute to economic activity.

Over the next 10-15 years, areas of public land treated by the BLM will require re-treatment to maintain their effectiveness as fuel breaks and fire resilient ecosystems. Because it is unclear whether or not funding will be available in the future to perform maintenance of these areas as they graduate to a more desirable condition, it is possible that maintenance costs would have to be absorbed at existing budget levels. Maintenance should cost less per acre than the initial treatments if it is conducted before fuels have re-accumulated to pre-treatment levels.

Restoration on a landscape scale could have a potential impact to subsistence and recreational activities within the adjacent communities. While the restoration may have a long-term beneficial impact of reducing the risk of wildland fire to the communities, other potential long-term impacts could include a reduction in the number of wooded acres that are available for wood product harvest (firewood, poles, etc.) and changes in the number or species of animals that inhabit popular hunting and recreation areas. Short-term adverse impacts could result from livestock grazing restrictions imposed on local ranchers during project implementation and post-seeding closures.

Each of the treatment activities could create a short-term adverse effect by initiating closure of certain areas of public land. Trails or OHV routes could be closed for a period of time during mechanical treatment or prescribed fire activities. It is not anticipated that closures would result in an adverse affect to recreational economics.

Socio-economics Collective Treatment Area

Manual Treatment

Economic studies of fuelbreaks are few, and results are difficult to pin down because of the balance between costs of the project and dollars –saved" because of an assumed reduction in damage to infrastructure from wildland fire. While fuels reduction is designed to create a defensible space on public lands adjacent to private homes, this type of project may run counter to some WUI homeowners' individual landscaping ideals. Hand treatments require the least investment in cost and although they are time consuming, typically face very little interest group opposition. Overall, adverse social or economic effects from manual treatment would be minimal.

Mechanical Treatment

Mechanical treatments in other areas of the country have led to concerns that fuels reduction may be used as a pretext for justifying the harvest of mature trees. In this particular proposed project, only young and mid-age trees would be removed, and the mechanical mastication process differs greatly from tree harvest. There has been nationwide dialogue about the potential for mechanical treatment in conjunction with biomass generation in the form of wood chips or other products that could be of economic benefit. However, to date there are no commercial producers of this type of biomass that have shown an interest in projects in this area. In fact, there are no commercial timber harvesting firms currently active in the Moab Field Office, which encompasses the project area.

As described above, the management of fuels to reduce the potential for wildland fire is normally less costly to the BLM than are fire suppression activities. Large scale fuel reduction projects such as the proposed action are normally contracted to the public. Because there are currently a lack of local contractors who bid on this type of project, the economic benefits linked with fuels reduction activities are realized more through a resultant decrease in the threat from catastrophic wildland fire and the economic impacts associated with wildland fire.

Prescribed Fire Treatment

Prescribed fire has generated controversy because of the distances over which the resulting smoke disperses (i.e., over living, work and travel areas) and the potentially disastrous impacts of prescribed fires that escapes. Smoke dispersal from prescribed fire in conjunction with the proposed project could affect local communities and there would be short-term impacts resulting from smoke that may last from several hours to several days. Burning would not be implemented all in one day, and each burning day would be selected with atmospheric conditions that would facilitate emissions drifting into the upper atmosphere.

Prescribed burning could create areas of bare soil that have the potential to increase wind-blown dust until vegetative re-growth occurs. These effects would be minor, short term and localized.

Herbicide Treatment
As with other treatment activities, chemical treatment could initiate the closure of some areas to grazing and/or recreational activities. Any closures would be short term and temporary and would not be expected to adversely affect recreational economic activity. Closure of specific pastures for several growing seasons could have a short-term adverse effect on ranching economic activity.

Socio-economics Phase One Treatment Area
Effects of all treatment activities (manual, mechanical, prescribed fire, and herbicide treatment) would be identical to those described above for the collective treatment area.

4.2.2 Alternative B – No Action
If the proposed project were not approved, there would be no direct, indirect or cumulative impacts resulting from management action in this area. The following resource analyses are based on potential results from taking no management action.

4.2.2.1 Watersheds
The no-action alternative would not have a direct impact to watersheds because vegetation disturbance or reduction activities beyond those that are already ongoing would not take place. However, the protection of watersheds against uncontrolled wildland fire is of utmost importance because of the danger of serious damage to soils from high-intensity fire. Wildland fire can intensify water yield through increased drainage density (scouring of water channels), loss of vegetative cover, and decreased soil permeability. The time required for a watershed to recover from a severe burn varies according to climate, type of soil, steepness of slope, the length of time soil depletion persists, and other considerations. Full recovery of a watershed from catastrophic fire may take several decades or even centuries when soils are damaged to the extreme (Sampson et al., 2004).

4.2.2.1.1 Floodplains
There would be no potential impacts from fuels reduction activities to floodplain areas if the proposed project did not take place. Consequences from a high-severity fire, however, could include the deposit of large amounts of sediment following an upper drainage precipitation event, potentially negatively affecting riparian as well as upland habitat. Depending on the recovery of the hillslopes following fire, effects could be long-lasting.

4.2.2.1.2 Water Quality
Wildland fires can exacerbate the affects of flooding and potentially affect discharge rates, water levels, sedimentation, and debris runoff. Consequently, increased fuel loading can perpetuate flooding vulnerability through loss of vegetation and groundcover following high-intensity wildland fire. Depending on how near the soil surface is to the groundwater table, and how dependent the watershed is on water infiltration, the groundwater basin could be adversely affected by a worst-case-scenario fire. High-intensity fires vaporize organic compounds on the soil surface, creating a water repellent layer within the upper soil, decreasing the infiltration capacity of the soil. Although

water repellent soil conditions are generally temporary, a lingering layer of hydrophobic soil can persist for years depending on soil types and fire intensity.

4.2.2.1.3 Wetlands/Riparian Zones

Should a high-intensity wildland fire occur, not only would overall watershed stability be compromised, but sufficient sediment could potentially be generated to measurably increase volumes above established Total Maximum Daily Loads (TMDLs) within the affected drainages. A typical wildland fire would be expected to kill vegetation and remove above-ground portions of the majority of vegetation along creek areas. A long-term increase in erosion along the banks of creeks and springs would be anticipated.

4.2.2.1.4 Soils

The no-action alternative has the greatest potential for indirect impacts to soils due to an increased risk of a large scale high-intensity wildland fire if the area is left untreated. In the absence of a fuels reduction treatment, the existing densities of pinyon-juniper and woody debris that have accumulated over the years would increase, along with the projected likelihood of a high severity wildland fire. Although fire suppression activities would continue as in the past, a fast-moving wildland fire could out-pace suppression efforts and the fire could potentially affect a large area. Impacts to soils from a high intensity fire could include an increase in erosion, a reduction in site productivity, spread of noxious and/or invasive weeds, and downstream impacts from sediment, decreased infiltration and increased water yield.

In the absence of a wildland fire, no changes to soil conditions would be expected in the dense, closed canopy pinyon-juniper woodlands or ponderosa forest. Research has shown that woodland encroachment into sagebrush steppe systems increases surface runoff and erosion (Miller et al., 2005). Runoff and erosion rates are highest in the inter-space zones between canopies and can negatively affect wildlife habitat and decrease soil productivity.

4.2.2.2 Invasive, Non-native Species

The no-action alternative would not increase the risk of noxious or invasive weed spread beyond the risk that currently exists in the area of the proposed treatment. Treatment of noxious weeds would continue under current management guidelines.

A high severity wildland fire occurring in the proposed project area would trigger an appropriate management response and suppression efforts may reduce the size of the area impacted by the fire. High intensity fire generally leaves a larger burned area with fewer unburned islands that that which results from a fuels reduction project, which could increase the potential for the spread of noxious and invasive species into the burned area.

Both native and non-native annual plants have the ability to become established within a few years in a burned site, especially where natives existed prior to a fire. However, the sterilization of soils and the depth of heat damage may prevent native reestablishment. Also, cheatgrass is well-adapted to burned sites and can displace native grasses and sagebrush meadows, which would negatively impact both food and shelter for a variety of animal species.

4.2.2.3 Rangeland Health Standards and Guidelines

No treatment would result in further maturation of the area's pinyon-juniper woodland with a simultaneous decline in herbaceous understory productivity and diversity. Under natural conditions without periodic low intensity fire, any herbaceous and shrubby species within pinyon-juniper woodlands would eventually falter. Grasses and forbs would be less available to wildlife and livestock for forage, and pinyon-juniper would continue to move into areas historically dominated by grasses and shrubs.

A wildland fire occurring in pinyon-juniper woodlands with a compromised fire regime and condition class would be susceptible to high-intensity wildland fire that could be extremely damaging to woodland ecology. Research results also point out that smoke conditions during these types of fires are high in both volume and duration, and the landscape can be completely altered from high fire temperatures; temperatures that volatize nutrients, kill soil microbes and consume soil organic matter. Soil conditions following a high intensity fire are prone to increased erosion, sedimentation into water sources, and invasive species spread.

If the fuels reduction project did not occur on Black Ridge, there would be no potential benefits to grazing allotments that may have been realized from corresponding improvements in vegetative diversity and vigor. Soil productivity would decrease substantially as a result of a hot fire, due to the loss of both the duff/litter layer as well as any organic matter (nutrients) present in the upper soil layers. The probability would be high for a decrease in plant diversity, invasion of noxious weeds, and wind and water erosion due to compromised soil health and productivity, which would lead to further declines in rangeland health.

4.2.2.4 Livestock Grazing

A decline in vegetative diversity would continue into the future if pinyon-juniper regeneration were allowed to continue unabated. Under the no-action alternative, competition from woody species in combination with dense closed-canopy pinyon-juniper woodland would continue to oppress the herbaceous understory. Grasses and forbs would be less available to livestock for forage, and pinyon-juniper would continue to move into areas historically dominated by grasses and shrubs.

Indirect impacts could be severe under the no-action alternative because of the potential for a high-intensity wildland fire. If a wildland fire occurred, livestock would be restricted from the burned area of the allotments until emergency fire stabilization and rehabilitation objectives could be met. Although restrictions would also be imposed under the proposed action, it is likely that a high severity wildland fire would have a greater impact to livestock grazing because significant damage could occur to the allotment in a stand-replacing fire. Potential impacts from a high intensity wildland fire could include indeterminate allotment closure.

4.2.2.5 Woodlands/Forestry

A wildland fire occurring in a ponderosa pine forest with a compromised fire regime and condition class would be extremely damaging to the ecology of that portion of Black Ridge. A high severity wildland fire would most likely cover a large amount of land and would produce high temperatures and an extreme amount of smoke over a long period of time. In this type of scenario, the landscape of the ponderosa forest would be altered completely and old-age ―yellow pines" would most likely burn. Exotic species invasion would be likely in areas of high fire severity as would soil erosion and sedimentation into streams. Because ponderosa pine forests in southeastern Utah are somewhat of an anomaly compared to those in other regions (RMRS-GTR-202, 2007), experts suggest that restoration treatments prior to the reintroduction of fire are the only way to increase the chances that all pines would not be eliminated from the forest if a wildland fire occurred in this area (RMRS-GTR-202, 2007).

The pinyon/juniper woodland would remain intact under the no action alternative. No reduction of the dense stands of mid-age pinyon-juniper would be realized and eventually the age and size of pinyon-junipers would be relatively constant. Tree-dominated woodlands with continuous canopy cover can support high intensity crown fires under high wind conditions such as the devastating Bircher Fire in the year 2000 that burned almost 20,000 acres of pinyon-juniper in Mesa Verde National Park. The 2002 Hang Dog fire burned over 6,000 acres of ponderosa pine, Gambel oak and pinyon-juniper woodlands on BLM and Forest Service lands to the east of the proposed project area. The area of the fire included two drainages of watershed importance where approximately 1,000 acres burned at a severe intensity, denuding the landscape and killing over 60% of the ponderosa pine. A wildland fire occurring in the dense, closed canopy, overly mature pinyon-juniper woodland areas of Black Ridge could result in a stand-replacing burn severe enough to move into adjacent Forest Service woodlands.

4.2.2.6 Vegetation

The existing vegetation would not be disturbed by any type of fuels reduction treatment. The mature pinyon-juniper woodland would not be affected and sagebrush meadows would continue to be overtaken by pinyon-juniper growth. Understory growth of grasses and forbs would be limited in areas of closed canopy pinyon-juniper and the potential for a high-intensity wildland fire would remain. Because seeding would not take place, there would be no restorative vegetative effects from the seeding, mulching and reduced overstory.

4.2.2.7 Fish and Wildlife (Including Special Status Species)

While the no-action alternative would not significantly impact wildlife, the eventual occurrence of a high intensity and potentially stand-replacing wildland fire would have direct adverse impacts. A wind-driven, canopy fire event would typically alter the animal community and habitat more dramatically than an understory fire, as animal species are adapted to survive fire patterns of high fire frequency and low severity. The impact to wildlife from a high-severity fire in the proposed project area would depend on the tree density and the amount of grass in a given area. Most animal species respond predictably to wildland fire, although responses vary widely among species (Komarek, 1969). Large,

intense fires are dangerous to animals caught in their path, and animals with limited mobility living above ground appear to be the most vulnerable to injury and mortality from fire. The removal of groundcover as a result of a high-intensity fire would affect prey species such as raptors by temporarily reducing the number of prey available for consumption. Bird mortality from wildland fire would depend on the season in which the fire occurred. For example, species nesting in the tree canopy could be injured in a wildland fire, but fires in pinyon-juniper areas often occur in the hotter summer seasons rather than during nesting season.

Studies show that many bird species will take advantage of woodlands altered by wildland fire, but others abandon burned areas because the ecosystem no longer supports the habitat required for their survival and reproduction. Spotted owls in south-central Washington reportedly continued to use areas where low-intensity fire had occurred, but abandoned stand-replacement areas (Bevis and others, 1997). The number of bird populations absent or declining two years following fire has been reported to exceed populations that are stable or that increase after fires in a variety of shrub and grassland habitats (RMRS-GTR-42-vol. 1, page 21, 2000). Literature research shows that bird communities are disturbed for at least two years by stand-replacing fires, although vegetation usually responds more slowly after fire in dry forest such as pinyon-juniper. Changes can be positive for insect-eating and seed-eating bird species, but can adversely affect species that depend on bark and foliage such as woodpeckers.

The SWFL Recovery Plan recognizes that fire is an imminent threat to riparian areas in general and specifically to occupied and potential SWFL breeding habitat. Fires in riparian areas are most often catastrophic and cause sometimes irreparable damage to plant species composition and density.

Stand-replacing fires and severe, high-intensity wildland fires can trigger high rates of mammal emigration because of their dependence on vegetation for forage, cover and thermal protection. Small mammal species are also adversely affected when their habitat burns and may relocate due to decreased protection for predators and competition for decreased food sources.

Invasion by non-native plant species, particularly cheatgrass in sagebrush ecosystems, increases fuel load and continuity which results in increased fire frequency. More fires result in the spread of invasive annuals, which disrupts the balance of shrubs/forbs and native grasses and threatens the native habitats of sagebrush obligate species such as sage grouse, sage sparrow, Brewer's sparrow and sage thrasher.

4.2.2.8 Recreation

If the proposed project were not implemented, a high intensity wildfire would eventually occur in this area. Large portions of the area would be totally denuded of vegetation and soils would be damaged from high-intensity heat and subsequent soil erosion. In this scenario, the possibility of increased cross-country OHV use would have a greater negative impact to soils already damaged from a high-intensity burn. There would be

increased potential for erosion in these damaged soil areas and also a threat from the spread of noxious weeds.

Recreational use of areas severely burned by wildland fire could be curtailed until re-vegetation efforts were well underway, and road closures may be imposed during wildland fire events. Smoke and particulates generated by a high-intensity fire could impact the viewshed for a lengthy period of time from Class I areas surrounding the Black Ridge vicinity.

4.2.2.9 Visual Resources

Under the no-action alternative there would be no short-term direct effects on the visual resource within the proposed project area. In the long term, if fuel reduction activities did not occur, a further decline in the variability and age classes of vegetative communities would be likely, decreasing scenic diversity. In the absence of a fuels treatment, the likelihood would be great that a wildland fire would eventually occur in the Black Ridge area. A large area could be impacted by high intensity fire with discernible changes to the visual landscape such as extensive loss of vegetative cover, erosion, and color and other contrast changes in the character of the landscape. Smoke and particulates generated by a high-intensity fire could impact the viewshed for a lengthy period of time from Class I areas surrounding the Black Ridge vicinity.

4.2.2.10 Fuels/Fire Management

If the proposed project were not approved, no action would be taken to reduce the hazardous fuels threat, and continued fuel loading would pose a greater wildfire hazard than currently exists. In dry forest ecosystems, the impacts of no action include the probability of stand-replacing, intense fire where increased stand density and hazardous fuels have increased from historical levels.

It is somewhat speculative to predict where and when wildland fire will occur, but it is a well-known fact that substantial acreages of dense pinyon-juniper woodlands have burned in the recent past and will continue to be burned by severe wildland fire. With no treatment, given the current fire regime and condition class, there would be a high risk of a severe high-temperature fire throughout the Black Ridge area at some point in the future. A combination of high temperatures, low relative humidity, winds, and/or drought conditions could result in a stand-replacing wildland fire. The potential also exists in this particular area for a wildland fire originating on BLM lands to spread to communities, to adjacent Forest Service lands, and to high-use recreational lands.

4.2.2.11 Socio-economics

If fuels reduction actions were not implemented in the Black Ridge area there would be increased risks to public safety as well as public infrastructure losses from wildland fire. Future national trends may move toward potential insurance increases in fire-prone hazardous fuel areas in which fuel reduction around homes has not taken place. In addition to threats to the health and safety of the public, the dangers inherent in fighting a high-intensity wildland fire expose wildland firefighters to risk of injury and loss of life.

Because of the fine particulate matter and other pollutants in smoke, wildland fires can pose a health threat to people living in WUI areas (GAO/RCED-99-65, 1999, Norton, 2002). Communities place a value on lower fire risk as well as reduced smoke and generally support the removal of high fuel loads in WUI areas. Although the cost of fuel reduction especially by mechanical means is known to be costly, the market does not place an economic value on the negative environmental consequences resulting from high intensity fire. Fuel reduction costs can be slightly offset by the secondary benefits to rural communities from fuel reduction contracts and wood product utilization. However, considering the increasing costs of suppressing wildland fire along with threats to public and firefighter safety, potential losses of infrastructure, habitat, grazing land, recreational opportunities and probable watershed damage, the economic impacts from a high-intensity wildland fire can be disastrous.

The past decade has shown a trend of increasing wildland fire, with an average of 130 fires each year burning an average of 16,000 acres. As discussed in Chapter 4 (4.2.1.11, page 111), the average cost of wildland fire suppression was estimated at approximately $140 per acre versus $105 per acre for fuels treatment. The costs to the economy of a single county can be substantial in the event of a catastrophic wildland fire. Potential evacuation of homes as well as the actual loss of private homes and infrastructure can create a significant hardship for citizens. Because the economy of San Juan County is influenced to a certain extent by tourism, a decrease in tourism linked to cancelled vacation plans during a widespread fire event can have a negative effect to local economies. Smoke from high-acreage fires can also negatively impact the Class I airsheds in the national parks nearest the Black Ridge area (Canyonlands National Park, Arches National Park). Local governments could be required to assist with funding to fight a widespread fire, although fixed labor costs for local firefighters would be channeled back into the local economy.

4.3 Monitoring and/or Compliance

Transects and/or photo plots to document fuel load and vegetation composition would be assembled within the treatment area prior to project implementation. Monitoring results would be documented prior to treatment and for a period following completion of the project. A successful reduction in fuel load and reduced flammability of the treatment area, in addition to improved habitat and forage, would indicate desired goals had been reached.

Monitoring results would be incorporated into management decisions regarding future resource treatments in the area of the proposed project as well as in other possible treatment areas. Further treatment in this project area could include maintenance burning, additional seeding, reintroduction and/or adjustment of grazing seasons or numbers, additional fuels treatments, and/or other actions. Management decisions requiring treatment methods not previously analyzed could initiate further NEPA analysis.

4.4 Cumulative Impacts Analysis

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions.

- **Standards for Rangeland Health**

In 1995, BLM grazing regulations were changed to focus public land management on ecosystem health. As a result, standards for rangeland health and guidelines for grazing management were developed for each state (USDOI, BLM Instruction Memorandum No. 2001-079, January, 2001). The standards set minimum requirements for proper nutrient/hydrologic cycling and energy flow relative to a system's ecological potential, and the guidelines directed significant progress towards meeting the standards. Ongoing efforts to move resources toward ecosystem health are expected to continue into the future.

- **Increased recreational use of BLM lands within the planning area**

Southeastern Utah and BLM lands in particular experience heavy seasonal recreational visitation which has more than doubled in the past twenty years. Recreationists include those visiting the area to engage in personal recreational activities as well as those who attend many of the special events in the area and/or participate in an organized activity with a commercial outfitter. Recreational use includes camping, OHV use (ATV, dirt bike, and four-wheel driving), mountain biking, horseback riding, hiking, and river recreation including river corridor camping. There are developed recreation sites throughout the Moab Field Office with facilities including campgrounds and picnic areas (tables, dumpsters, shade shelters, fire grills, etc.), vault toilets, boat ramps, information boards, and parking lots.

Because visitation has increased every year since 1999, it is estimated that the number of visitors will continue to increase and that the demand for facility development will increase concurrently. Priorities for suppression of wildland fires include not only protecting firefighter and public safety, but also preventing damage to BLM improvements.

- **Continued expansion of mineral extraction activities associated with oil and gas, coal, copper, and uranium/vanadium**

Exploration and development will continue to expand throughout the planning area. Oil, gas, uranium, gold, and potash exploration and production has been on the rise, and it is likely that resources will continue to be developed over the next fifteen years.

The Moab Field Office has two uranium exploration notices located within the Black Ridge Project boundary. Information on these two notices is as follows:

The first notice is located in T. 27 S., R. 23 E., Section 30, SWSE and T. 27 S., R. 23 E. Section 31, NWNW. This area is near the Black Ridge Road junction with Highway 191. Total proposed surface disturbance is 1.5 acres with drilling mostly occurring on old existing mine roads that do not require improvements for access. The Moab Field Office accepted this notice in October of 2008 and the notice will expire in October of 2010.

The second project is located in T. 28 S., R. 23 E., Section 8, NE. The proposal is to re-drill five existing drill holes to test for uranium. The proposed total surface disturbance is 1.0 acre and the access is along an existing road.

- **Transportation and utility corridor development, expansion, maintenance, and improvement**

Cumulative impacts to the viewshed in the Moab Field Office are resulting from increases in recreation and visitation as well as from the development of utility corridors, oil and gas production, and other land use disturbances. The increasing number of two-track roads and routes allow OHV users, campers, and woodlands harvesters to access more backcountry areas. As the 2008 RMP for the Moab Field Office designates areas available for off-road travel, it is also possible that areas previously open may now receive fewer visitation numbers with associated decreases in human-caused wildland fire ignitions.

- **Continued and increased invasive/non-native weed infestation**

In addition to tamarisk and Russian olive encroachment along river corridors, major areas of uplands and rangelands are being converted to invasive annual grasses such as cheatgrass, as well as halogeton, Russian thistle, and Russian knapweed. These species become a fire hazard in wet years, produce little forage in dry years, and prevent the establishment of native species.

The Invasive Species Executive Order 13112 encourages all agencies, including the BLM, to research mechanisms to control the introduction and spread of invasive species. Invasive/non-native weed infestation can spread to BLM lands from adjacent public and private lands and vice versa. The BLM Noxious Weed Program has identified and documented populations of invasive/non-native/noxious weeds in the Moab Field Office area. These sites are monitored annually and controls and/or treatments are applied as dictated by time and budgetary constraints. This ongoing monitoring, documentation, and treatment program supports the achievement of DWFC goals by identifying potential treatment sites and reducing the likelihood of sites that may go un-noticed, uncontrolled, and that could spread further if untreated.

- **Continued human-caused and natural ignitions of wildland fire**

Human-caused fires can increase along major highways in wet years when annual grasses have matured and dried. If these climatic conditions occur in combination with an increase in the number of visitors to an area, the occurrence of wildland fire can increase. Wildland fire as a result of natural ignitions can also depend on FRCC (vegetative conditions) and seasonal conditions. Extended periods of drought, low fuel moistures, and environmental influences, for example, can all affect human-caused wildland fire spread.

4.4.1 Reasonably Foreseeable Actions on Adjacent Lands

The Canyon Country Fire Zone is comprised of a variety of vegetative communities that obviously spread beyond BLM jurisdictional boundaries. Vegetative communities overlap with thousands of acres under private ownership, under management direction of

several different federal agencies (BIA, NPS, USFS), and under ownership of various divisions within the State of Utah (UFFSL, State Institutional Trust Lands Administration). Management of lands under multiple jurisdictions adjacent to or within BLM tracts of land may cumulatively affect BLM-managed lands in areas such as fire and fuels management; recreation management; invasive weed control; grazing and wildlife management; extractive industries; and/or private and commercial uses such as airports, highways, railroads, powerlines, campgrounds, and other private developments. In addition, various communities-at-risk within the Canyon Country Fire Zone boundaries may or may not have developed plans to manage growth and development extending into surrounding landscapes and to mitigate hazards within the communities, which could also have a cumulative effect on BLM resource management.

The UFFSL oversees fire-related activities on lands currently under State of Utah ownership as well as wildland fire and fuel mitigation on private lands within San Juan County. Lands that are managed by the UFFSL are adjacent to the proposed action. UFFSL oversees, plans, and implements fire suppression and fuels reduction on state lands as well as working directly with communities to establish community fire plans.

There are also many thousands of acres of public lands in southeastern Utah managed by the Department of Agriculture, USFS. The Manti-La Sal National Forest which includes the Moab Ranger District is currently in the process of a Forest Plan Revision to establish long-term management decisions which include fire and fuels management. The Moab Ranger District is involved in separate and/or combined multi-agency fire suppression activities and in ongoing fuels treatment projects.

Reservation lands in the general vicinity of the proposed action include the Navajo Reservation to the south. Fire and fuels management on lands within the reservation are overseen by the BIA, which provides wildland fire protection for over 60 million acres of Indian reservations and other trust lands across the United States. The BIA's national wildland fire and aviation staff is headquartered at the National Interagency Fire Center, where BIA is one of many agencies who work together to exchange support, protection responsibilities, information, and training for wildland fire and fuels treatment. When fires occur on reservation lands adjacent to BLM lands, initial attack and suppression activities are coordinated between the cooperating agencies.

Private lands and management of those lands can affect resources such as vegetation, air quality, soils, watersheds, and water quality on adjacent BLM lands. Population growth, increases in WUI areas, community pro-activeness in fire and fuel management, recreation, industrial growth and/or extractive industries, and invasion or spread of non-native/invasive weeds are just a few examples of actions that may take place on adjacent private land that could contribute to resource effects from the proposed action.

Human activities such as wood gathering, hunting, and recreational off-highway vehicle (OHV) use; fire control, additional fuels treatments; livestock grazing management; and other multiple use activities to differing degrees have previously affected portions of the proposed project area.

Invasion of non-native species (noxious weeds), fire suppression activities, and cumulative effects from past fuel treatment projects could affect vegetation, soils, wildlife, and/or air quality within the proposed treatment area. An incidence of wildland fire on adjacent public and/or private lands could spread to the project area. The implementation progress of the proposed project would determine the extent to which it may be affected by a wildland fire. Achievement of desired wildland fire condition goals in this area would lessen the chances that a wildland fire spreading from adjacent land would severely damage vegetation and soils in the proposed project area.

4.4.2 Cumulative Impacts

The distribution of vegetative communities across a landscape are primarily influenced by soil type, elevation, precipitation, topography, and on public lands in varying degrees by management of land uses such as livestock and wildlife grazing, roads, oil, gas, and mineral development, and recreational uses. Vegetative communities form a mosaic pattern across the landscape of the Canyon Country Fire Zone, sometimes occurring in relatively homogenous stands but more often occurring in various species combinations and associations that may be affected indiscriminately by the land uses listed above as well as other uses. Many of the lands adjacent to public lands are undergoing urbanization, which can result in impacts such as increased human-caused fire threats and further fragmentation of vegetative communities.

Recent influences to vegetative communities have occurred as a result of extended periods of regional drought across southeastern Utah, which has brought about changes in the types and distribution of vegetation. The effects of regional drought are still being studied, although research and monitoring indicate severe stress to particular species and in some cases loss of significant portions of vegetative communities in the region; in particular, pinyon pine, sagebrush, and salt desert shrub species. Drought stress is in addition to a documented increase in the distribution of invasive species, particularly halogeton and cheatgrass.

Below normal precipitation and variations in seasonal weather patterns over the region are coupled with an increase in overall temperatures recorded over the past century. According to a recent report from the United States Geologic Survey (USGS) Office of Global Change, the southwest portion of the United States is likely to experience summertime temperature increases greater than the annual average over the next decades (www.globalchange.gov/usimpacts). This temperature increase could have a variety of long-term effects including: Plants entering spring green up earlier and going into dormancy later, altered snowmelt patterns and subsequent water availability, changes in evapo-transpiration dynamics and soil infiltration capacity, and growth impacts in particular species as a result of decreased nutrient uptake. The uncertainty associated with future climatic conditions makes the identification of cumulative effects uncertain to some extent. If the current ongoing regional dry trend continues and temperatures continue to rise, restoration and treatment efforts could take longer, be more costly and time-consuming to implement, and/or could be subject to increased failure rates. Climate change is also predicted to have fire regime effects including an increase in fire frequency

and extent in years that fuels have accumulated from the previous growing season. Increased temperatures would most likely result in longer fire seasons with a higher number of fires occurring both earlier and later than the fire season that has been typical over the past 100 years (Chambers and Pellant, 2008). Fires that occur on adjacent lands managed by other entities could affect natural resources such as soil, vegetation, water and wildlife in the area encompassing the proposed action. In the case of a large fire on adjacent lands, less native vegetation would be available to serve as a seed source for burned areas on BLM lands, and there may be less vegetative cover for wildlife species on BLM lands.

It has now become well accepted that a link between rising carbon dioxide levels and generally increasing temperatures will lead to a national focus on global climate change as it relates to the reduction of the human ―carbon footprint" as well as to the sequestering of carbon in vegetative communities such as forests, grasslands, and sagebrush meadows. Currently, forests and other vegetative communities absorb carbon dioxide from the atmosphere and store it as carbon, offsetting up to twenty percent of the nationwide human-caused carbon emissions (Knudson, 2008). Grasslands and planted pastures also store carbon in aboveground vegetation as well as in the soil organic matter (Sharrow, 2008). Although land management practices and specifically fuels reduction projects will affect carbon storage on a particular project site, it is hard to predict an impact because research in this area is still in the beginning stages. For example, a recent study near Corvallis, Oregon comparing carbon inventories for pastures, forests, and pasture/forest combinations, showed that all test sites had roughly the same total amount of stored carbon. It should be noted, however, that carbon storage above the ground was higher in forested vegetation and carbon stored below the ground was higher in pasture land (Sharrow, 2008). Generally, the rehabilitation of rangelands is one of the practices that would likely increase carbon storage because of the expansive area covered by these lands. Because rangeland productivity can vary greatly from year to year considering location, weather factors, and vegetative variability, carbon sequestration rates would be difficult to measure as well as to sustain at a consistent level over the long term.

Although prescribed fire releases carbon dioxide while burning, prescribed fires are generally much lower in intensity than wildland fire and therefore release less overall carbon. Prescribed fire can also reduce the probability of high-intensity wildland fire and can therefore be considered effective at reducing emissions. Mechanical treatments that reduce the risk of wildland fire and associated high carbon emissions are also considered to have beneficial effects in that they store carbon in mulched soils.

General cumulative impacts to threatened, endangered, or candidate plant and animal species could result from land uses which are ongoing or that have historically occurred in the area. BLM authorized land uses include but are not limited to livestock grazing, on- or off-road recreation by motorized and non-motorized vehicles, oil and gas activities, camping, hiking, hunting, wildlife viewing, rights-of-way development and maintenance, and mining. With the exception of recreation, which has increased drastically in the past ten years, most ongoing activities have been constant over the past 80-100 years.

Treatments that remove hazardous fuels would be expected to benefit the long-term health of plant communities in which natural fire cycles have been altered. The suppression of fire on pinyon-juniper woodlands has resulted in the growth of substantial acres of dense closed-canopy trees as well as the buildup of litter and dead woody materials in the understory of these woodlands. Treatments designed to restore and maintain fire-adapted ecosystems would decrease the effects of wildland fire on plant communities and would generally improve ecosystem resilience and sustainability.

Long-term benefits to special status and non-status plant and animal habitat could result from a return to more natural fire cycles and improved ecosystem function. Species in general could benefit from well-functioning ecosystems and cumulative impacts could include increased habitat/population connectivity as well as enhanced migratory corridors, habitat structure, forage, and stability.

4.4.3 Past and Present Actions

Past or ongoing actions that affect the same components of the environment as the proposed action are:

Other fuels reduction treatment projects have occurred on BLM and USDA Forest Service lands in the general area. As mentioned previously, the BLM reduced the pinyon-juniper woodlands along portions of Black Ridge in the early 1960's through the use of an anchor chain-type treatment in which trees were upended and root balls exposed. A large majority of the pinyon-juniper trees were not killed and at present many of the old living trees have multiple-branched ~~"t~~rees" growing from the original downed trunk. Soils surrounding the closed canopy rows of pinyon-juniper are generally barren of vegetation and prone to disturbance from weather and other erosional forces.

The Forest Service completed a 260 acre sagebrush regeneration project in 1979 approximately one-half mile from the eastern boundary of the proposed Black Ridge project area. Other fire activity in the vicinity of the project is listed in the table below.

Past Fires within the Vicinity of the Black Ridge Proposed Project Area*				
Year	**Fire Name**	**Type**	**Agency Lands**	**Acres**
1958	Carpenter Canyon	Wildland Fire	USFS	40
1958	Slaughter Flats	Wildland Fire	USFS	14
1976	Amasas Back	Wildland Fire	USFS	24
1976	Carpenter Basin	Wildland Fire	USFS	49
1979	Slaughter Flat Prescribed Fire	Sagebrush Regeneration	USFS	266
2007	Pole Canyon	Wildland Fire	USFS	27

*Between the years of 1980 and 2006 there were approximately **35 small fires** on BLM lands within the proposed project area and approximately **45 small fires** surrounding the perimeter of the proposed project area on public and/or private lands.

These fire and fuels activities are within the larger watershed hydrologic unit that includes Black Ridge. Fuels and restoration treatments and wildland fire combined could impact the watershed over the next few decades. With the exception of severe, high-intensity wildland fire, impacts from the combined treatments and small-acreage fires would be expected to be beneficial because of an expected overall decrease in soil erosion, an increase in ground cover, and other factors as discussed in Chapter 4.

5.0 CONSULTATION AND COORDINATION

5.1 Introduction

The issue identification section of Chapter 1 identifies those issues analyzed in detail in Chapter 4. Appendix A provides the rationale for issues that were considered but not analyzed further. The issues were identified through the public and agency involvement process described in sections 5.2 and 5.3 below.

5.2 Persons, Groups, and Agencies Consulted

Scoping, which is an early process for determining issues to be addressed, also helps to identify the issues that are not relevant or that have been reviewed in other environmental documents. Issues analyzed in detail in Chapter 4 were identified through resource staff and cooperating agency involvement.

A notification of the preparation of this environmental assessment was listed on May 1, 2009, on the BLM State Office Environmental Notification Bulletin Board at https://www.blm.gov/ut/enbb/.

The Utah Association of Conservation Districts formally organized the UPCD to strengthen coordination efforts and to link state and federal financial and technical resources in the implementation of conservation practices significant to watersheds, shrub-steppe ecosystems, endangered species, and others. The UPCD has prioritized potential projects, prepared conservation plans, and obtained federal, state, and private dollars to implement restoration treatments and maximize efforts to restore watershed health. The UPCD has been supportive of the goals and objectives of fuels reduction and watershed restoration proposals submitted by the Canyon Country Fire Zone over the past several years. The Black Ridge proposal was submitted to the UPCD for funding assistance in both 2008 and 2009 and further requests could be forthcoming in future years if the proposed project is authorized.

A copy of any decision and the finalized EA will be mailed to the San Juan County Commission, the appropriate grazing permittee, cooperating agencies with adjacent public lands, and other interested parties.

Table 5.2.1 List of all Persons, Agencies and Organizations Consulted for the Purposes of this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions

5.3 Summary of Public Participation

Describe in greater detail than Chapter 1, the process used to involve meaningful participation by the public. Discuss the need for public comment, or if comment period is not afforded, include date of posting on ENBB, when and how scoping was conducted, dates of public meetings [if any], dates of public comment period, etc. See Chapter 2 for guidance on public involvement.)

Example: During preparation of the EA, the public was notified of the proposed action by posting on the Utah Internet Homepage on ___*date*. The process used to involve the public included_____. A public comment period was (not) offered (because….) between ___*month/date/year* and ____*month/date/year*.

5.3.1 Comment Analysis

*If applicable, complete this section **after** the public comment period. Delete this section in EAs that are being released for public comment. Follow the guidance provided in the public involvement section of this Guidebook.*

5.3.2 List of Commenters

*If applicable, complete this section **after** the public comment period. Delete this section in EAs that are being released for public comment. List all individuals/entities providing comment on the EA. If appropriate, provide a succinct summary of the comments received or copies of the letters with the comments bracketed and numbered for response. Include copies of letters from state, local, and tribal governments (and agencies) and members of Congress.*

5.3.3 Response to Public Comment

If applicable, group similar/like comments under appropriate headings if numerous comments are received. See Chapter 9 of the Guidebook for guidance and examples on responding to comments.

5.4.1 BLM

Name	Title	Responsible for the Following Section(s) of this Document
Brian Keating	Fuels Program Manager, Canyon Country Fire Zone	Collaboration, project design and proposed action, technical coordination, verification of analyses content, resource consultation in mitigation development, and analyses for air quality,

		woodland/forestry, and fire/fuels resources.
Gabriel J. Bissonette	GIS Specialist	Preparation of project boundary maps, unit design, and resource maps, quality control.
Ann Marie Aubry	Hydrologist	Consultation and analyses for watershed resources (floodplains, riparian, water quality, soils).
Kim Allison	Natural Resource Specialist	Consultation and analyses for Rangeland Health and livestock resources.
Pam Riddle	Wildlife Biologist	Consultation and analyses for fish and wildlife resources.
Katie Stevens	Recreation Planner	Consultation and analyses for recreation and visual resources.
Bill Stevens	Recreation Plan	Consultation for socio-economic resources.
Rebecca Doolittle	Assistant Field Office Manager	Consultation for paleontology and minerals resources.
Daryl Trotter	Environmental Protection Specialist	Consultation for vegetation, special status plant species, and invasive/non-native plant species resources.
Kate Juenger	NEPA Coordinator, Canyon Country Fire Zone	Data compilation, research, and analysis composition.

5.4.2 Non-BLM Preparers

Name	Title	Responsible for the Following Section(s) of this Document

6.0 REFERENCES, GLOSSARY AND ACRONYMS

6.1 References Cited

Anderson, O. J., Kues, B. S., and Lucas, S. G. (editors), ―Mesozoic Geology and Paleontology of the Four Corners Region," New Mexico Geological Society Forty-Eighth Annual Field Conference, 1997.

Arno, S.F. and Fiedler, C.E., ―Mimicking Nature's Fire: Restoring Fire-prone Forests in the West," Island Press, Washington, D.C., 2005.

Arno, S.F., Ostlund, L. and Keane, R.E., ―Living Artifacts: The Ancient Ponderosa Pines of the West," Montana: The Magazine of Western History, Spring, 2008.

Arnold, J.F., Jameson, D.A. and Reid, E.H., ―The Pinyon-Juniper Type in Arizona: Effects of Grazing, Fire and Tree Control," USDA Forest Service Production Research Report 84, 1964.

Asher, J.E., Dewey, S.A., Johnson, C., and Olivarez, J., ―Reducing the Spread of Invasive Exotic Plants Following Fire in Western Forests, Deserts, and Grasslands," Tall Timbers Research Station, Tallahassee, Florida, 2001.

Baker, M.B., Jr., ―History of Watershed Research in the Central Arizona Highlands," RMRS-GTR-29, 1999.

Baker, M.B., Jr., DeBano, L.F., Ffolliott, P.F., Gottfried, G.J., ―Riparian-watershed Linkages in the Southwest," Rangeland Management and Water Resources, 1998.

Bartos, D.L., Amacher, M.C., Mueggler, W.F., ―Restoration Ecology of Disturbed Lands," USDA Forest Service Research Work Unit RMRS-4301, at http://www.fs.fed.us/rm/.ogan/4301, page created October, 1999, updated January, 2003.

Bay, R.F. and Sher, A.A., ―Success of Active Revegetation After Tamarix [sic] Removal in Riparian Ecosystems of the Southwestern United States: A Quantitative Assessment of Past Restoration Projects," Restoration Ecology, Vol. 16, 2008.

Bevis, K.R., King, G.M., and Hanson, E.E., ―Spotted Owls and 1994 Fires on the Yakima Indian Reservation," International Association of Wildland Fire, 1997.

Bissonette, Gabriel J., GIS Specialist, Canyon Country Fire Zone, Bureau of Land Management (personal contact).

Biswell, H.H., Kallander, H.R., Komarek, R., Vogl, R.J., and Weaver, H., ―Ponderosa Pine Fire Management," Tall Timbers Research Station, Tallahassee, Florida, Publication 2, 1973.

BLM TR 1737-9, ―Riparian Area Management/Process for Assessing Proper Functioning Condition," 1993

Borchers, Jeffrey G. and Perry, David A., ―Effects of Prescribed Fire on Soil Organisms," Oregon University Press, 1990.

Brockway, et al., Journal of Environmental Management, pp. 179-197, 2002.

Brooks, K.N., Ffolliott, P.F., Gregersen, H.M., DeBano, L.F., ―Hydrology and the Management of Watersheds," 2003.

Bunting, S.C., ―Prescribed Burning of Live Standing Western Juniper and Post-burning Succession," Proceedings: Western Juniper Management Short Course, Oregon State University Department of Rangeland Resources, 1984.

Bureau of Land Management, Canyon Country Fire Zone (Previously Moab Fire District), Fire Management Plan, UT-063-04-02, UT-060-2005-042, November, 2005

Bureau of Land Management, Moab Field Office, Record of Decision and Approved Resource Management Plan, October, 2008.

Bureau of Land Management, Record of Decision, Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States, Programmatic Environmental Impact Statement (PEIS), September, 2007.

Bureau of Land Management, Technical Reference 1737-9 (BLM TR 1737-9), Riparian Area Management, ―Process for Assessing Proper Functioning Condition," 1993, Revised 1995 and 1998.

Bureau of Land Management, Utah Land Use Plan Amendment for Fire and Fuels Management, UT-USO-04-01, September, 2005.

Bureau of Land Management, Utah Record of Decision, Vegetation Treatment on BLM Lands in Thirteen Western States, July, 1991.

Bureau of Land Management, Vegetation Treatments on Bureau of Land Management Lands in 17 Western States, Programmatic Environmental Report (PER), June, 2007.

Busby, G. M., ―Analyzing the Cost-Effectiveness of Hazardous Fuel Treatments on the Deschutes-Ochoco National Forest," Western Fire Ecology Center, 2002.

Canyon Country Fire Zone Fire Management Plan, USDI Bureau of Land Management, September, 2004.

Chambers, et al., ―Sagebrush Steppe and Pinyon-Juniper Ecosystems – Effects of Changing Fire Regimes, Increased Fuel Loads, and Invasive Species," Final Report to the Joint Fire Science Program, Project #00-1-1-03, September, 2005.

Chambers, Jeanne C. and Pellant, Mike, ―Climate Change Impacts on Northwestern and Intermountain United States Rangelands," Society of Range Management, June, 2008.

Cooper, C. F., ―Changes in Vegetation, Structure, and Growth of Southwestern Pine Forests since White Settlement, Ecological Monographs, 1960.

Cox, H.L., Morton, H.L., Johnson, Jr., T.N., Jordan, G.L., Martin, S.C., and Fleo, L.C., ―Vegetation Restoration in the Chihuahuan and Sonoran Deserts of North America," USDA Resource Service, Washington, D.C., 1982.

Daubenmire, R., ―Plant Succession on Abandoned Fields, and Fire Influences in a Steppe Area in Southeastern Washington," Northwest Science, 1975.

DeBano, L.F., Neary, D.G., and Ffolliott, P.F., ―Fire: Its Effect on Soil and Other Ecosystem Resources," John Wiley and Sons, Inc., New York, NY, 1998.

Dennis, F.C. and Sturtevant, B., ―Forest Restoration Guidelines in Ponderosa Pine on the Front Range of Colorado," 2007.
(http://www.cfri.colostate.edu/docs/ForestRestorationGuidelines_021507.pdf)

Dombeck, M. P., Williams, J.E., and Wood, C.A., ―Wildfire Policy and Public Lands: Integrating Scientific Understanding with Social Concerns across Landscapes," Conservation Biology, pages 883-889, Volume 18, No. 4, August, 2004.

Edminster, C.B., Weatherspoon, C.P., and Neary, D.G., ―The Fire and Fire Surrogates Study: Providing Guidelines for Fire in Future Forest Watershed Management Decisions," in Land Stewardship in the 21st Century: The Contributions of Watershed Management, USDA Forest Service, Rocky Mountain Research Station, RMRS-P-13, 2000.

Fernandes, P.M., and Botelho, H.S., ―A Review of Prescribed Burning Effectiveness in Fire Hazard Reduction," International Journal of Wildland Fire, 2003.

Ffolliott, P.F., ―Guidelines for Managing Wildlife Habitats in Southwestern Ponderosa Pine Forests of the United States," Journal of Forestry Research, 1997.

Finney, M.A. ―Calculating Fire Spread Rates Across Random Landscapes," International Journal of Wildland Fire, 2003.

Fire Science Digest, Issue 3, ―Big Changes in the Great Basin," June, 2008.

Fowler, J.M. and Witte, J.M., ―Growth Characteristics and Thinning Response for the Pinyon-Juniper Woodland Type in New Mexico," in Proceedings of the Pinyon-Juniper Conference, USDA Forest Service Intermountain Research Station GTR-INT-215, 1987.

GAO/RCED-99-65, ―Western National Forests – A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats," Report to the Subcommittee on Forests and Forest Health, Committee on Resources, House of Representatives, April, 1999.

Gloyn, R.W., Morgan, C.D., Tabet, D.E., Blackett, R.E., Tripp, B.T., and Lowe, M., ―Mineral, Energy, and Ground Water Resources of San Juan County, Utah," Utah Geological Survey, 1995.

Grace, J.B., Smith, M.D., Grace, S.L., Collins, S.L., and Stohlgren, T.J., ―Interactions Between Fire and Invasive Plants in Temperate Grasslands of North America," Tall Timbers Research Station, Tallahassee, Florida, 2001.

Graham, R.T., Harvey, A.E., Jain, T.B., and Tonn, J.R., ―The Effects of Thinning and Similar Stands Treatments on Fire Behavior in Western Forests," USDA Forest Service Pacific Northwest Research Station, PNW-GTR-463, 1999.

Gray, S.T., Betancourt, J.L., Fastie, C.L. and Jackson, S.T., ―Patterns and Sources of Multidecadal Oscillations in Drought Sensitive Tree-ring Records from the Central and Southern Rocky Mountains," Geophysical Research Letters, 2003.

Hann, W.J. and Bunnell, D.L., ―Fire and Land Management Planning and Implementation Across Multiple Scales," International Journal of Wildland Fire, 10:389-403, 2001.

Hobbs, N. T., and Spowart, R. A., "Effects of Prescribed Fire on Nutrition of Mountain Sheep and Mule Deer During Winter and Spring," Journal of Wildlife Management, 1984.

Hunter, M.E., Shepperd, W.D., Lentile, L.B., Lundquist, J.E., Andreu, M.G., Butler, J.L., and Smith, F.W.; "A Comprehensive Guide to Fuels Treatment Practices for Ponderosa Pine in the Black Hills, Colorado Front Range, and Southwest," USDA Rocky Mountain Research Station, RMRS-GTR-198, September, 2007.

Johnson, H.S., and Thordarson, W., "The Elk Ridge-White Canyon Channel System, San Juan County, Utah: Its Effects on Uranium Distribution," Economic Geology, 1959.

Kay, C.E., "Are Ecosystems Structured from the Top-down or Bottom-up? A New Look at an Old Debate," Wildlife Society Bulletin, 1998.

Keith, J.O., "The Abert Squirrel and Its Dependence on Ponderosa Pine," Ecology, pp. 150-163, 1965.

Klopatek, C.C., Debano, L.F., and Klopattek, J.M., "Effects of Simulated Fire on Vesicular-Arbuscular Mycorrhizae in Pinyon-Juniper Woodland Soil," Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Lab., USDA Forest Service, September, 1987.

Knudson, Tom, The Sacramento Bee, Sept. 21, 2008. (http://www.sacbee.com/sierrawarming/v-print/story/1253187.html)

Komarek, E.V., Sr., "Fire and Animal Behavior," Proceedings: Ninth Annual Tall Timbers Fire Ecology Conference, Tall Timbers Research Station, Tallahassee, Florida, 1969.

Martinson, E.J., and Omi, P.N., "Performance of Fuel Treatments Subjected to Wildfires," USDA Forest Service Proceedings, RMRS-P-29, 2003.

Miller, R.F., Bates, J.D., Svejcar, T.J., Pierson, F.B., Eddleman, L.E., "Biology, Ecology, and Management of Western Juniper," Agricultural Experiment Station, Oregon State University, 2005.

Miller, R.F. and Tausch, R.J., "The Role of Fire in Pinyon and Juniper Woodlands: A Descriptive Analysis," Fire Conference 2000: Proceedings of the Invasive Species Workshop, 2001.

Miller, R. F. and Wigand, P.E., "Holocene Changes in Semiarid Woodlands: Response to Climate, Fire and Human Activities in the US Great Basin," Bioscience, 1994.

National Sage-grouse Habitat Conservation Strategy, Bureau of Land Management, Washington, D.C., November, 2004.

Norton, G., Secretary of the Interior, ―Fire, Forests, and the Department of the Interior," http://www.doi.gov/fire/frepresentation.pdf, 2002.

O'Brien, R.A., ―Description of pinyon-juniper woodlands in Utah and Nevada from an inventory perspective," Proceedings: ecology and management of pinyon-juniper communities within the Interior west, USDA Forest Service, Rocky Mountain Research Station, 1999.

Oechel, W.C., ―Seedling Establishment and Water Relations After Fire in a Mediterranean Ecosystem," in ―The Reconstruction of Disturbed Arid Ecosystems, An Ecological Approach," Westview Press, 1988.

Ott, R., ―Factors Affecting Stream Bank and River Bank Stability, with an Emphasis on Vegetation Influences," Region III Forest Practices Riparian Management Committee, 2000.

Page, Doug, USDI Bureau of Land Management, ―Preliminary Thinning Guidelines for the Maintenance of Pinyon-Juniper Ecosystems," April, 2006.

Peterson, D.L., Raymond, C., ―How Did Prefire Treatments Affect the Biscuit Fire?" in Fire Management Today, Spring, 2005.

Plemons, Paul, Monticello Field Office Fuels Technician, Canyon Country Fire Zone, Bureau of Land Management (personal contact).

President Clinton's Clean Water Initiative, http://clinton6.nara.gov/1998/02/1998-02-19-clean-water-initiative.html.

Price, L., ―The Response of Shallow Groundwater Levels to Fuels Reduction in the Middle Rio Grande Bosque," University of New Mexico, December, 2007.

Resh, S.C., Joyce, L.A., and Ryan, M.G., ―Fuel Treatments by Mulching—A Synthesis of the Ecological Impacts," Department of Forest, Rangeland, and Watershed Stewardship, Colorado State University, 2007.

Restoring Western Ranges and Wildlands, Volume 1, September, 2004.

Rosenstock, S.S., ―Influence of Gambel Oak on Breeding Birds in Ponderosa Pine Forests of Northern Arizona," Condor, 1998.

SageSTEP News, Sagebrush Steppe Treatment Evaluation Project, Issue 6, Summer, 2008.

Sampson, A.W., and Schultz, A.M., ―Control of Brush and Undesirable Trees: IV," Unasylva, University of California School of Forestry, 2004.

Scott, J., ―Reduce Fire Hazards in Ponderosa Pine by Thinning," Fire Management Notes 58, 1998.

RMRS-RP-29, Scott, J. H. and Reinhardt, E.D., ―Assessing Crown Fire Potential by Linking Models of Surface and Crown Fire Behavior," USDA Forest Service, Rocky Mountain Research Station, 2001.

RMRS-GTR-42, ―Wildland Fire in Ecosystems: Effects of Fire on Soil and Water," USDA Forest Service, Rocky Mountain Research Station, Volume 4, 2005.

RMRS GTR-91, ―Cascading Effects of Fire Exclusion in Rocky Mountain Ecosystems," USDA Forest Service, Rocky Mountain Research Station, 2002.

RMRS-GTR-120, ―Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity," USDA Forest Service, Rocky Mountain Research Station, January, 2004.

RMRS-GTR-198, ―A Comprehensive Guide to Fuels Treatment Practices for Ponderosa Pine in the Black Hills, Colorado Front Range, and Southwest," USDA Forest Service, Rocky Mountain Research Station, September, 2007.

RMRS-GTR-136, ―Restoring Western Ranges and Wildlands, Volumes 1-3, USDA Forest Service, Rocky Mountain Research Station, September, 2004.

RMRS-GTR-202, Battaglia, M.A. and Shepperd, W.D., ―Ponderosa Pine, Mixed Conifer, and Spruce-fir Forests," USDA Forest Service, Rocky Mountain Research Station, 2007.

RMRS-GTR-202, ―Fire Ecology and Management of the Major Ecosystems of Southern Utah," USDA Forest Service, Rocky Mountain Research Station, November, 2007.

Roundy, B.A., McArthur, E.D., Haley, J.S., and Mann, D.K., ―Proceedings: Wildland Shrub and Arid Land Restoration Symposium," Gen. Tech. Rep. INT-GTR-315. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 1995.

Scott, J. H. and Reinhardt, E.D., ―Assessing Crown Fire Potential by Linking Models of Surface and Crown Fire Behavior," RMRS-RP-29, USDA Rocky Mountain Research Station, 2001.

Sharrow, Steven H., ―Interest in Carbon Farming is Growing," The Grazier, No.334, Department of Rangeland Ecology and Management, Oregon State University, October, 2008.

Smith, B., Wildlife Biologist, Manti-La Sal National Forest, USDA Forest Service, (personal contact).

Strategic Management Plan for Sage-grouse, Publication 02-20, Utah Division of Wildlife Resources, Salt Lake City, Utah, 2002.

Swetnam, T., Baisan, C., Caprio, A., and Brown, P., "Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico," USDA Forest Service, RM-218, April, 1992.

Tausch, R.J., and Hood, S., "Pinyon/Juniper Woodlands," in Fire Ecology and Management of the Major Ecosystems of Southern Utah, Chapter 4, USDA Forest Service Rocky Mountain Research Station, 2007.

Tausch, R.J., McArther, E.D., and Sanderson, S., "Woodland Expansion, Stand Dynamics and Fuel Loads in Single-needled Pinyon and Utah Juniper Woodlands," USDA Rocky Mountain Research Station, in Sagebrush Steppe and Pinyon-Juniper Ecosystems – Effects of Changing Fire Regimes, Increased Fuel Loads, and Invasive Species," Project #00-1-1-03, Final Report to the Joint Fire Science Program, September, 2005.

Thames, J.L., "Reclamation and Use of Disturbed Land in the Southwest," University of Arizona Press, 1977.

USDOI, BLM, IM-2001-079, 4180 Rangeland Health Standards Manual Section and Handbook and Guidance for Conducting Watershed-Based Land Health Assessments, January, 2001.

Utah Climate Center, http://www.utahweather.org/, 2004.

Utah Division of Wildlife Resources (UDWR), Utah Comprehensive Wildlife Conservation Strategy (aka Wildlife Action Plan or WAP), 2005.

Utah Division of Wildlife Resources (UDWR), Strategic Management Plan for Sage-grouse, Utah Division of Wildlife Resources, Salt Lake City, June, 2002.

Weaver, H., "Effects of Prescribed Burning in Ponderosa Pine," Journal of Forestry, 1957.

Weaver, H., "Fire as an Enemy, Friend, and Tool in Forest Management. Journal of Forestry, 1955.

Whisenant, S. G., "Changing Fire Frequencies on Idaho's Snake River Plains: Ecological and Management Implications," Proceedings: Symposium on Cheatgrass Invasion, Shrub Die-off, and Other Aspects of Shrub Biology and Management, INT-GTR-276, USDA Forest Service Intermountain Research Station, pp 4-10, 1989.

White, R.S., "The Impact of Utilization on Establishment of Seeded Stands of Crested Wheatgrass and Russian Wildrye," Proceedings: 38th Annual Meeting of Society for Range Management, 1985.

6.2 Glossary of Terms

Air Quality – A measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Allotment – An area of land designated and managed for grazing by livestock. An allotment may include land not suitable for livestock grazing.

Alluvium – Unconsolidated material, such as sand, silt, or clay deposited on land by running water.

Broadcast Burning – Intentional burning within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both.

Crown Fire – The movement of fire through the crowns of trees or shrubs, more or less independent from the surface fire.

Dead Fuels – Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry bulb temperature, and solar radiation.

Drip Torch – Hand-held device for igniting fires by dripping flaming liquid fuel on the materials to be burned; consists of a fuel fount, burner arm, and igniter. Fuel used is generally a mixture of diesel and gasoline.

Endangered Species – Any animal or plant species in danger of extinction throughout all of a significant portion of its range. These species are listed by the U. S. Fish and Wildlife Service.

Escaped Fire – As determined by the person in charge of the fire, a fire which has exceeded attack actions or established conditions within a prescribed fire plan.

Fire Management Plan – An activity plan developed to support and accomplish resource management objectives and applicable land use decisions authorized in BLM Resource Management Plans.

Forbs – A plant with a soft, rather than permanent woody stem that is not a grass or grass-like plant.

Fuel Moisture – The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Grazing Permit – An authorization which allows grazing on public lands. Permits specify class of livestock on a designated area during specified seasons each year. Permits are of two types: preference (10 year) and temporary nonrenewable (1 year).

Integrated Pest Management – Management practices that control and eradication noxious weed infestations such as Prevention, Chemical (herbicides), Biological Control, Mechanical, Controlled Burning, Grazing and Revegetation.

Ladder Fuels – Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. Ladder fuels instigate and advance crowning.

Mechanical Treatment – The employment of equipment such as mowers or masticators as the primary method of modifying or removing fuels.

Mitigation – Constraints, requirements, actions, or conditions to reduce the significance of or eliminate an anticipated impact to environmental, socioeconomic, or other resource values from a proposed project or land use.

Rangeland – Land on which the native vegetation is predominantly grasses, grass-like plants, forbs or shrubs suitable for grazing or browsing use. Includes lands revegetated naturally or artificially to provide forage cover managed like native vegetation.

Resource Management Plan (RMP) – A document prepared by field office staff with public participation and approved by management that provides general guidance and direction for land management activities at a field office. An RMP may identify the need for fire in a particular area and for a specific benefit.

Revegetation – The reestablishment or improvement of vegetation through management practices or chemical or mechanical means.

Shaded Fuel Break – A wide strip or block of land on which the vegetation has been modified so that fires burning into it may be more readily suppressed.

Slope – The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Special Status Species – Wildlife and plant species either federally listed or proposed for listing as endangered or threatened; state-listed or BLM determined priority species.

Surface fuels – Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not decayed. Surface fuels can also consist of grasses, forbs, low and medium shrubs, tree seedlings, heavier branch-wood, downed logs and stumps, and/or debris from a "lop and scatter" treatment.

Threatened Species - Any animal or plant species likely to become endangered within the foreseeable future throughout a significant portion of its range. These species are officially listed by the U. S. Fish and Wildlife Service.

Treatment – A technique or action customarily applied to improve a damaged or deteriorated area through management action such as vegetation establishment (seeding, planting, etc.), restricted use, or resource manipulation (i.e. livestock, wildlife, fire, mechanical, recreation, etc.)

Uncontrolled Fire – Any fire which threatens to destroy life, property, or natural resources.

Vegetation Treatment – Fire vegetation and fuel load treatments generally entail reducing the quantity of the fuel load to impede fire's ability to pass through the habitat. Continuity is often ―rearranged" vertically or horizontally; firebreaks or shaded fuel breaks are created in some treatments, or fuels are cut and burned on site and/or removed.

Visual Resource Management (VRM) Classes - Management classes are determined on the basis of overall scenic quality, distance from travel routes, and sensitivity to change.

Wildland Fire – Any naturally-ignited, non-structure fire other than prescribed fire.

Wildland-Urban Interface - Lands on which buildings, homes, and other structures of human development are adjacent to or directly intermingling with undeveloped wildland or other fuel sources.

6.3 List of Acronyms Used in this EA

ACEC – Areas of Critical Environmental Concern

AMP – Allotment Management Plan

ARS – Agricultural Research Station (USDA)

AQRV - Air Quality Related Values

ATV – All-Terrain Vehicle

AUM – Animal Unit Month

BCC – Birds of Conservation Concern

BIA – Bureau of Indian Affairs

BLM - Bureau of Land Management

BSC – Biological Soil Crust

CWCS – Comprehensive Wildlife Conservation Strategy (Utah)

DAQ - Utah State Division of Air Quality, a division of the Utah State Department of Environmental Quality

DFC – Desired Future Condition

DR - Decision Record

DWFC – Desired Wildland Fire Condition

EA - Environmental Assessment

EIS - Environmental Impact Statement

EPA – Environmental Protection Agency

ESA – Endangered Species Act

FLPMA - Federal Land Policy and Management Act of 1976, as amended (43 U.S.C. 1701 et seq.)

FMP – Fire Management Plan

FMU – Fire Management Unit

FONSI - Finding of No Significant Impact

FRCC – Fire Regime and Condition Class

HFI - Healthy Forests Initiative

HFRA - Healthy Forests Restoration Act of 2003

HLI – Healthy Lands Initiative

HUC – Hydrologic Unit Classification

KOP – Key Observation Point

LUP – Land Use Plan as in the Utah Land Use Plan Amendment for Fire and Fuels

MMA – Maximum Manageable Area

MOU - Memorandum of Understanding

MSO - Mexican Spotted Owl

NAAQS - National Ambient Air Quality Standards

NEPA - National Environmental Policy Act

NFP - National Fire Plan

NHPA – National Historic Preservation Act of 1966

NWTF – National Wild Turkey Federation

OHV – Off-Highway Vehicle

PEIS – Programmatic Environmental Impact Statement

PER – Programmatic Environmental Report

PFYC - Potential Fossil Yield Classification

ROD – Record of Decision

SDI – Stand Density Index

SHPO – State Historic Preservation Office

SMP – Smoke Management Plan (Utah)

SOP - Standard Operation Procedure

SWFL – Southwestern Willow Flycatcher

T&E – Threatened and Endangered

TMDL – Total Maximum Daily Loads (Water Volume)

UC – University of Colorado

UDAQ – Utah Division of Air Quality

UDWR – Utah Division of Wildlife Resources

UDWQ – Utah Division of Water Quality

UFFSL – Utah Forestry, Fire and State Lands

UPCD – Utah Partners for Conservation and Development/Watershed Restoration Initiative

UPIF – Utah Partners in Flight

USDA – United States Department of Agriculture

USFS – United States Forest Service

USGS – United States Geologic Survey

VRM - Visual Resource Management [Rating System]

WAP – Wildlife Action Plan

WUI - Wildland/Urban Interface

WRI – Watershed Restoration Initiative (Utah)

APPENDICES

APPENDIX A

Interdisciplinary Team Analysis Record Checklist

INTERDISCIPLINARY TEAM ANALYSIS RECORD CHECKLIST

Project Title: **Black Ridge - Fuels Reduction for Vegetative Restoration and Resource Protection**

NEPA Log Number: **DOI-BLM-UT-060-2009-0092EA**

Project Leader: Brian Keating

DETERMINATION OF STAFF: (Choose one of the following abbreviated options for the left column)

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for significant impact analyzed in detail in the EA; or identified in a DNA as requiring further analysis
NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section C of the DNA form.

Determination	Resource	Rationale for Determination	Signature	Date
		CRITICAL ELEMENTS		
NI	Air Quality	any burning will be conducted according to Utah State Air Quality requirements	Am Arbry	3/16/09
NP	Areas of Critical Environmental Concern		K Stevens	3.16.09
NI	Cultural Resources	AVOID - NO EFFECT	Ed Maloney	3/25/09
NP	Environmental Justice		Myron Koch	03/16/09
NP	Farmlands (Prime or Unique)	see discussion in EA	K Stevens	3/16/09
~~PI~~	Floodplains	~~no equipment working in flood plains, acts would involve hand cutting + thinning only~~	Am Arbry	3.16.09
PI	Invasive, Non-native Species	removal of vegetation has potential to spread invasive species	D Trotter	3-25-09
NI	Native American Religious Concerns	NO EFFECT	Ed Maloney	3/25/09
NI	Threatened, Endangered or Candidate Plant Species	If known to be in treatment area they will be avoided. Based on past inventories none in area.	D Trotter	3-25-09
~~PI~~	Threatened, Endangered or Candidate Animal Species	Suitable USO habitat Bac	[illegible]	4-19-09
NP	Wastes (hazardous or solid)		Myron Koch	03/16/09
PI	Water Quality (drinking/ground)	Browns Hole residents drink water from spgs + cks; these sources need to be protected as well as upstream drainages	Am Arbry	3.16.09
PI ~~NP~~	Wetlands/Riparian Zones	there are several healthy riparian areas in the project area.	Am Arbry ~~D Trotter~~	3-26-09 ~~3-25-09~~
~~NP~~ NP	Wild and Scenic Rivers		K Stevens	3.16.09

Recreation; would improve hunting opportunities.
* would help in implementing designated rte. system.

Determination	Resource	Rationale for Determination	Signature	Date
NP	Wilderness		D Stevens	3.16.09
		OTHER RESOURCES / CONCERNS		
PI	Rangeland Health Standards and Guidelines	Impacts to permittee by temporary closures but will benefit in long run	Kim Allen	3/16/09
PI	Livestock Grazing	may help to improve areas that are not meeting S&G. Info provided in EA	Kim Allen	3/16/09
PI	Woodland / Forestry	Proposed action will help return PJ woodlands to healthy and functional levels. Opportunities for utilization such as firewood, Christmas trees, nut gathering should be considered.	B. K	3/25/09
PI NP	Vegetation including Special Status Plant Species other than FWS candidate or listed species	Impacts to PJ, sage brush to improve watershed + improve veg. cover	D Stotler	4-20-09
PI	Fish and Wildlife Including Special Status Species other than FWS candidate or listed species e.g. Migratory birds.	Deer + Elk winter range, migratory birds + raptors habitat, Turkey habitat	[illegible]	4-19-09
PI	Soils	impacts over the long term are positive & will improve overall watershed + soil conditions	Am Avery	3.16.09
PI	* see above Recreation	- short term impacts include soil compaction, increased erosion ~~are~~ can be minimized by avoiding wet soil conditions + steep slopes	K Stevens	3.16.09
PI	Visual Resources	impacts in the long term are positive. The area is combination of VRM II & III see write up	[illegible]	3/26/09
NI	Geology / Mineral Resources/Energy Production	We have an exploration notice to check out 5 previously drilled holes for testing for uranium. Location is SWNENE, Sec 8 T 28 S R 23 E + NWSENE-Sec	R Dodd	4/20/2009
NI	Paleontology	Paleo. Resources may be present, but due to soil cover, resources should not be impacted	R. Dodd	4/20/2009
NP	Lands / Access	use designated access roads	Morn Koch	03/16/09
PI	Fuels / Fire Management	Reduction of over stocked pinyon juniper woodlands chaining slash and PJ encroachment in sagebrush areas would restore ecological processes and reduce the threat of a catastrophic wildfire to WUI and non-WUI areas	B. K	3/25/09
PI	Socio-economics	S/B Positive - info provided	W Stevens	3-16-09
NP	Wild Horses and Burros			
NP	Wilderness characteristics		D Stevens	3.16.09

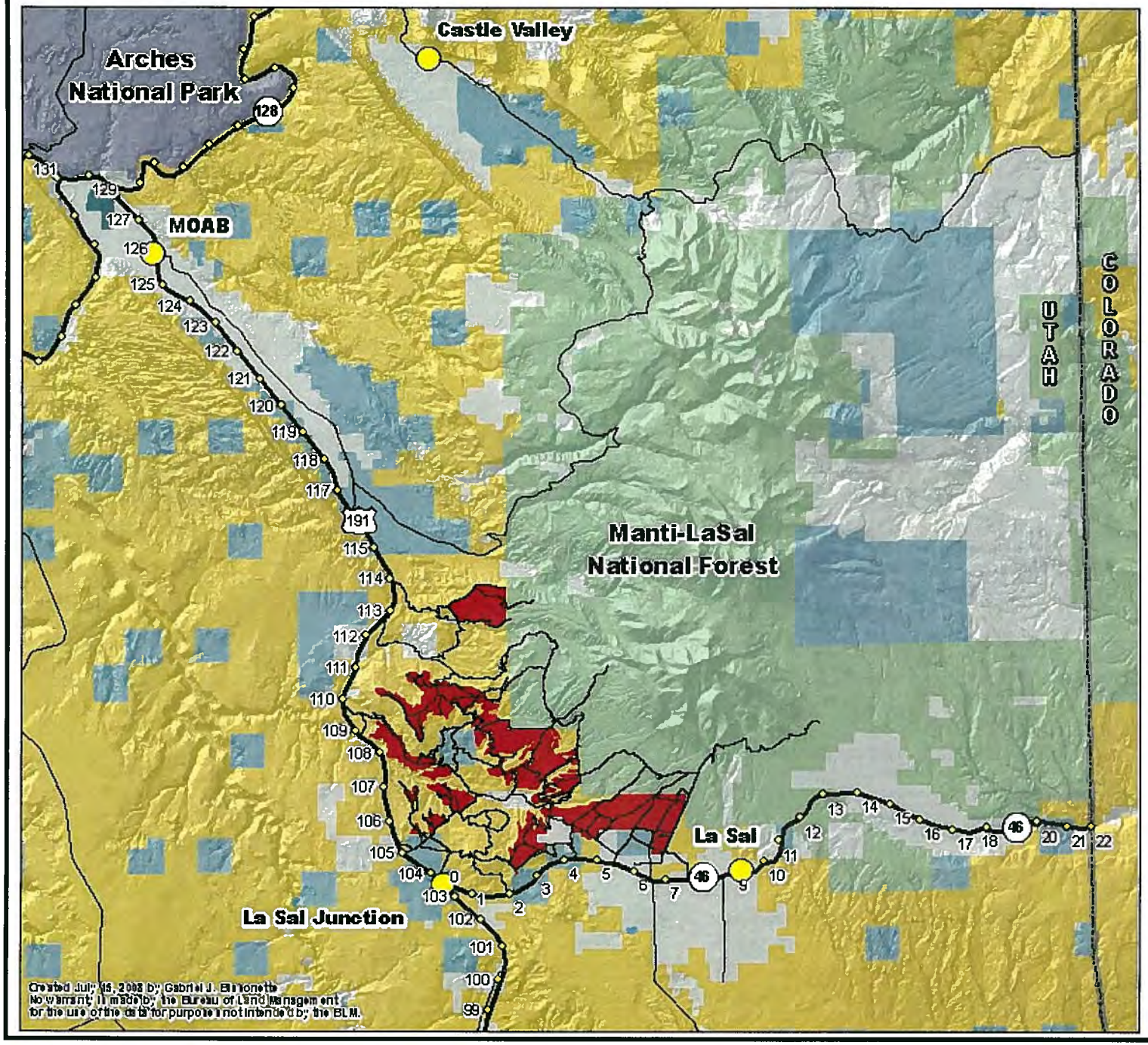
FINAL REVIEW:

Reviewer Title	Signature	Date	Comments
NEPA / Environmental Coordinator	Kate Kenger	5/1/09	
Authorized Officer	[illegible]	1/22/10	

APPENDIX B
Locality Map
Project Map

Black Ridge Project Area (2008)

Vicinity Map



State of Utah
1:250,000

0 1.25 2.5 5 Miles

N

Legend

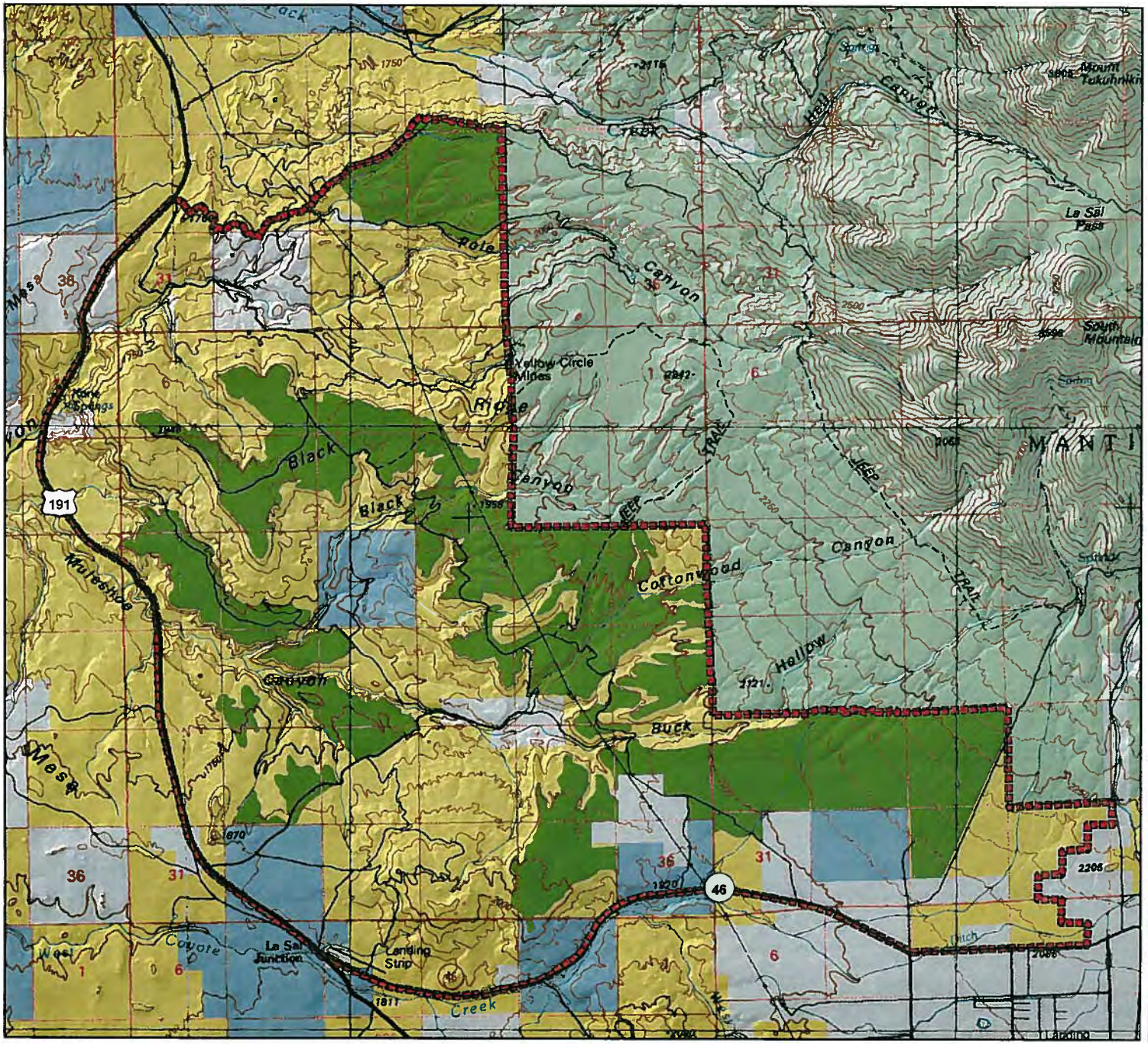
- Mile Marker
- City Locations
- Black Ridge Treatment Units
- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- State
- Private

Black Ridge Proposed Project Area (30,107 Acres)

State of Utah
1:90,000

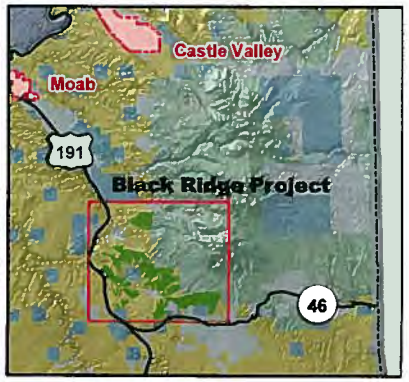
Miles
0 1 2

Created April 16, 2009
Gabriel J. Bissonette



LEGEND

- Municipality
- Phase I Units (9,080 Acres)
- Black Ridge Proposed Project Area
- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- State



APPENDIX C

Standard Operating Procedures (SOPs)
Mitigation Measures for Herbicide Treatment

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES

This section identifies standard operating procedures (SOPs) that will be followed by the U.S. Department of the Interior Bureau of Land Management (USDI BLM) under all alternatives to ensure that risks to human health and the environment from herbicide treatment actions will be kept to a minimum. Standard operating procedures are the management controls and performance standards required for vegetation management treatments. These practices are intended to protect and enhance natural resources that could be affected by future vegetation treatments.

Prevention of Weeds and Early Detection and Rapid Response

Once weed populations become established, infestations can increase and expand in size. Weeds colonize highly disturbed ground and invade plant communities that have been degraded, but are also capable of invading intact communities. Therefore, prevention, early detection, and rapid response are the most cost-effective methods of weed control. Prevention, early detection, and rapid response strategies that reduce the need for vegetative treatments for noxious weeds should lead to a reduction in the number of acres treated using herbicides in the future by reducing or preventing weed establishment.

As stated in the BLM's *Partners Against Weeds: An Action Plan for the BLM*, prevention and public education are the highest priority weed management activities. Priorities are as follows:

- Priority 1: Take actions to prevent or minimize the need for vegetation control when and where feasible, considering the management objectives of the site.
- Priority 2: Use effective nonchemical methods of vegetation control when and where feasible.
- Priority 3: Use herbicides after considering the effectiveness of all potential methods or in combination with other methods or controls.

Prevention is best accomplished by ensuring the seeds and vegetatively reproductive plant parts of new weed species are not introduced into new areas.

The BLM is required to develop a noxious weed risk assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists. If the risk is moderate or high, the BLM may modify the project to reduce the likelihood of weeds infesting the site, and to identify control measures to be implemented if weeds do infest the site.

To prevent the spread of weeds, the BLM takes actions to minimize the amount of existing non-target vegetation that is disturbed or destroyed during project or vegetation treatment actions (Table B-1). During project planning, the following steps are taken:

- Incorporate measures to prevent introduction or spread of weeds into project layout, design, alternative evaluation, and project decisions.
- During environmental analysis for projects and maintenance programs, assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.
- Determine prevention and maintenance needs, to include the use of herbicides if needed, at the onset of project planning.
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

During project development, weed infestations are prioritized for treatment in project operating areas and along access routes. Weeds present on or near the site are identified, a risk assessment is completed, and weeds are controlled as necessary. Project staging areas are weed free, and travel through weed infested areas is avoided or minimized. Examples of prevention actions to be followed during project activities include cleaning all equipment and clothing before entering the project site; avoiding soil disturbance and the creation of other

soil conditions that promote weed germination and establishment; and using weed-free seed, hay, mulch, gravel, soil, and mineral materials on public lands where there is a state or county program in place.

Conditions that enhance invasive species abundance should be addressed when developing mitigation and prevention plans for activities on public lands. These conditions include excessive disturbance associated with road maintenance, poor grazing management, and high levels of recreational use. If livestock grazing is managed to maintain the vigor of native perennial plants, particularly grasses, the chance of weeds invading rangeland is much less. By carefully managing recreational use and educating the public on the potential impacts of recreational activities on vegetation, the amount of damage to native vegetation and soil can be minimized at high use areas, such as campgrounds and off-highway vehicle (OHV) trails. Early detection in recreation areas is focused on roads and trails, where much of the weed spread occurs.

The BLM participates in the National Early Warning and Rapid Response System for Invasive Plants (Figure B-1). The goal of this System to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes by:

- Early detection and reporting of suspected new plant species to appropriate officials;
- Identification and vouchering of submitted specimens by designated specialists;
- Verification of suspected new state, regional, and national plant records;
- Archival of new records in designated regional and plant databases;
- Rapid assessment of confirmed new records; and
- Rapid response to verified new infestations that are determined to be invasive.

Herbicide Treatment Planning

BLM Manual 9011 (*Chemical Pest Control*) outlines the policies, and BLM Handbook H-9011-1 (*Chemical Pest Control*) outlines the procedures, for use of herbicides on public lands. As part of policy, the BLM is required to thoroughly evaluate the need for chemical treatments and their potential for impact on the environment. The BLM is required to use only U.S. Environmental Protection Agency (USEPA)-registered herbicides that have been properly evaluated under National Environmental Policy Act (NEPA), and to carefully follow label directions and additional BLM requirements.

An operational plan is developed and updated for each herbicide project. The plan includes information on project specifications, key personnel responsibilities, and communication, safety, spill response, and emergency procedures. For application of herbicides not approved for aquatic use, the plan should also specify minimum buffer widths between treatment areas and water bodies. Recommended widths are provided in BLM Handbook H-9011-1 (*Chemical Pest Control*), but actual buffers are site and herbicide active ingredient specific, and are determined based on a scientific analysis of environmental factors, such as climate, topography, vegetation, and weather; timing and method of application; and herbicide risks to humans and non-target species. Table B-2 summarizes important SOPs that should be used when applying herbicides to help protect resources of concern on public lands.

Revegetation

Disturbed areas may be reseeded or planted with desirable vegetation when the native plant community cannot recover and occupy the site sufficiently.

Determining the need for revegetation is an integral part of developing a vegetation treatment. The most important component of the process is determining whether active (seeding/planting) or passive (natural recovery) revegetation is appropriate.

U.S. Department of the Interior policy states, "Natural recovery by native plant species is preferable to planting or seeding, either of natives or non-natives. However, planting or seeding should be used only if necessary to prevent unacceptable erosion or resist competition from non-native invasive species" (620 Departmental Memorandum 3 2004). This policy is reiterated in the USDI *Burned Area Emergency Stabilization and Rehabilitation* Manual, the BLM *Burned Area Emergency Stabilization and Rehabilitation* Manual (BLM H-1742-1), and the *Interagency Burned Area Rehabilitation Guidebook.*

TABLE B-1
Prevention Measures

BLM Activity	Prevention Measure
Project Planning	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds. • Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning. • Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes. • Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations. • Pre-treat high-risk sites for weed establishment and spread before implementing projects. • Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. • Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.
Project Development	• Minimize soil disturbance to the extent practical, consistent with project objectives. • Avoid creating soil conditions that promote weed germination and establishment. • To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives. • Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely. • Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material. • Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material. • Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled. • Prevent weed establishment by not driving through weed-infested areas. • Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area. • Avoid acquiring water for dust abatement where access to the water is through weed-infested sites. • Identify sites where equipment can be cleaned. Clean equipment before entering public lands. • Clean all equipment before leaving the project site if operating in areas infested with weeds. • Inspect and treat weeds that establish at equipment cleaning sites. • Ensure that rental equipment is free of weed seed. • Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Revegetation	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans. • Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation. • To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques. • Maintain stockpiled, uninfested material in a weed-free condition.

TABLE B-1 (Cont.)
Prevention Measures

BLM Activity	Prevention Measure
Revegetation (Cont.)	• Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. • Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings). • Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules. • Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project. • Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. • Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines). • Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way (ROW), and other areas of disturbed soils.

In addition to these handbooks and policy, use of native and non-native seed in revegetation and restoration is guided by BLM Manual 1745 (*Introduction, Transplant, Augmentation and Reestablishment of Fish, Wildlife and Plants*). This manual states that native species shall be used, unless it is determined through the NEPA process that: 1) suitable native species are not available; 2) the natural biological diversity of the proposed management area will not be diminished; 3) exotic and naturalized species can be confined within the proposed management area; 4) analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment; or 5) resource management objectives cannot be met with native species.

When natural recovery is not feasible, revegetation can be used to stabilize and restore vegetation on disturbed sites and to eliminate or reduce the conditions that favor invasive species. Reseeding or replanting may be required when there is insufficient vegetation or seed stores to naturally revegetate the site.

To ensure revegetation success, there must be adequate soil for root development and moisture storage, which provides moisture to support the new plants. Chances for revegetation success are improved by selecting seed with high purity and percentage germination; selecting native species or cultivars adapted to the area; planting at proper depth, seeding rate, and time of the year for the region; choosing the appropriate planting method; and, where feasible, removing competing vegetation. Planting mixtures are adapted for the treatment area and site uses. A combination of forbs, perennial grasses, and shrubs is typically used on rangeland sites, while shrubs and trees might be favored for riparian and forestland sites. A mixture of several native plant species and types or functional groups enhances the value of the site for fish and wildlife and improves the health and aesthetic character of the site. Mixtures can better take advantage of variable soil, terrain, and climatic conditions, and thus are more likely to withstand insect infestations and survive adverse climatic conditions.

The USDI BLM Native Seed program was developed in response to Congressional direction to supply native plant material for emergency stabilization and longer-term rehabilitation and restoration efforts. The focus of the program is to increase the number of native plant species for which seed is available and the total amount of native seed available for these efforts. To date, the program has focused on native plant material needs of emergency stabilization and burned area rehabilitation in the Great Basin, but is expanding to focus on areas such as western Oregon, the Colorado Plateau, and most recently the Mojave Desert. The Wildland Fire Management Program funds and manages the effort.

The National Seed Warehouse is a storage facility for the native seed supply. Through a Memorandum of

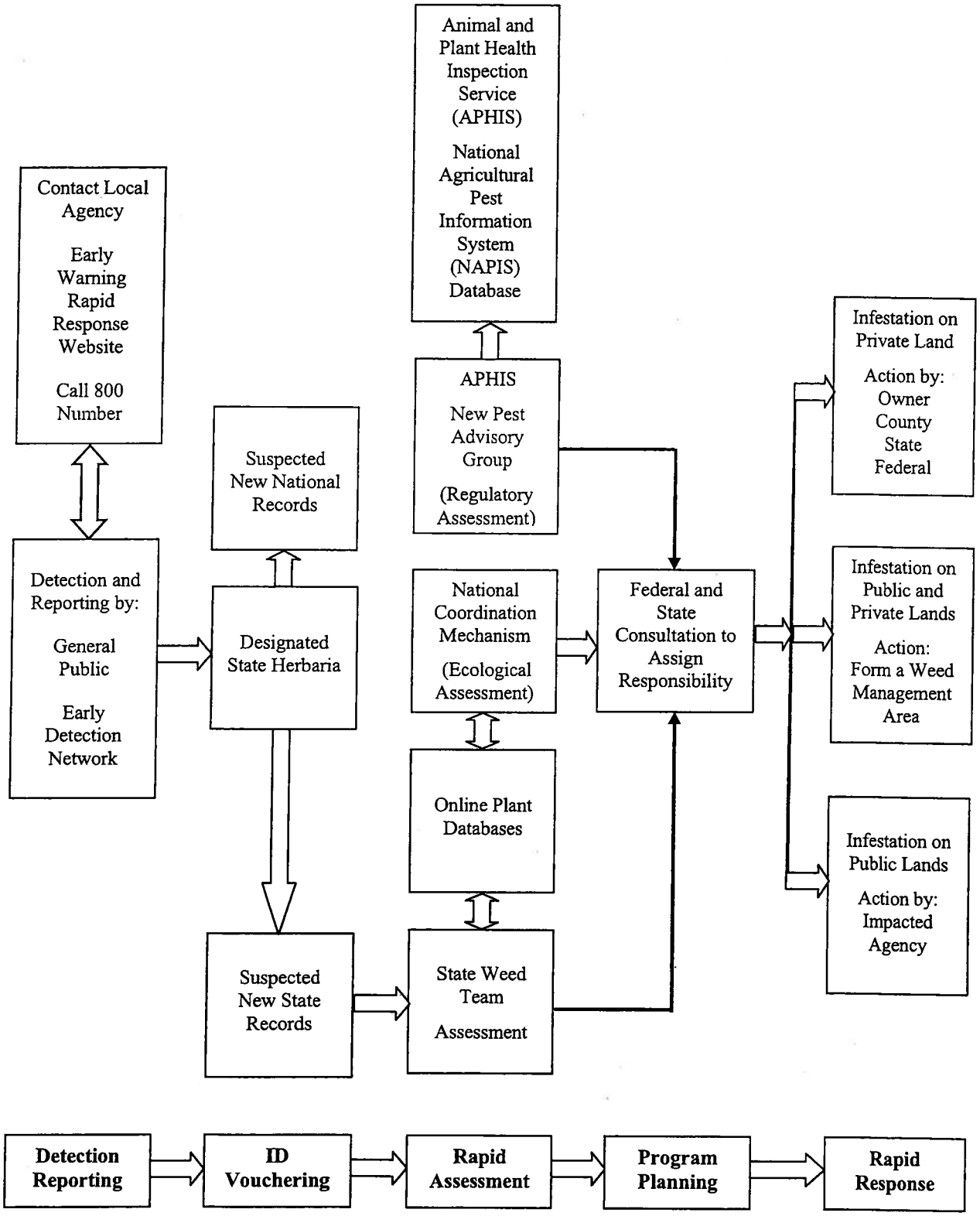


Figure B-1. National Early Warning and Rapid Response System for Invasive Plants.

Understanding with the BLM Idaho State Director, each state (Idaho, Oregon, Nevada, Utah and Colorado) can reserve an annual seed supply for purchase based on a reasonable projection of annual acreage to be stabilized or rehabilitated over a 5-year period.

The Great Basin Restoration Initiative (GBRI) grew out of concern for the health of the Great Basin after the wildfires of 1999. The goal of GBRI is to implement treatments and strategies to maintain functioning ecosystems and to proactively restore degraded ones at strategic locations. Native plants are emphasized in restoration projects where their use is practical and the potential for success is satisfactory. Monitoring is recommended to measure treatment success. To increase the availability of native plants, especially native forbs, the GBRI has established a collaborative native plant project, the Great Basin Native Plant Selection and Increase Project, to increase native plant availability and the technology to successfully establish these plants. This project is supported by funding from the BLM's Native Plant Initiative.

The BLM will follow the following SOPs when revegetating sites:

- Cultivate previously disturbed sites to reduce the amount of weed seeds in the soil seedbank.
- Revegetate sites once work is completed or soon after a disturbance.
- When available, use native seed of known origin as labeled by state seed certification programs.
- Use seed of non-native cultivars and species only when locally adapted native seed is not available or when it is unlikely to establish quickly enough to prevent soil erosion or weed establishment.
- Use seed that is free of noxious and invasive weeds, as determined and documented by a seed inspection test by a certified seed laboratory.
- Limit nitrogen fertilizer applications that favor annual grass growth over forb growth in newly seeded areas, especially where downy brome (cheatgrass) and other invasive annuals are establishing.
- Use clean equipment, free of plants and plant parts, on revegetation projects to prevent the inadvertent introduction of weeds into the site.
- Where important pollinator resources exist, include native nectar and pollen producing plants in the seed mixes used in restoration and reclamation projects. Include non-forage plant species in seed mixes for their pollinator/host relationships as foraging, nesting, or shelter species. Choose native plant species over manipulated cultivars, especially of forbs and shrubs, since natives tend to have more valuable pollen and nectar resources than cultivars. Ensure that bloom times for the flowers of the species chosen match the activity times for the pollinators. Maintain sufficient litter on the soil surfaces of native plant communities for ground-nesting bees.
- Where feasible, avoid grazing by domestic and wild animals on treatment sites until vegetation is well established. Where total rest from grazing is not feasible, efforts should be made to modify the amount and/or season of grazing to promote vegetation recovery within the treatment area. Reductions in grazing animal numbers, permanent or temporary fencing, changes in grazing rotation, and identification of alternative forage sources are examples of methods that could be used to remove, reduce or modify grazing impacts during vegetation recovery.

Special Precautions

Special Status Species

Federal policies and procedures for protecting federally-listed threatened and endangered plant and animal species, and species proposed for listing, were established by the Endangered Species Act of 1973 and regulations issued pursuant to the Act. The purposes of the Act are to provide mechanisms for the conservation of threatened and endangered species and their habitats. Under the Act, the Secretary of the Interior is required to determine which species are threatened or endangered and to issue recovery plans for those species.

Section 7 of the Act specifically requires all federal agencies to use their authorities in furtherance of the Act to carry out programs for the conservation of listed

species, and to ensure that no agency action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. Policy and guidance (BLM Manual 6840; *Special Status Species*) also stipulates that species proposed for listing must be managed at the same level of protection as listed species.

The BLM state directors may designate special status in cooperation with their respective state. These special status species must receive, at a minimum, the same level of protection as federal candidate species. The BLM will also carry out management for the conservation of state-listed species, and state laws protecting these species will apply to all BLM programs and actions to the extent that they are consistent with Federal Land Policy and Management Act (FLPMA) and other federal laws.

The BLM consulted with the U.S. Fish and Wildlife Service (UFWS) and National Marine Fisheries Service (NMFS) during development of the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) as required under Section 7 of the Endangered Species Act. As part of this process, the BLM prepared a formal consultation package that included a description of the program; species listed as threatened or endangered, species proposed for listing, and critical habitats that could be affected by the program; and a Biological Assessment (BA) that evaluated the likely impacts to listed species, species proposed for listing, and critical habitats from the proposed vegetation treatment program. Over 300 species were evaluated in the BA. The BA also provides broad guidance at a programmatic level for actions that will be taken by the BLM to avoid adversely impacting species or critical habitat.

Before any vegetation treatment or ground disturbance occurs, BLM policy requires a survey of the project site for species listed or proposed for listing, or special status species. This is done by a qualified biologist and/or botanist who consults the state and local databases and visits the site at the appropriate season. If a proposed project may affect a proposed or listed species or its critical habitat, the BLM consults with the USFWS and/or NMFS. A project with a "may affect, likely to adversely affect" determination requires formal consultation and receives a Biological Opinion from the USFWS and/or NMFS. A project with a "may affect, not likely to adversely affect" determination requires informal consultation and receives a concurrence letter from USFWS and/or NMFS, unless that action is implemented under the authorities of the alternative consultation agreement pursuant to counterpart regulations established for *National Fire Plan* projects.

Wilderness Areas

Wilderness areas, which are designated by Congress, are defined by the Wilderness Act of 1964 as places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The BLM manages 175 Wilderness Areas encompassing over 7.2 million acres.

Activities allowed in wilderness areas are identified in wilderness management plans prepared by the BLM. The BLM does not ordinarily treat vegetation in wilderness areas, but will control invasive and noxious weeds when they threaten lands outside wilderness area or are spreading within the wilderness and can be controlled without serious adverse impacts to wilderness values.

Management of vegetation in a wilderness area is directed toward retaining the natural character of the environment. Tree and shrub removal is usually not allowed, except for fire, insect, or disease control. Reforestation is generally prohibited except to repair damage caused by humans in areas where natural reforestation is unlikely. Only native species and primitive methods, such as hand planting, are allowed for reforestation.

Tools and equipment may be used for vegetation management when they are the minimum amount necessary for the protection of the wilderness resource. Motorized tools may only be used in special or emergency cases involving the health and safety of wilderness visitors, or the protection of wilderness values.

Habitat manipulation using mechanical or chemical means may be allowed to protect threatened and endangered species and to correct unnatural conditions, such as weed infestations, resulting from human influence.

The BLM also manages a total of 610 Wilderness Study Areas (WSAs) encompassing nearly 14.3 million acres. These are areas that have been determined to have wilderness characteristics worthy of consideration for wilderness designation. The BLM's primary goals in WSAs are to manage them so as to not impair their wilderness values and to maintain their suitability for

preservation as wilderness until Congress makes a determination on their future.

In WSAs, the BLM must foster a natural distribution of native species of plants and animals by ensuring that ecosystems and processes continue to function naturally.

Cultural Resources

The effects of BLM actions on cultural resources are addressed through compliance with the National Historic Preservation Act, as implemented through a national Programmatic Agreement (*Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*) and state-specific protocol agreements with State Historic Preservation Officers (SHPOs). The BLM's responsibilities under these authorities are addressed as early in the vegetation management project planning process as possible.

The BLM meets its responsibilities for consultation and government-to-government relationships with Native American tribes by consulting with appropriate tribal representatives prior to taking actions that affect tribal interests. The BLM's tribal consultation policies are detailed in BLM Manual 8120 (*Tribal Consultation Under Cultural Resource Authorities)* and Handbook H-8120-1 (*Guidelines for Conducting Tribal Consultation).* The BLM consulted with Native American tribes and Alaska Native groups during development of the PEIS. Information gathered on important tribal resources and potential impacts to these resources from herbicide treatments is presented in the analysis of impacts.

When conducting vegetation treatments, field office personnel consult with relevant parties (including tribes, native groups, and SHPOs), assess the potential of the proposed treatment to affect cultural and subsistence resources, and devise inventory and protection strategies suitable to the types of resources present and the potential impacts to them.

Herbicide treatments, for example, are unlikely to affect buried cultural resources, but might have a negative effect on traditional cultural properties comprised of plant foods or materials significant to local tribes and native groups. These treatments require inventory and protection strategies that reflect the different potential of each treatment to affect various types of cultural resources.

Impacts to significant cultural resources are avoided through project redesign or are mitigated through data recovery, recordation, monitoring, or other appropriate measures. When cultural resources are discovered during vegetation treatment, appropriate actions are taken to protect these resources.

TABLE B-2
Standard Operating Procedures for Applying Herbicides

Resource Element	Standard Operating Procedure
Guidance Documents	BLM Handbook H-9011-1 (*Chemical Pest Control*); and manuals 1112 (*Safety*), 9011 (*Chemical Pest Control*), 9012 (*Expenditure of Rangeland Insect Pest Control Funds*), 9015 (*Integrated Weed Management*), and 9220 (*Integrated Pest Management*).
General	• Prepare operational and spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to the environment while providing the desired results. • Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures. • Apply the least amount of herbicide needed to achieve the desired result. • Follow herbicide product label for use and storage. • Have licensed applicators apply herbicides. • Use only USEPA-approved herbicides and follow product label directions and "advisory" statements. • Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment. • Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas. • Minimize the size of application area, when feasible. • Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners. • Post treated areas and specify reentry or rest times, if appropriate. • Notify adjacent landowners prior to treatment. • Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at http://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spill conditions to minimize risks to resources. • Consider surrounding land uses before aerial spraying. • Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence). • Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground. • Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent. • Use drift control agents and low volatile formulations. • Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas. • Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species. • Turn off applied treatments at the completion of spray runs and during turns to start another spray run. • Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Clean OHVs to remove seeds.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Air Quality See Manual 7000 (*Soil, Water, and Air Management*)	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil See Manual 7000 (*Soil, Water, and Air Management*)	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected. • Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility. • Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.
Water Resources See Manual 7000 (*Soil, Water, and Air Management*)	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs. • Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments. • Use local historical weather data to choose the month of treatment. Considering the phenology of the target species, schedule treatments based on the condition of the water body and existing water quality conditions. • Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity. • Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies. • Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies. • Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
Wetlands and Riparian Areas	• Use a selective herbicide and a wick or backpack sprayer. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
Vegetation See Handbook H-4410-1 (*National Range Handbook*), and manuals 5000 (*Forest Management*) and 9015 (*Integrated Weed Management*)	• Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Use native or sterile species for revegetation and restoration projects to compete with invasive species until desired vegetation establishes. • Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for revegetation and other activities. • Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Pollinators	• Complete vegetation treatments seasonally before pollinator foraging plants bloom. • Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily. • Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment. • Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources. • Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources. • Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula. • Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use appropriate buffer zones based on label and risk assessment guidance. • Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use herbicides of low toxicity to wildlife, where feasible. • Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Threatened, Endangered, and Sensitive Species See Manual 6840 (*Special Status Species*)	• Survey for special status species before treating an area. Consider effects to special status species when designing herbicide treatment programs. • Use a selective herbicide and a wick or backpack sprayer to minimize risks to special status plants. • Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.
Livestock See Handbook H-4120-1 (*Grazing Management*)	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible. • As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable. • Use herbicides of low toxicity to livestock, where feasible. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources. • Avoid use of diquat in riparian pasture while pasture is being used by livestock. • Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary. • Provide alternative forage sites for livestock, if possible.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wild Horses and Burros	• Minimize using herbicides in areas grazed by wild horses and burros. • Use herbicides of low toxicity to wild horses and burros, where feasible. • Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
Cultural Resources and Paleontological Resources See handbooks H-8120-1 (*Guidelines for Conducting Tribal Consultation*) and H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*), and manuals 8100 (*The Foundations for Managing Cultural Resources*), 8120 (*Tribal Consultation Under Cultural Resource Authorities*), and 8270 (*Paleontological Resource Management*) See also: *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act* and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes. • Follow BLM Handbook H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts. • Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments. • Work with tribes to minimize impacts to these resources. • Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
Visual Resources See handbooks H-8410-1 (*Visual Resource Inventory*) and H-8431-1 (*Visual Resource Contrast Rating*), and manual 8400 (*Visual Resource Management*)	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation. • Consider the surrounding land use before assigning aerial spraying as an application method. • Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area. • If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II). • Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low-growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) revegetating the site following treatment. • When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management (VRM) objectives.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Wilderness and Other Special Areas See handbooks H-8550-1 (*Management of Wilderness Study Areas (WSAs)*), and H-8560-1 (*Management of Designated Wilderness Study Areas*), and Manual 8351 (*Wild and Scenic Rivers*)	• Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area. • Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation. • Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration. • Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds. • Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness. • Give preference to herbicides that have the least impact on non-target species and the wilderness environment. • Implement herbicide treatments during periods of low human use, where feasible. • Address wilderness and special areas in management plans. • Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (*Land Use Planning Handbook, Appendix C*)	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas. • Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post signs noting exclusion areas and the duration of exclusion, if necessary. • Use herbicides during periods of low human use, where feasible.
Social and Economic Values	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas. • Post treated areas and specify reentry or rest times, if appropriate. • Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions. • Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Control public access until potential treatment hazards no longer exist, per herbicide product label instructions. • Observe restricted entry intervals specified by the herbicide product label. • Notify local emergency personnel of proposed treatments. • Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area. • Consult with Native American tribes and Alaska Native groups to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide treatments. • To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies, including chemicals, for herbicide treatment projects through local suppliers. • To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated pest management program for projects proposing local use of herbicides.

TABLE B-2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Rights-of-way	• Coordinate vegetation management activities where joint or multiple use of a ROW exists. • Notify other public land users within or adjacent to the ROW proposed for treatment. • Use only herbicides that are approved for use in ROW areas.
Human Health and Safety	• Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide product label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide product label. • Provide public notification in newspapers or other media where the potential exists for public exposure. • Have a copy of MSDSs at work site. • Notify local emergency personnel of proposed treatments. • Contain and clean up spills and request help as needed. • Secure containers during transport. • Follow label directions for use and storage. • Dispose of unwanted herbicides promptly and correctly.

TABLE 2
Mitigation Measures

Resource	Mitigation Measures
Air Quality	None proposed.
Soil Resources	None proposed.
Water Resources and Quality	• Establish appropriate (herbicide-specific) buffer zones to downstream water bodies, habitats, and species/populations of interest (see Appendix C of PEIS, Table C-16). • Areas with potential for groundwater for domestic or municipal water use shall be evaluated through the appropriate, validated USEPA model(s) to estimate vulnerability to potential groundwater contamination, and appropriate mitigation measures shall be developed if such an area requires the application of herbicides and cannot otherwise be treated with non-chemical methods.
Wetland and Riparian Areas	• See mitigation for Water Resources and Quality and Vegetation.
Vegetation	• Minimize the use of terrestrial herbicides (especially bromacil, diuron, and sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are identified. • Establish appropriate (herbicide-specific) buffer zones (see Tables 4-12 and 4-14 in Chapter 4 of the Final PEIS) around downstream water bodies, habitats, and species/populations of interest. Consult the ecological risk assessments (ERAs) prepared for the PEIS for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. • Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible. Do not apply sulfometuron methyl aerially. • To protect special status plant species, implement all conservation measures for plants presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment.*
Fish and Other Aquatic Organisms	• Limit the use of diquat in water bodies that have native fish and aquatic resources. • Limit the use of terrestrial herbicides (especially diuron) in watersheds with characteristics suitable for potential surface runoff that have fish-bearing streams during periods when fish are in life stages most sensitive to the herbicide(s) used. • To protect special status fish and other aquatic organisms, implement all conservation measures for aquatic animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment.* • Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest (see Final PEIS Appendix C, Table C-16, and recommendations in individual ERAs). • Consider the proximity of application areas to salmonid habitat and the possible effects of herbicides on riparian and aquatic vegetation. Maintain appropriate buffer zones around salmonid-bearing streams (see Appendix C, Table C-16, of the Final PEIS, and recommendations in the individual ERAs). • Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing polyoxyethyleneamine (POEA), or seek to use formulations with the least amount of POEA, to reduce risks to aquatic organisms in aquatic environments. • At the local level, consider effects to special status fish and other aquatic organisms when designing treatment programs.
Wildlife	• To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, diuron, glyphosate, hexazinone, tebuthiuron, or triclopyr, where feasible. • Minimize the size of application areas, where practical, when applying 2,4-D, bromacil, diuron, and Overdrive® to limit impacts to wildlife, particularly through contamination of food items.

TABLE 2
Mitigation Measures (Cont).

Resource	Mitigation Measures
Wildlife (cont.)	• Where practical, limit glyphosate and hexazinone to spot applications in rangeland and wildlife habitat areas to avoid contamination of wildlife food items. • Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Tables 4-12 and 4-14 in Chapter 4 of the Final PEIS) to limit contamination of off-site vegetation, which may serve as forage for wildlife. • Do not aerially apply diquat directly to wetlands or riparian areas. • To protect special status wildlife species, implement all conservation measures for terrestrial animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*.
Livestock	• Minimize potential risks to livestock by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible. • Do not apply 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through the contamination of food items. • Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. • Do not aerially apply diquat directly to wetlands or riparian areas used by livestock. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Tables 4-12 and 4-14 in Chapter 4 of the Final PEIS) to limit contamination of off-site rangeland vegetation.
Wild Horses and Burros	• Minimize potential risks to wild horses and burros by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use. • Consider the size of the application area when making applications of 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to wild horses and burros. • Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros. • Where practical, limit glyphosate and hexazinone to spot applications in rangeland. • Do not apply bromacil or diuron in grazing lands within herd management areas (HMAs), and use appropriate buffer zones identified in Tables 4-12 and 4-14 in Chapter 4 of the Final PEIS to limit contamination of vegetation in off-site foraging areas. • Do not apply 2,4-D, bromacil, or diuron in HMAs during the peak foaling season (March through June, and especially in May and June), and do not exceed the typical application rate of Overdrive® or hexazinone in HMAs during the peak foaling season in areas where foaling is known to take place.
Paleontological and Cultural Resources	• Do not exceed the typical application rate when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr in known traditional use areas. • Avoid applying bromacil or tebuthiuron aerially in known traditional use areas. • Limit diquat applications to areas away from high residential and traditional use areas to reduce risks to Native Americans and Alaska Natives.
Visual Resources	None proposed.
Wilderness and Other Special Areas	Mitigation measures that may apply to wilderness and other special area resources are associated with human and ecological health and recreation (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, Recreation, and Human Health and Safety).
Recreation	Mitigation measures that may apply to recreational resources are associated with human and ecological health (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, and Human Health and Safety).

TABLE 2
Mitigation Measures (Cont).

Resource	Mitigation Measures
Social and Economic Values	None proposed.
Human Health and Safety	• Use the typical application rate, where feasible, when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr to reduce risk to occupational and public receptors. • Avoid applying bromacil and diuron aerially. Do not apply sulfometuron methyl aerially. • Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. • Limit diquat application to ATV, truck spraying, and boat applications to reduce risks to occupational receptors; limit diquat applications to areas away from high residential and subsistence use to reduce risks to public receptors. • Evaluate diuron applications on a site-by-site basis to avoid risks to humans. There appear to be few scenarios where diuron can be applied without risk to occupational receptors. • Do not apply hexazinone with an over-the-shoulder broadcast applicator.

APPENDIX D

Stock Pond Repair Location

Road Crossing Reinforcement

Enhancements and Modifications
Phase I - Black Ridge

NATIONAL SYSTEM OF PUBLIC LANDS

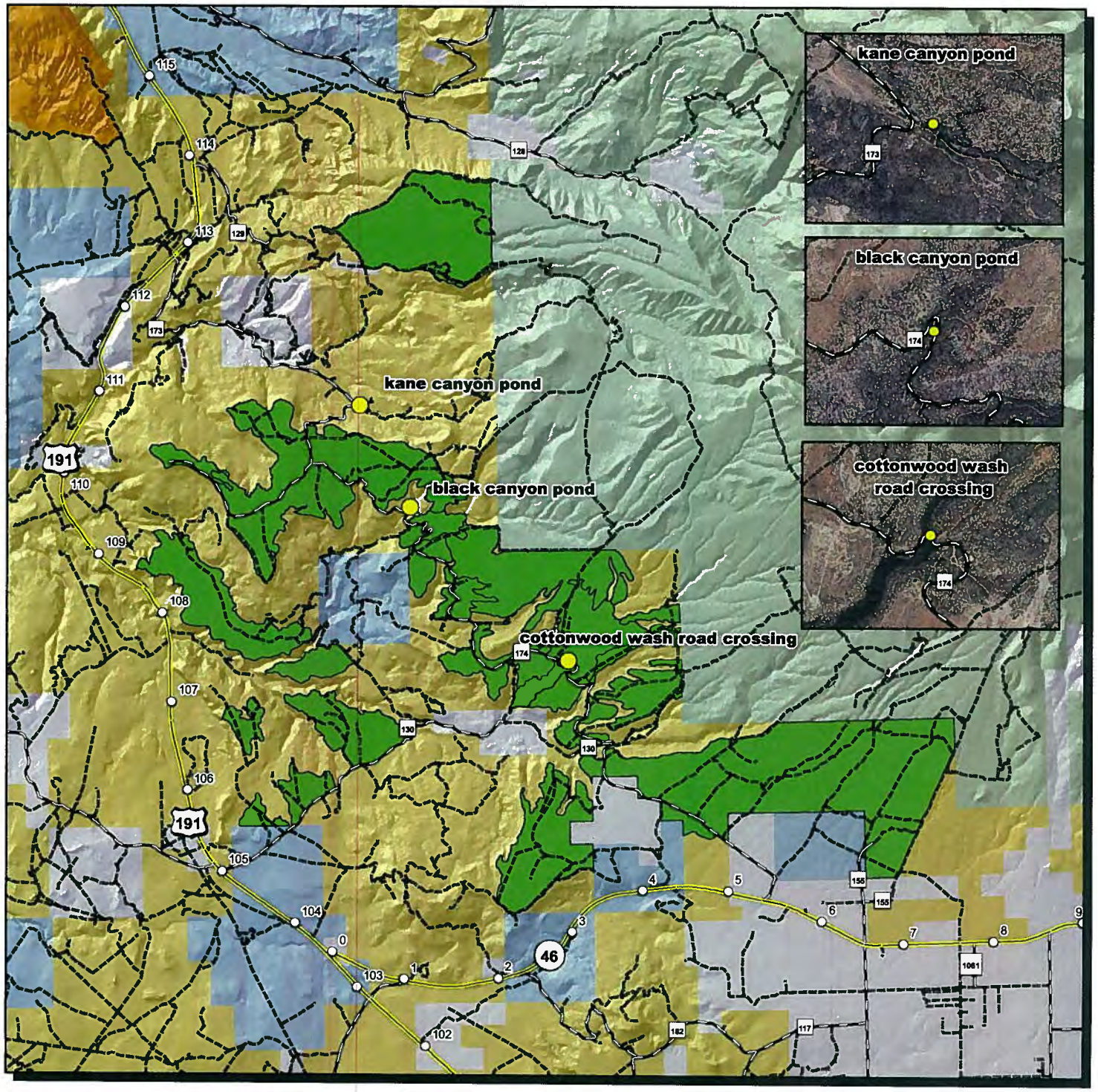
State of Utah

Created December 30, 2009
Gabriel J. Bissonette

N

1:100,000

0 1 2 3
Miles



LEGEND

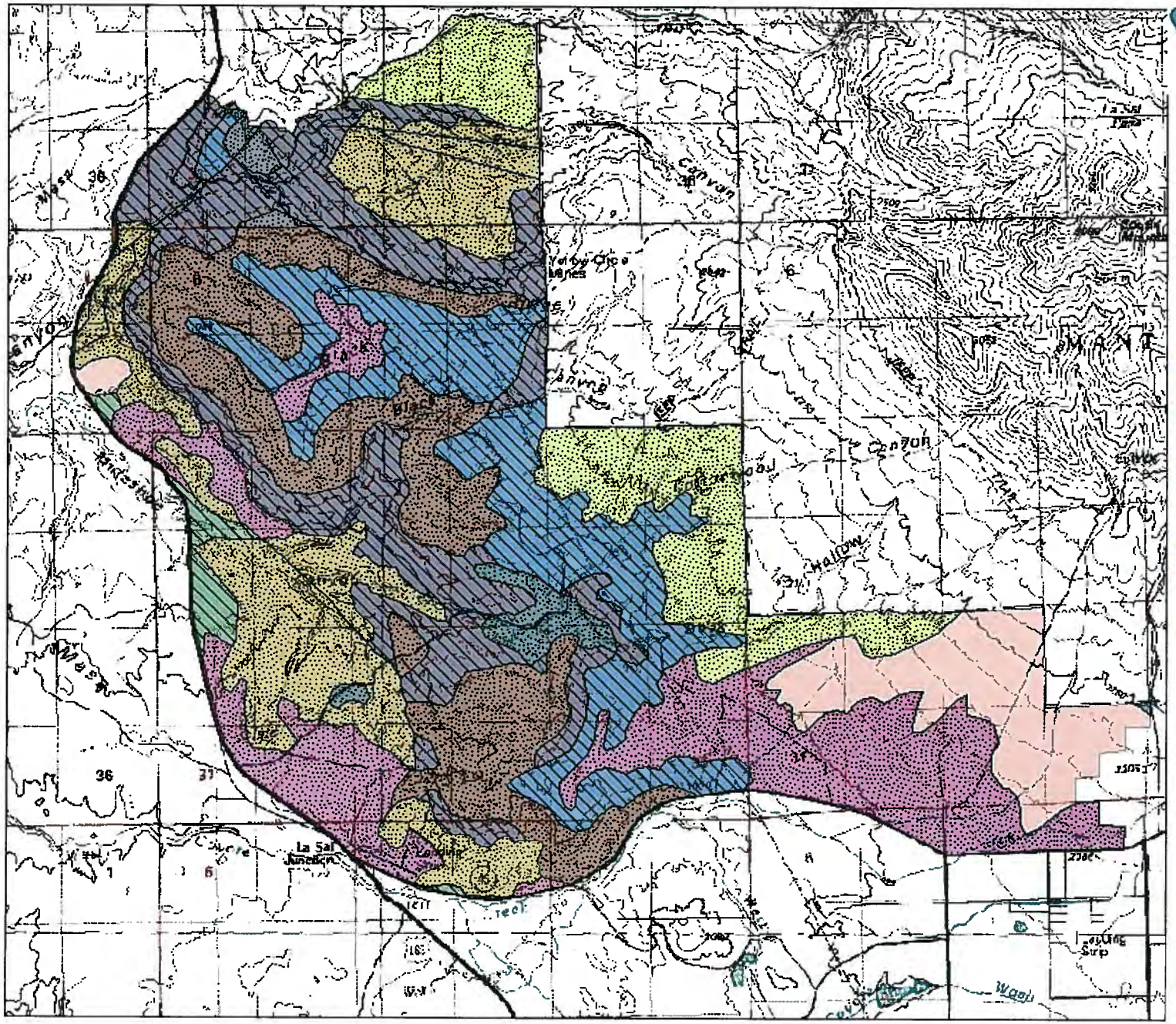
- Range Improvements
- A Roads
- B Roads
- D Roads
- Black Ridge Phase I
- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- State
- Private (White)
- Wilderness Study Areas

APPENDIX E
Geologic Map
Paleontology Map

Black Ridge Restoration

Geology and Paleontology Sensitivity

State of Utah
1:90,006



NATIONAL SYSTEM OF PUBLIC LANDS

N

Miles
0 0.8 1.6

Created October, 2009
Kluenger

Legend

Collective Treatment Area

Geologic Formation

- Entrada (Morrison)
- Brushy Basin (Morrison)
- Navajo Sandstone
- Dakota (Morrison)
- Wahweap Sandstone
- Alluvium
- Older Alluvium
- Eolian Deposits
- Landslides
- Not Surveyed

Paleontology Sensitivity

- High
- Medium

Black Ridge Restoration

Paleontology Sensitivity

State of Utah

1:101,477

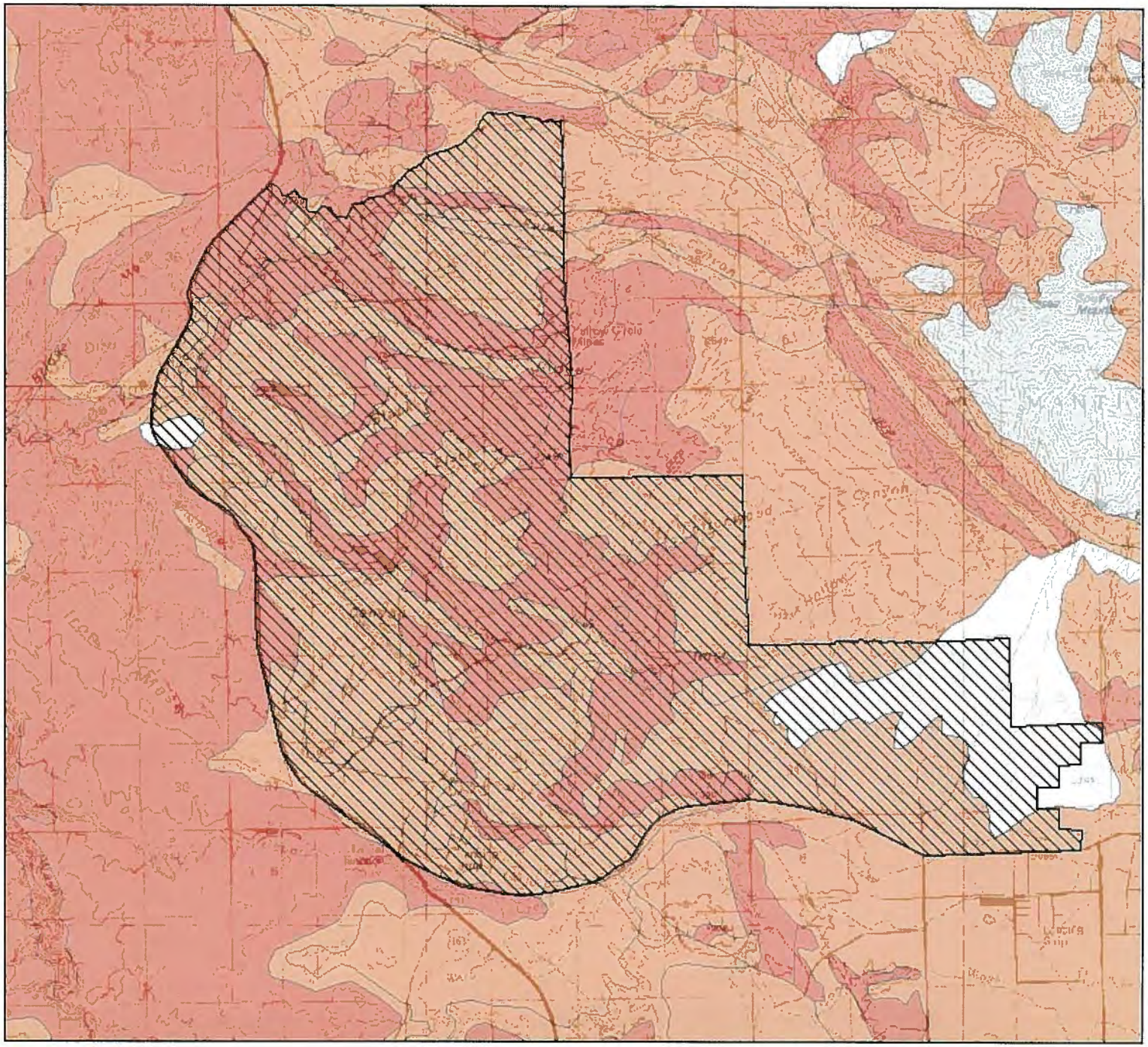
NATIONAL SYSTEM OF PUBLIC LANDS

N

Miles

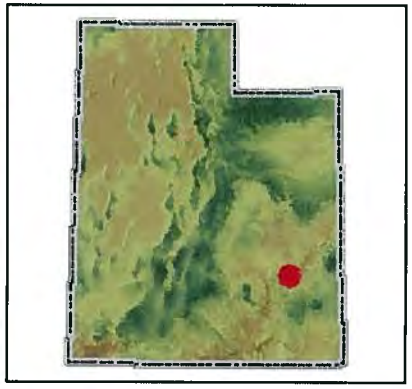
0 1 2

Created March, 2009
Kluenger



Legend

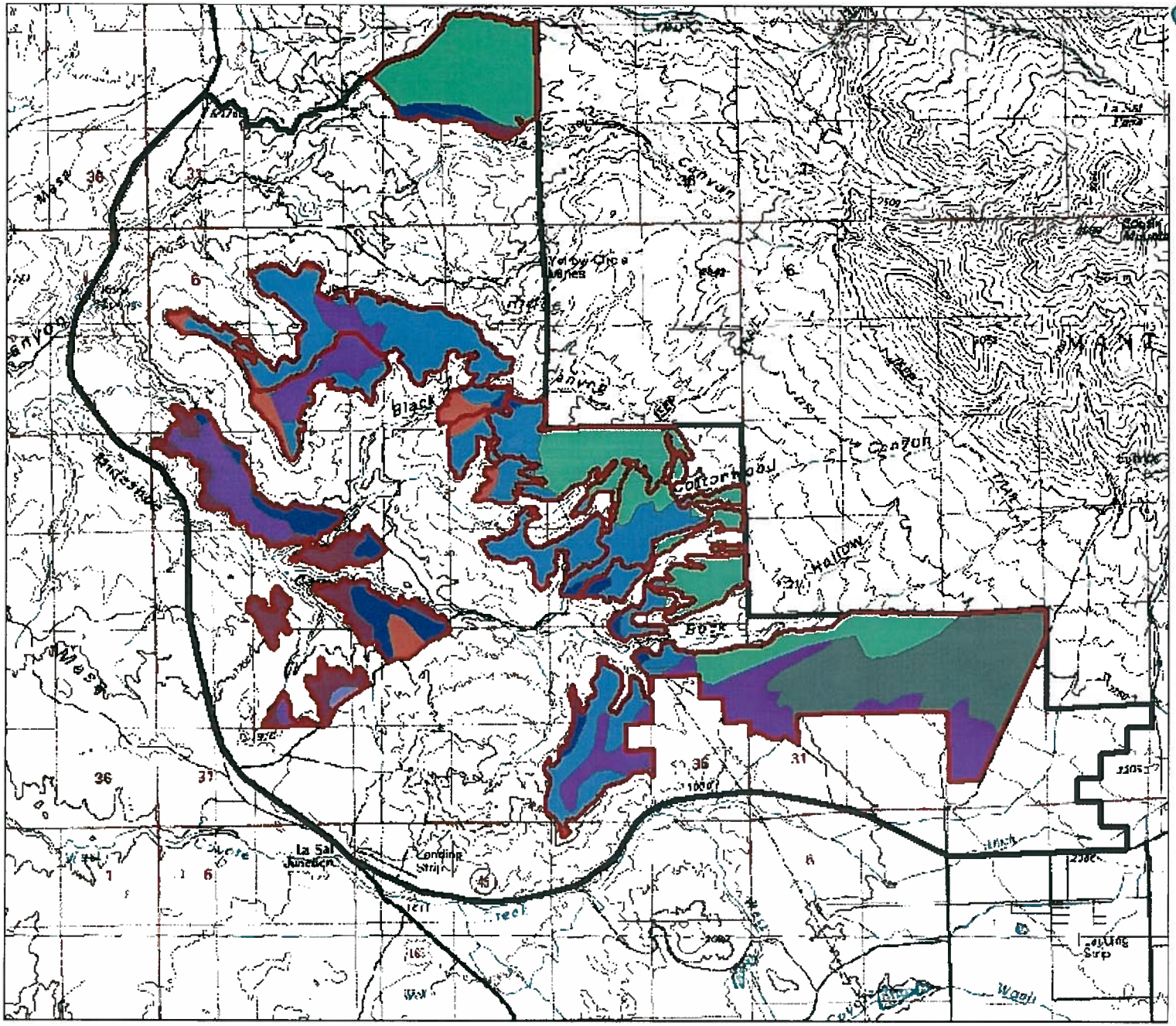
- Black Ridge Proposed Project Area
- High
- Medium
- Low
- None



Black Ridge Restoration

Geology

State of Utah
1:89,900



NATIONAL SYSTEM OF PUBLIC LANDS

N

Miles
0 0.8 1.6

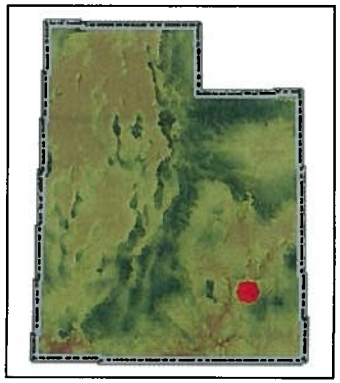
Created October, 2009
Kluenger

Legend

- Proposed Phase I Treatment
- Collective Proposed Treatment

Geologic Formation

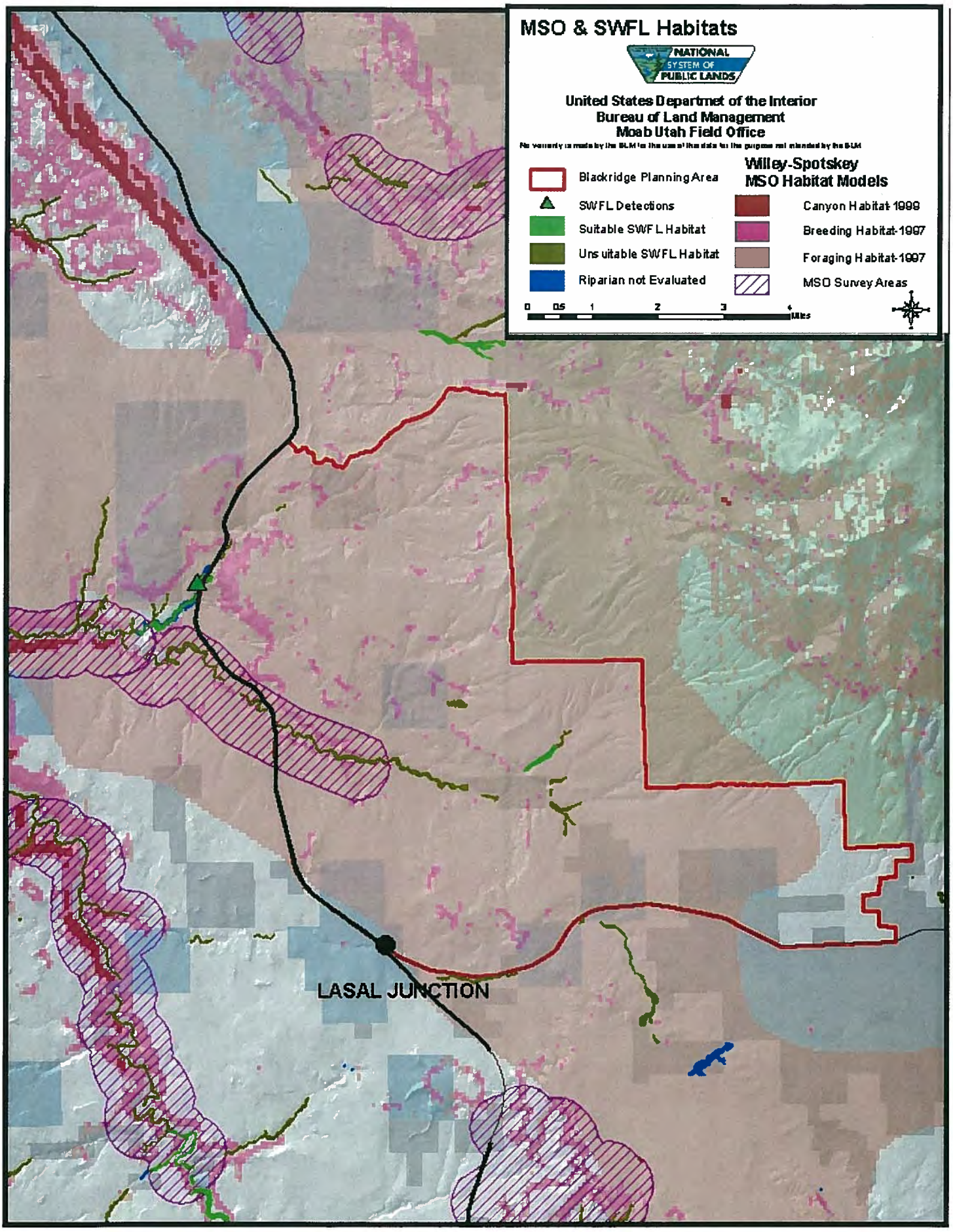
- Entrada (Morrison)
- Brushy Basin (Morrison)
- Dakota (Morrison)
- Qa Alluvial
- Older Alluvium
- Eolian Deposits
- Landslides
- Not Surveyed



APPENDIX F

Mexican Spotted Owl Survey Area

Southwestern Willow Flycatcher Map


MSO & SWFL Habitats
NATIONAL SYSTEM OF PUBLIC LANDS
United States Departmet of the Interior
Bureau of Land Management
Moab Utah Field Office
Willey-Spotskey
MSO Habitat Models
Blackridge Planning Area
SWFL Detections
Suitable SWFL Habitat
Unsuitable SWFL Habitat
Riparian not Evaluated
Canyon Habitat 1999
Breeding Habitat-1997
Foraging Habitat-1997
MSO Survey Areas
0 0.5 1 2 3 4
Miles
LASAL JUNCTION

APPENDIX G

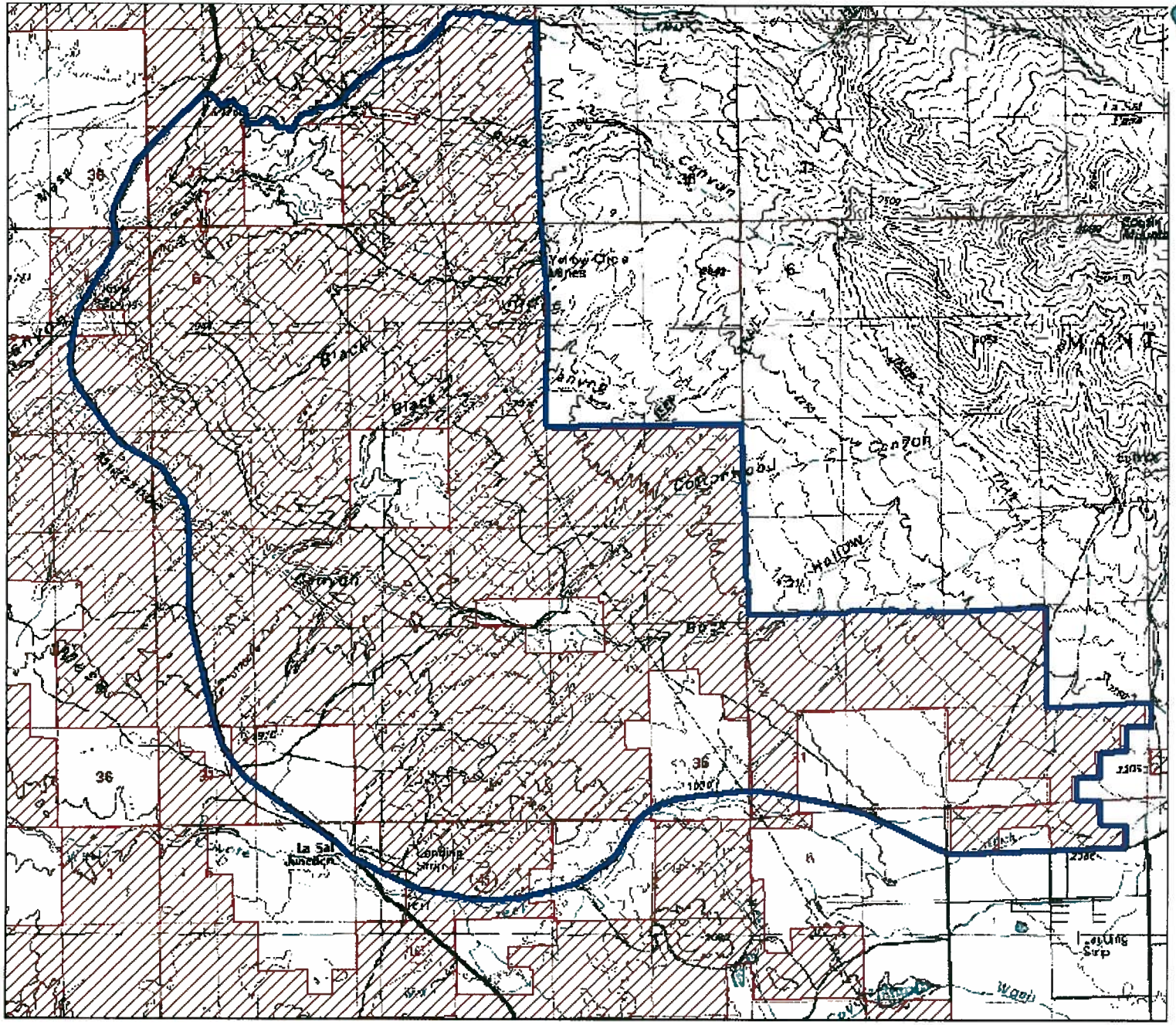
OHV Designated Roads in Project Area

Black Ridge Restoration

OHV Designations

State of Utah

1:90,006



NATIONAL SYSTEM OF PUBLIC LANDS

N

Miles

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Created October, 2005
Kluenger

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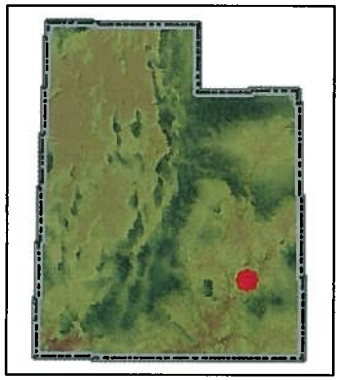
- Proposed Treatment Area
- Closed
- Limited to Designated Roads
- Open