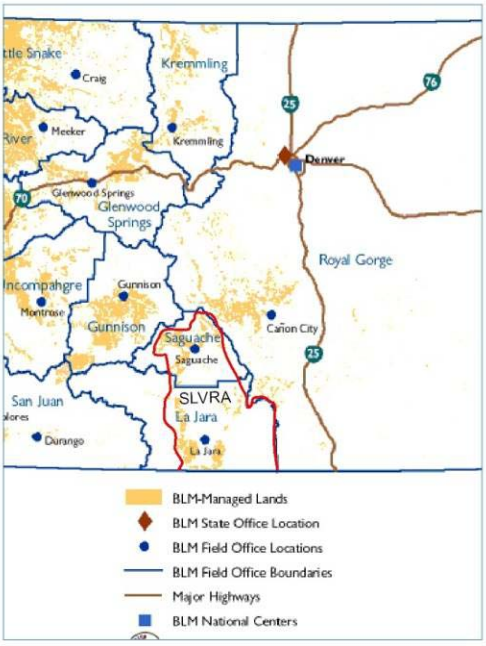
BLM

United States Department of the Interior
Bureau of Land Management

SLVRA Noxious and Invasive Species Management Environmental Assessment
DOI-BLM-CO-140-2009-004-EA
January 12, 2010

Noxious and Invasive Species Management – SAN LUIS VALLEY RESOURCE AREA

Location: *The* SAN LUIS VALLEY RESOURCE AREA *(SLVRA) is located in south-central Colorado. The SLVRA includes approximately 520,000 acres of public land in Saguache, Rio Grande, Conejos, Alamosa, and Costilla counties.*



U.S. Department of the Interior
Bureau of Land Management
San Luis Valley Public Lands Center
1803 W. Highway 160
Monte Vista, Colorado 81144
Phone: (719) 852-5941

SLVRA Noxious and Invasive Species Management Environmental Assessment
DOI-BLM-CO-140-2009-004-EA

Table of Contents

1.0 INTRODUCTION AND PURPOSE AND NEED 1
1.1 Background 1
1.2 Purpose(s) of the Proposed Action 2
1.3 Need for the Proposed Action 2
1.4 Conformance with SLRA Record of Decision and Approved Resource Management Plan 3
1.5 Summary of Public Scoping and Identification of Issues 3
1.6 Summary 4
2.O DESCRIPTION OF ALTERNATIVES 4
2.1 Introduction 4
2.2 Actions Common to All Alternatives 4
2.3 Alternative A – Proposed Action 5
2.4 Alternative B – Continue Present Management 5
2.5 Alternative C – No Herbicide Use 6
3.O AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 11
3.1 Introduction 12
3.2 Invasive Plant Species 12
3.3 Threatened, Endangered, and Special Status Plants 16
3.4 Wildlife 18
3.4A Migratory Birds 18
3.4B Threatened, Endangered, Candidate, and Special Status Wildlife 22
3.4C Aquatic Wildlife 30
3.4D Terrestrial Wildlife 33
3.5 Riparian/Floodplain/Wetlands Resources 34
3.6 Cultural and Paleontological Resources 42
3.7 Water Resources 45

3.8 Soil Resources **48**
3.9 Air Quality **53**
3.10 Recreation **57**
3.11 Wilderness **60**
3.12 Environmental Justice **60**
3.13 Social Economic **60**
4.O MITIGATION MEASURES **61**
5.O RESIDUAL EFFECTS **62**
6.O MONITORING AND/OR COMPLIANCE **62**
7.O CONSULTATION AND COORDINATION **63**

APPENDICES

Appendix A: References **65**
Appendix B: Weed Treatment Unit Maps **66**
Appendix C: Authorities, Laws, and Policies **83**
Appendix D: Standard Operating Procedures (SOPs) **90**
Appendix E: Mitigation Measures **100**
Appendix F: Summary of Possible Treatment Methods **104**
Appendix G: Key Issues Identified during the Scoping of the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (PEIS)* **109**

TABLES AND FIGURES

Table 1: Comparison of effects among alternatives **7**
Table 2: Environmental elements level of analysis for IPM in the SLVRA **11**
Table 3: Noxious/invasive plants and locations in the SLVRA **12**
Table 4: BLM special status plants and habitats in the SLVRA **16**
Table 5: Migratory birds in the SLVRA **19**
Table 6: Threatened, endangered, and special status wildlife species in the SLVRA **23**
Table 7: BLM-administered wetlands in the SLVRA **35**

Figure 1: BLM soil orders in the SLVRA **49**

SLVRA Noxious and Invasive Species Environmental Assessment
DOI-BLM-CO-140-2009-004-EA

1.0 INTRODUCTION AND PURPOSE & NEED

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of treating noxious weeds and invasive species by the Bureau of Land Management (BLM) San Luis Valley Resource Area (SLVRA). The EA analyzes three alternatives: *Proposed Action, No Action (Current Management),* and *No Herbicide Use*. The EA assists the BLM in project planning and discloses environmental effects to the public. An EA determines whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). A Decision Record, including the FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts beyond those already addressed in *SLRA Record of Decision and Approved Resource Management Plan* (SLRA, 1991).

The SLVRA is located in south-central Colorado and includes approximately 520,000 acres of public lands managed by the BLM. Elevation ranges from 7,500 feet on the valley floor to approximately 11,000 feet. This area receives between 7 and 23 inches of rainfall depending on the elevation. Dominant vegetation types include semi-desert shrubland habitat that is comprised primarily of mixed conifer, aspen, cottonwood, piñon-juniper, rabbitbrush, greasewood, fringed sage, winterfat, and four-wing saltbrush, as well as various grasses and forbs.

1.1 Background

Noxious weeds are plant species designated by federal or state law, and invasive plant and aquatic species are defined as "non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health," defined in Executive Order 13112.[1] Invasive species compromise the ability to manage healthy native terrestrial and aquatic ecosystems on public lands. Noxious and invasive species can create a host of environmental effects, most of which are harmful to native ecosystem processes, including: displacement of native plant species; reduction in quality of habitat and forage for wildlife and livestock; increased potential for soil erosion and reduced water quality; alteration of physical and biological properties of soil and water; loss of riparian area function; loss of habitat for culturally significant native plant and aquatic species. In addition, these species have a high cost to treat and control.

[1] EXECUTIVE ORDER 13112 INVASIVE SPECIES (1999) directs federal agencies to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

1.2 Purpose(s) of the Proposed Action

The purpose of the action is to authorize the BLM to treat noxious and invasive species on public lands throughout the SLVRA using an Integrated Pest Management (IPM) approach.

IPM is an approach for selecting methods for preventing, containing, and controlling noxious weeds and invasive species in coordination with other resource management activities to achieve a desired vegetation condition. It uses a combination of treatment methods that interact to control a particular invasive plant or plant infestations efficiently and effectively, with minimum adverse impacts to non-target organisms. The IPM approach contrasts with the traditional approach of using a single control action, such as applying herbicides, to treat all invasive plant problems.

The BLM has treated invasive plants with non-herbicide methods for many years; these methods have not effectively controlled infestations. In addition, research and anecdotal evidence have demonstrated that using an IPM approach is the most cost-effective method for treating noxious and invasive plants.

IPM requires an ecologically based, interdisciplinary approach. Selection of treatment methods is based on information such as the biology of particular noxious and invasive species, site location, proximity to water, and size of infestation. Multiple treatments may be required to appropriately treat species and meet identified management objectives for each treatment area. Treatments may be repeated as needed. Similarly, the treatment method used may change over time as the site conditions change. For example, an area may first be treated using mechanical methods followed up with biological methods or herbicides.

1.3 Need for the Proposed Action

The need for the Proposed Action is to allow the BLM to implement an IPM approach to treat existing infestations of noxious weeds and invasive species and provide for early detection rapid response (EDRR) strategies to address the introduction of new weed species. Currently the BLM is permitted to only use two herbicides, 2,4 D and glyphosate, to treat noxious and invasive species. This analysis will allow the BLM to use a broader spectrum of herbicides to treat noxious and invasive species more effectively. Many of these new herbicides are targeted for specific species and are less harmful to the environment.

1.4 Conformance with SLRA Record of Decision and Approved Resource Management Plan

The three alternatives described in Chapter 2 are in conformance with vegetation objectives, goals, and decisions as stated on pages 9 and 13 of the SLRA Record of Decision and Approved Resource Management Plan.[2]

Authorities, laws, and policies permitting the BLM to treat noxious and invasive species are listed in Appendix C. This appendix also lists other laws (i.e. Endangered Species Act, Clean Water Act) and policies that BLM must comply with when authorizing activities on public lands.

1.5 Summary of Public Scoping and Identification of Issues

Public scoping for the "Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision-PEIS (2007)" is summarized in Volume III of that document.[3]

The SLVRA's public scoping process occurred between February 11, 2009 and March 13, 2009. The San Luis Valley Public Lands Center issued a news release seeking comments to identify issues or concerns to be analyzed during the EA process for the proposed integrated pest management program on lands administered by the BLM in the San Luis Valley.

A scoping letter was also sent to a list of interested groups and tribal nations on February 20, 2009.

The BLM received a total of 11 comments. Below are comments and issues that were identified and relevant to Integrated Pest Management in the SLVRA:

- Herbicide spraying in proximity to organic farming
- Herbicide spraying in proximity to municipalities in regards to an intergovernmental Agreement (IGA) with the local counties
- Genetically modified organisms

Internal comments and concerns were identified during an Interdisciplinary Team meeting on February 3, 2009. Internal comments and issues that were identified internally and relevant to IPM in the SLVRA are listed below:

- Effects of herbicide treatments on native vegetation

---

[2] San Luis Resource Area (SLRA), December 18, 1991, Record of Decision and Approved Resource Management Plan, Canon City, Colorado

[3] The Programmatic Environmental Impact Statement (PEIS) and Programmatic Environmental Report (PER) on Vegetation Treatments using Herbicides on Bureau of Land Management Lands in 17 Western States are viewable at http://www.blm.gov/wo/st/en/prog/more/veg_eis.html.

- Effects of vegetative management and ground disturbing activities
- Effects of herbicides on soils and surface /groundwater
- Herbicide treatment effects on plants and wildlife including Threatened and Endangered and Special Status Species
- Effects of herbicide treatments on invasive aquatic species and native aquatic communities

1.6 Summary

This chapter has presented the background, purpose, and need of this environmental assessment, as well as the relevant issues. Three alternatives (*Proposed Action, No Action,* and *No Herbicide Use*) are presented in Chapter 2. The affected environment and environmental consequences resulting from the implementation of each alternative are analyzed in Chapter 3 for each of the identified issues.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Introduction

This chapter describes and compares three alternatives (*Proposed Action, No Action [Current Management]*, and *No Herbicide Use*) to treat noxious weeds and invasive species in the SLVRA. This analysis provides a baseline, enabling the public to compare the magnitude of environmental effects of the three alternatives.

This EA tiers to the analysis contained in the "Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision-PEIS (2007)" for the 18 herbicide active ingredients listed under the *Preferred Action* and references the "Final Programmatic Environmental Report (PER)," which was developed for all other non-herbicide treatment methods.

2.2 Actions Common to All Alternatives

The following actions will occur across all three alternatives.

Proposed biological treatment methods may include using approved USDA-APHIS (Animal Plant Health Inspection Service) insects, or livestock grazing. For biological control introductions, a *Biological Control Agent Release Proposal* must be approved prior to any releases to the environment.

Mechanical treatment methods include hand pulling, cutting, and mowing, typically with some sort of heavy equipment.

After treatments take full effect, some areas may require the reestablishment of native vegetation if areas of bare ground are present. Treatment areas will be evaluated prior to and after treatment to determine what type of site restoration, if any, is necessary. The *BLM Reclamation Policy* (March 2009) outlines the requirements for rehabilitation of disturbed sites.

Standard Operating Procedures (SOPs), conservation, and mitigation measures listed in Appendices D and E will be implemented and followed while using IPM and EDRR.

To ensure all mitigation measures are implemented and the treatment methods are achieving their goals, monitoring will be conducted to determine effectiveness of treatment methods.

2.3 Alternative A – Proposed Action

Under the proposed action up to 6,000 acres/year of noxious and invasive plant species would be treated. Up to 4,000 acres/year of noxious weeds and invasive species would be treated chemically with the following 15 herbicides: 2,4-D, bromacil, chlorsulfuron, clopyralid, dicamba, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, sulfometuron methyl, tebuthiuron, triclopyr, imazapic, diquat, diflufenzopyr (in formulation with dicamba), and fluridone. The remaining 2,000 acres/year would be treated using mechanical or biological methods. Possible treatment methods are listed in Appendix F. Locations of treatment areas are identified on maps in Appendix B.

In the future the use of additional approved herbicides would follow the BLM's protocol for adding new active ingredients not listed in this document. A site-specific *Determination of NEPA Adequacy* may be completed for the use of newly approved herbicides or the need to treat noxious weeds and invasive species in areas not identified in this document.

Herbicides would be applied by ground methods, either by spot spraying using a back pack sprayer or by broadcast spraying with a boom on an ATV or other vehicle. No aerial application of herbicides would be conducted. Herbicide treatments would not exceed 4,000 acres/year, with no one treatment area more than 2,000 acres. Small, isolated infestations would primarily be treated by spot spraying from a back pack, while larger infestations would be treated using a vehicle.

All pesticide or insect applications on BLM lands require the submission of a *Pesticide Use Proposal or Biological Use Proposal*. These proposals require information on the target pests, chemicals or insects to be used, rates of application, locations of applications, and identification of any issues of concern. For herbicides, only those formulations on the BLM approved list may be used.[4]

2.4 Alternative B – Continue Present Management (No Action)

Under the proposed action up to 1,000 acres/year of noxious and invasive plant species would be treated. Up to 500 acres/year of noxious weeds and invasive species would be treated chemically with the following two herbicides: 2,4-D and glyphosate. The

[4] The *BLM Approved List of Herbicides* is located at: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_information/2009/IB_2009-060.print.html

remaining 500 acres/year would be treated using mechanical (200 acres) or biological methods (300 acres). Possible treatment methods are listed in Appendix F. Locations of treatment areas are identified on maps in Appendix B.

All pesticide or insect applications on BLM lands require the submission of a *Pesticide Use Proposal or Biological Use Proposal*. These proposals require information on the target pests, chemicals or insects to be used, rates of application, locations of applications, and identification of any issues of concern. For herbicides, only those formulations on the BLM approved list may be used.

2.5 Alternative C – No Herbicide Use

No herbicide use would occur under Alternative C. A total of up to 800 acres/year of noxious weeds and invasive species would be treated under this alternative, of which 300 acres would be biological, and 500 acres would be mechanical. The BLM would treat vegetation using only mechanical, and biological control methods.

Biological, Cultural, Herbicide, Manual, or Physical Control

Federal agencies are directed to use an IPM approach to managing invasive species. Thus, the use of any one technique, exclusively, was not considered in this EA.
All biological applications on BLM lands require the submission of a *Biological Use Proposal*. This proposal requires information on the target pests, insects to be used, locations of applications, and identification of any issues of concern.

Table 1: Comparison of effects among alternatives

Resource	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – No Herbicide
3.2. Invasive Plant Species			
Acres treated/year - herbicides	4,000	500	0
Acres treated/year - biological	1,000	300	300
Acres treated/year – mechanical	1,000	200	500
Effects of treatments on weed spread	Greatest – weed spread would be reduced	Marginal – weed spread slightly reduced	Least – weeds would continue to spread
Likelihood of detecting and treating of new weeds	Greatest	Marginal	Least
Cheatgrass control	Greatest – using *Plateau*	Marginal – using glyphosate	Least – unable to use herbicide
Restoration actions	Yes, where appropriate	Yes, where appropriate	Yes, where appropriate
Monitoring	Yes	Yes	Yes
3.3. Threatened, Endangered, and Special Status Plants			
Federally listed T/E, Proposed, and Candidate Species	No Effect	No Effect	No Effect
BLM Special Status Plants	Greatest – most use of herbicides; SOPs and mitigation would reduce impacts	Marginal – Some use of herbicides; SOPs and mitigation would reduce impacts	Least – no herbicides would be used
3.4. Wildlife			
3.4A. Migratory Birds	Greatest – most acres treated; SOPs and mitigation measures would reduce impacts; most beneficial effects to migratory birds as more acres treated and restored to native species	Marginal – fewer acres treated but still use; SOPs and mitigation measures would reduce impacts; slightly more beneficial effects to migratory birds as slightly more acres treated and restored to native species	Least – fewest acres and no use of herbicides; SOPs and mitigation measures would reduce impacts; least beneficial effects to migratory birds as fewer acres treated and restored to native species

Resource	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – No Herbicide
3.4B. Threatened, Endangered, Candidate, & Special Status Wildlife	Greatest – most acres treated; SOPs and mitigation measures would reduce impacts; most beneficial effects to migratory birds as more acres treated and restored to native species	Marginal – fewer acres treated but still use; SOPs and mitigation measures would reduce impacts; slightly more beneficial effects to migratory birds as slightly more acres treated and restored to native species	Least – fewest acres and no use of herbicides; SOPs and mitigation measures would reduce impacts; least beneficial effects to migratory birds as fewer acres treated and restored to native species
Federally listed T/E, proposed, and Candidate Species (8 species)	2 species – No effect 6 species – Not Likely to Adversely Affect	2 species – No effect 6 species – Not Likely to Adversely Affect	2 species – No effect 6 species – Not Likely to Adversely Affect
BLM Special Status Species (19 species)	May impact 19 species	May impact 19 species	May impact 19 species
Restoration of native species	Greatest – more acres potentially restored to native species	Marginal – slightly more acres potentially restored to native species	Least – fewest acres potentially restored to native species
3.4C. Aquatic Wildlife	Greatest – most acres treated; SOPs and mitigation measures would reduce impacts; aquatic weeds would be treated with appropriate aquatic herbicides that treat target species; provide for greatest native habitat	Marginal – fewer acres treated but still use; SOPs and mitigation measures would reduce impacts; unable to treat aquatic weeds with herbicides; provide native habitat	Least – fewest acres and no use of herbicides; SOPs and mitigation measures would reduce impacts; loss of native habitat
3.4D. Terrestrial Wildlife	Greatest – most acres treated; SOPs and mitigation measures would reduce impacts; most	Marginal – fewer acres treated but still use; SOPs and mitigation measures would reduce impacts; slightly more	Least – fewest acres and no use of herbicides; SOPs and mitigation measures would reduce impacts; least beneficial

Resource	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – No Herbicide
	beneficial effects to migratory birds as more acres treated and restored to native species	beneficial effects to migratory birds as slightly more acres treated and restored to native species	effects to migratory birds as fewer acres treated and restored to native species
Restoration of native species	Greatest – more acres potentially restored to native species	Marginal – slightly more acres potentially restored to native species	Least – fewest acres potentially restored to native species
3.5. Riparian/Floodplain/Wetlands Resources			
Riparian Habitats	Greatest– both negative and positive	Marginal - both negative and positive	Least - both negative and positive
Floodplain/Wetlands Habitats	Greatest– both negative and positive	Marginal - both negative and positive	Least - both negative and positive
3.6. Cultural and Paleontological Resources	Moderate to high potential overall for negative effects: Given higher number of acres and use of mechanical treatments	Moderate overall: positive and negative	Highest due to the primary use of mechanical treatments that would incur ground disturbance
3.7. Water Resources			
Water Quantity	No Effect	No Effect	No Effect
Water Quality	Greatest – due to amount of acres treated using herbicides	Marginal	Least – no use of herbicides
3.8. Soil Resources	Greatest – due to most acres treated with herbicide		
Compaction	Greatest – localized in areas where broadcast treatments occur on soils	Marginal – localized at a smaller scale as fewer acres would be treated using	Least – no herbicide use

Resource	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – No Herbicide
	susceptible to compaction	broadcast herbicide treatment	
Soil Productivity	Greatest – herbicides may impact nutrients, others; productivity may increase as weeds are treated and native species re-established	Marginal	Least
3.9. Air Quality			
Herbicide Drift	Localized and Marginal	Localized and Marginal – less than Alternative A	None
Fugitive Dust	Minimal	Minimal	Minimal
3.10. Recreation			
Recreational Users	Minimal	Minimal	Minimal
Recreation Infrastructure	Minimal	Minimal	Minimal
3.11. Wilderness	Minimal	Minimal	Minimal
3.12. Environmental Justice	None	None	None
3.13. Social Economic	None	None	None

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

After review of the PER, PEIS, and public comments, internal specialists' comments and interagency consultation, a determination of the level of site-specific analysis needed for this EA was completed. Table 2 identifies issues analyzed either not present or located within the analysis area, issues addressed in the PEIS and not analyzed further in this document, and those issues specific to the SLV area that will be analyzed in detail.

Table 2: Environmental elements level of analysis for IPM in the SLVRA

Environmental Elements	**N/A or *Issues* Not Present within the Analysis Area**	***Issues* Applicable or Present but Addressed in PEIS**	**Site-Specific Analysis Conducted**
Invasive Plant Species			X
TE/Special Status Plants			X
Migratory Birds			X
TE/Special Status Wildlife			X
Aquatic Wildlife			X
Terrestrial Wildlife			X
Riparian/Floodplain/ Wetlands Resources			X
Cultural/Paleontological Resources			X
Water Resources			X
Soil Resources			X
Air Quality			X
Recreation			X
Wilderness			X
Environmental Justice			X
Social Economic			X
Global Warming/Climate		X	
Vegetation		X	
Range		X	
Farmlands		X	
Lands and Realty		X	
Fuels		X	
Forest Management		X	
Hazardous Materials		X	
Noise		X	
Native American Concerns		X	
Wild and Scenic Rivers	X		
Visual Resources	X		
Geology and Minerals	X		

3.1 Introduction

This chapter describes aspects of the environment likely to be affected by the alternatives described in Chapter 2. Also described are the environmental effects (direct, indirect, and cumulative) that would result from undertaking the *Proposed Action,* the *No Action,* and the *No Herbicide* alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects in Chapter 2.

3.2 INVASIVE PLANT SPECIES

Affected Environment

Currently there are 15 noxious and invasive plant species occurring or suspected to occur in the SLVRA (Table 3). This is not an all-inclusive list and is subject to change. The acres infested with noxious and invasive species is currently not known since all lands managed by the BLM in the SLVRA have not been inventoried. Known weed infestations are shown on maps in Appendix B.

Table 3: Noxious/invasive plants and locations in the SLVRA

Species	Current Inventoried Location
Leafy Spurge	No known sites, but in adjacent private land (watch species)
Black Henbane	Along roads and disturbed sites in the northern SLV, primarily around Saguache; also at some locations just east of Del Norte and west of Capulin
Dalmatian Toadflax	12 miles north of Saguache along US 285 adjacent to BLM
Scotch Thistle	Near Rito Alto trailhead in the Sangre de Cristos
Spotted Knapweed	12 miles north of Saguache along US 285 adjacent to BLM
Russian Knapweed	Simpson /McIntire springs, Blanca Wetlands, La Garita Creek, Dorsey Creek, and the Rio Grande River corridor+
Canada Thistle	Along drainages throughout the SLVRA
Field Bindweed	Scattered throughout the SLVRA
Hoary Cress	Simpson /McIntire springs, Blanca Wetlands, La Garita Creek, Dorsey Creek, and the Rio Grande River corridor, spreading quickly
Perennial Pepperweed	Simpson /McIntire springs, Blanca Wetlands, La Garita Creek, Dorsey Creek, and the Rio Grande River corridor
Yellow Toadflax	Poncha Pass, and in the Noland Gulch drainage west of Saguache
Houndstongue	No known sites (watch species)
Russian Olive	Blanca Wetlands and Simpson/McIntire springs
Cheat Grass	Throughout the SLVRA, limited to disturbances or roads
Oxeye Daisy	Southern BLM lands adjacent to National Forest
Salt Cedar	Blanca Wetlands/ Simpson McIntire/ Riparian areas
Russian Thistle/Kochia	Zapata and Penitente recreational areas
Hydrilla	Blanca Wetlands/ Simpson McIntire
Eurasian Water Milfoil	Blanca Wetlands/ Simpson McIntire/ Rio Grande River Corridor

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

BLM will adhere to the SOPs, conservation measures and mitigation measures described in Appendices D and E. Restoration efforts will occur following treatment if necessary. Monitoring to determine effectiveness of treatments will occur.

Alternative A – Proposed Action

Direct and Indirect Effects

Reduction of the spread of noxious and invasive species and of detecting and treating new species would be greatest under Alternative A. Approximately 6,000 acres/year would be treated using all methods of treatment. This would include IPM and EDRR.

Under the *Proposed Action,* the BLM would be able to use additional herbicide active ingredients listed in the PEIS, in addition to two previously approved herbicides, to treat approximately 6,000 acres of noxious and invasive plants with a combination of manual, mechanical, and herbicide treatments. This alternative would result in control or eradication of noxious and invasive plants and aquatic species. Biological controls would be used when they are available and reasonably effective.

One of the noxious/invasive species that would be targeted under Alternative A is cheatgrass. Cheatgrass populations are at a stage where herbicide treatment would be effective in reducing the species' spread in the SLVRA. Under this alternative the BLM would be able to apply imazapic (brand name *Plateau*), a pre-emergent herbicide that specifically targets cheatgrass.

The BLM could treat up to 2,000 acres of cheatgrass yearly using imazapic-based herbicides. Cheatgrass is especially competitive with native perennial plants after a wildfire when additional nitrogen is released by the burning of standing biomass and litter. The use of imazapic may be an important tool for emergency stabilization and rehabilitation of areas burned by wildfire. For rangelands infested with cheatgrass, imazapic can provide a window of opportunity to allow shrubs and perennial grasses and forbs to reestablish with normal precipitation.

With the additional acreage treated using imazapic under the *Proposed Action,* there would be a potential increase of adverse effects to some native plants. However, since most cheatgrass sites in the SLVRA are located along roads and rights-of-way, impacts to desired native vegetation while using imazapic-based herbicides would be minimal. There is a potential for damage to native plants or nearby agricultural lands from unforeseen environmental conditions such as severe thunderstorms or windstorms that could move imazapic away from treatment areas.

Because of the protection of non-target species by the direct application method; the implementation of the SOPs; following the herbicide label requirements; the relatively short degradation time of the herbicide; and the small amount of herbicide being used,

no long-term adverse effects are expected from the *Proposed Action*. Restoration may likely coincide with this alternative, due to the chance of bare ground left after some herbicide treatments. Plans for seeding and replanting would be part of the evaluation plan prior to herbicide spraying.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Under the *No Action* alternative the BLM would be able to use only the two previously approved herbicide active ingredients.

This alternative would result in eradication of most noxious and invasive plants where herbicide treatment is conducted, and control and/or eradication of invasive plant populations where biological or manual treatment is proposed, resulting in reduced invasive plant infestations in terms of both number and size of infestations. Additionally, complete vegetation control would be conducted on industrial locations.

Being restricted to 2,4-D and glyphosate may reduce the effectiveness of treatment for some species such as yellow toadflax, Canada thistle, and Russian knapweed, since these two herbicides may not be as effective as the additional herbicides proposed in Alternative A. In addition, these two herbicides usually target other desired vegetation whereas the new herbicides are more plant specific. Glyphosate is a non-selective herbicide that can be used to treat cheatgrass but has also been known to eliminate all other desirable species.

Not having the ability to use imazapic-based herbicides would remove an effective tool for cheatgrass control. Efforts to stabilize and rehabilitate burned areas would be less effective and could allow continued cheatgrass invasion and spread.

Alternative C – No Herbicide Use
Direct and Indirect Effects
The ability to reduce the spread of noxious/invasive species and of detecting and treating new species would be least under Alternative C. Many of the invasive plants proposed for treatment are most effectively controlled with herbicides, making non-herbicide methods ineffective and unsuccessful when used exclusively.[5] For many noxious and invasive plants (e.g. Canada thistle, yellow toadflax, Russian knapweed, and cheatgrass), manual and mechanical treatment is difficult and often ineffective regardless of the size of the population. Manual treatment is not recommended for many invasive plants because digging out roots or rhizomes, in addition to being extremely labor intensive, tends to spread rhizome fragments that produce new plants.

[5] *Final Environmental Impact Statement Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16 (March 2008)*

Treating salt cedar by exclusively manual or mechanical methods is not generally recommended because disturbance stimulates the growth of new plants from fragmented roots and redistributes the plants, increasing their rate of spread. Although manual and mechanical treatments may be effective for black henbane, plants can produce and disperse 50 to 100 million seeds per acre up to three times a year depending on moisture. Seeds are distributed by livestock, recreational activities, and all types of surface disturbance maintenance, which makes manual and mechanical treatments more difficult. Manual treatment for knapweeds is difficult due to the species' tough perennial root crown; repeated mechanical treatment of diffuse knapweed may actually increase populations by spreading seeds.

Many existing noxious and invasive plants populations wouldn't be controlled, eradicated, or reduced under this alternative. Noxious and invasive plants would continue to spread and increase, eventually becoming impossible to eradicate. Noxious and invasive plants would increasingly impact native ecosystems, affecting diversity of flora and fauna (including special status species), as well as surface water availability. Native plant diversity and wildlife habitat quality would be significantly reduced over time due to increasing dominance by invasive plants.

There is a high risk that seeds or propagative parts from invasive plants would migrate off site, resulting in increased infestations and subsequent mechanical and chemical treatments over a wider area adjacent to public land. Herbicide use on adjacent lands could potentially be higher as control efforts are implemented, resulting in an increased risk of exposing non-target species on BLM lands.

Cumulative Effects

Vectors (livestock, vehicles, recreationists, water, wind, wildlife) and disturbances (roads, grazing, fuel treatments, water developments, recreation developments etc.) that contribute to weed spread would continue to be present in the SLVRA. Project-specific mitigations, incorporated into all new projects, help to reduce the risk of new infestations and the spread of weeds associated with new disturbance. Several projects, including mineral development, have measures included for post project noxious and invasive plant control, as well as weed prevention measures, (e.g. equipment cleaning, weed free hay/mulch, revegetation). Adjacent to BLM lands, on Forest Service, State, and private lands, noxious control efforts are underway for state listed noxious weeds.

Under the *No Herbicide* alternative, existing infestations would continue to spread unchecked, gaining increasing vegetative dominance over the long term. The *Proposed Action* and *No Action* alternative would have fewer cumulative effects overall than the *No Herbicide* alternative.

3.3 THREATENED, ENDANGERED, AND SPECIAL STATUS PLANTS

Affected Environment

There are currently no federally threatened, endangered, proposed, or candidate plant species in the SLVRA. The number of species and designation of threatened, endangered and special status plants may change over time depending on each species status. Table 4 lists BLM special status plant species and their habitat in the SLVRA. As previously mentioned there are no federally threatened, endangered, proposed, or candidate plant species in the SLVRA. There are, however, three sensitive plant species listed (Colorado Natural Areas Program Master Plant List, 2001), and those species are presented below. As of the date of this EA, a new Colorado sensitive species list for Colorado is being prepared.

Table 4: BLM Special Status Plants and Habitats in the SLVRA

Species	Habitats
Astragulus brandegei	**Sandy or gravelly banks, flats, and stony meadows; mostly in piñon-juniper woodlands, sometimes in oak woodlands, rarely in yucca-grasslands. Bedrock is usually sandstone, occasionally granite or basalt. Elev. 5,400-8,800 ft.**
Astragalus ripleyi	**On volcanic substrates in open-canopy ponderosa pine-Arizona fescue savannah, or along the edges of mixed coniferous woodlands where *Festuca arizonica* is dominant. Elev. 8,200-9,300 ft.**
Aletes neoparrya	**Igneous outcrops or sedimentary rock derived from extrusive volcanics. North facing cliffs and ledges, within piñon-juniper woodlands. Elev. 7,000-10,000 ft.**
Cleome multicaulis	**Saline or alkaline soils; around ponds, meadows, or old lake beds. Often grows in bands just above rushes and extending into greasewood and saltgrass. Elev. 7,500-8,000 ft.**

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

No effect to federally listed T/E and candidate species. The BLM will adhere to the SOPs, conservation measures and mitigation measures described in Appendices D and E.

Alternative A – Proposed Action

Direct and Indirect Effects

Direct and indirect effects on BLM special status plant species are described below for each treatment category

Effects of herbicide treatment on BLM special status plant species in the SLVRA would be greatest under Alternative A, since more acres would be treated.

The direct and indirect effects of biological and mechanical treatments on BLM special status plant species are described in the BLM PER, pp. 4-54 to 4-57. Direct effects could

include injury or mortality to any special status plants present on the treatment site if these plants were not avoided. Under manual or mechanical treatments removal of top soil layer could adversely impact the special status plant species seed bank. Species with small populations or very limited distributions could be adversely impacted by such an occurrence. Beneficial direct and indirect impacts from manual/physical treatment of invasive species could include reduced competition from non-native vegetation that often threatens vulnerable populations of special status plant species. Given projected manual/physical treatment acreages of non-native and invasive species is highest under Alternative A, relative to Alternative B or C, risk of direct and indirect, adverse, and beneficial impacts are assumed highest.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
The direct and indirect effects (adverse and beneficial) of herbicide use under this alternative are less than Alternative A, because fewer acres are proposed for treatment. Effects of special status plant species are described in the BLM PEIS, pp. 4-68 to 4-73.

Biological and mechanical effects on special status plant species are described in the BLM PER, pp. 4-56 to 4-59. Adverse and beneficial direct and indirect effects of biological and mechanical treatments on BLM special status plant species would be similar to those described in Alternative A.

Alternative C – No Herbicide Use
Direct and Indirect Effects
There are no direct and indirect effects on BLM special status plant species from herbicide use under Alternative C. Potential impacts from biological and mechanical treatments would be similar to Alternative B but less than Alternative A.

Cumulative Effects
Cumulative effects are described in the BLM PEIS, pp. 4-197 to 4-245. Past, present, and reasonably foreseeable actions on public lands in the SLV or private lands in proximity to public lands that would be cumulative to the effects on BLM sensitive plant species in Alternatives A, B, and C include grazing, recreation, timber harvest, road development, center-pivot agriculture, and urbanization, among other forces. The level of herbicide application or mechanical treatment, either in concentration or physical area under any of the three alternatives is marginal relative to the area of surface disturbance associated with SLV agriculture production and road maintenance. The cumulative effects of the continued spread of noxious and invasive plant species on public lands from any of the alternatives could be dramatic and irreversible.

3.4 WILDLIFE

3.4A MIGRATORY BIRDS

Affected Environment

Most migratory bird use in the SLV is limited to the summer period due to the harsh fall, spring, and winter months. Most birds arrive during late spring (April/May) and migrate from the area in early fall (August/September). The species present during summer are most likely breeding and rearing young. Most species on the Bird Conservation Regions (BCR) 16 list follow this migration pattern. A few species are present during the wintertime. Resident species that spend all or part of the winter in the SLV include the northern harrier, short-eared owl, ferruginous hawk, golden eagle, Gunnison's sage-grouse, peregrine falcon, prairie falcon, Lewis's woodpecker, and piñon jay. Table 5 below identifies the Birds of Conservation Concern for BCR 16, their associated habitat types as defined by Partners-In-Flight, and their status within the project area(s).

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

Migratory birds may be affected directly and indirectly by herbicide, mechanical, and biological treatments to control weeds, so the determination of effects is "May Impact": May Impact Individuals, but is not likely to cause a trend towards federal listing or loss of viability in the analysis area for migratory birds. Mitigation may be necessary to not lead to "take" of migratory birds, individuals, or their reproductive viability.

BLM will adhere to the SOPs, conservation measures, and mitigation measures described in Appendices D and E. Restoration efforts would occur following treatment if necessary. Monitoring to determine effectiveness of treatments would occur.

Alternative A – Proposed Action

Direct and Indirect Effects

Potential effects to migratory birds would be greatest under Alternative A since more acres would be treated. Negative direct effects of treating weeds could include destruction of nests and flushing of birds, making them more susceptible to predation. These effects should generally be short-term in nature.

Adverse indirect effects include reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; decrease in migratory bird population densities within the first year following application as a result of limited reproduction; habitat and range disruption (as migratory birds may avoid sprayed areas for several years following treatment), resulting in changes to territorial boundaries and breeding and nesting behaviors; and increase in predation of small mammals due to loss of ground cover (BLM PEIS, p. 4-101).

Table 5: Migratory birds in the SLVRA –
FWS Birds of Conservation Concern (BCC) for BCR 16 and their status within the analysis area

Species	Associated Habitat Types(s)	Occurrence in Analysis Area
Northern Harrier	Agricultural, Grassland, Wetlands	Yes
Swainson's Hawk	Agricultural, Grassland, Mountain Shrub, Semi-Desert Shrubland, Piñon-Juniper, Mixed-Conifer, Spruce-Fir, Low Elevation Riparian	Yes
Ferruginous Hawk	Grassland, Mountain Shrub, Semi-Desert Shrubland, Sagebrush Shrublands	Yes
Golden Eagle	Agricultural, Grassland, Cliff/Rock/Talus	Yes
Peregrine Falcon	Agricultural, Piñon-Juniper, Spruce-Fir, Ponderosa Pine, Cliff/Rock/Talus, Wetlands	Yes
Prairie Falcon	Agricultural, Grassland, Semi-Desert Shrubland, Cliff/Rock/Talus	Yes
Gunnison's sage-grouse	Mountain Shrub, Sagebrush Shrubland, Low Elevation Riparian	Yes
Snowy Plover	Wetlands	Yes
Mountain Plover	Agricultural, Grassland, Semi-Desert Shrubland, Sagebrush Shrubland	Yes
Solitary Sandpiper	Wetlands	Yes
Marbled Godwit	Wetlands	Yes
Wilson's Phalarope	Wetlands	Yes
Yellow-billed Cuckoo	Low Elevation Riparian, Wetlands	Yes
Flammulated Owl	Aspen, Ponderosa Pine, Mixed-Conifer, Spruce-Fir	Yes
Burrowing Owl	Grassland, Semi-Desert Shrubland, Sagebrush Shrubland	Yes
Short-eared Owl	Agricultural, Grassland, Low Elevation Riparian, Wetlands	Yes
Black Swift	Cliff/Rock/Talus, High Elevation Riparian	Yes
Lewis's Woodpecker	Ponderosa Pine, Low Elevation Riparian	Yes
Williamson's Sapsucker	Aspen, Mixed-Conifer, Ponderosa Pine	Yes
Gray Vireo	Oak Woodlands/Scrub	No*
Piñon Jay	Piñon-Juniper, Ponderosa Pine	Yes
Bendire's Thrasher	Semi-Desert Shrubland	Possible
Crissal Thrasher	Desert Scrub	No*
Sprague's pipit	Shortgrass Prairie	No*
Virginia's warbler	Mountain Shrub, Piñon-Juniper, Ponderosa Pine, Low Elevation Riparian	Yes

Species	Associated Habitat Types(s)	Occurrence in Analysis Area
Black-throated gray warbler	Piñon-Juniper	Yes
Grace's warbler	Ponderosa Pine	No*
Sage sparrow	Sagebrush Shrubland	Yes
Chestnut-collared longspur	Shortgrass Prairie	No*

* *Excluded from analysis because the species either does not occur or has very rare migratory occurrence in the SLV.*

Indirect effects to migratory birds include spraying of forage (vegetation that creates cover and harbors insects and small mammals or other prey species that are important forage species for migratory birds), and loss of habitat from removal of weeds and incidental removal of native vegetation that provides cover and forage for these species. Indirect impacts from spraying activities can include crushing of nests or burrows and disturbance to individual bird species. For more information on direct and indirect effects to bird species, see the BLM PEIS, pp. 4-118 through 4-120. Impacts of BLM and Forest Service individually evaluated herbicides to wildlife can be found in the PEIS, pp. 4-102 through 4-109. The Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (BA) (2007) provides a description of the distribution, life history, and current threats for each federally listed animal species, as well as species proposed for listing. The BA also discusses the risks to federally listed terrestrial wildlife associated with each of the herbicides proposed for use by the BLM under the different alternatives.

For individual treatments near the *Proposed Action* limit of 300 acres per individual treatment, manual or physical manipulations could make habitats less suitable for some migratory birds, displacing them to find suitable habitat elsewhere. There is a possible indirect effect of disturbance to nesting birds. Some birds would be flushed during the nesting season from personnel that are conducting manual, mechanical, or cultural treatments.

The effects of biological treatment using insects and pathogens would be insignificant. In most cases, the target plants would remain standing, although weakened or unable to reproduce.

Cumulative Effects

Cumulative effects include loss of habitat due to fragmentation from roads, human development, changes in land management, and catastrophic events such as stand replacing fires. Energy development such as oil and gas exploration can fragment habitat or change areas that were once contiguous to landscapes that have less cover and more disturbance. Wind turbine farms can alter flyways and cause mortalities to migratory birds. Excessive grazing impacts from livestock could contribute to the replacement of native vegetation with weeds due to the competitive nature of weeds when native vegetation is reduced.

Other effects include weed infestation from private agricultural practices (irrigation, plowing, using heavy equipment that has not been decontaminated, introduction of non-native vegetation), county road and state highway roadside maintenance that spreads weeds and non-native vegetation and seed, use of pack animals or movement of livestock onto public lands that recently ate hay that harbored weeds or non-native vegetation, use of the BLM lands by recreationists that have weed seeds in their ATVs, vehicles, boats, and other recreational equipment.

These actions could potentially affect a very important area for migratory bird nesting and foraging activities and could include nest destruction, displacement or disturbance to individual or pairs of birds, and loss of habitat. Development on adjacent private lands generally leads to habitat loss and fragmentation. Human influences and development generally places more importance on public lands to provide foraging and nesting opportunities for migratory birds.

A primary concern for migratory birds from herbicide application includes direct spraying of birds or chicks, their nests, their prey, or their drinking water. Mechanical treatment can have direct impacts to individuals or nests from disturbance to birds, destruction of nests, and nest abandonment due to temporary equipment or human presence. Biological treatment may involve crushing of nests or disturbance to individuals when goats, sheep, or other livestock are present or competition for resources from biological controls using insects that may out-compete prey species that birds rely on. Another concern for migratory birds involves possible indirect impacts from habitat loss through overgrazing, loss of vegetation cover from removal or treatment of weeds, or trampling nest sites during the nesting season.

Mitigation

As a mitigation measure, the actions analyzed by this EA are subject to surveys and monitoring to ensure protection of nests and individual birds if additional information becomes available that suggests the need to do so. Any actions done outside of the prime breeding and brood rearing season (May 15 to July 15) would not affect migratory birds. Treatments occurring inside this season may require surveys and monitoring by the biologist prior to treatment.

See Appendix E for a summary of mitigation measures by resource.

3.4B THREATENED, ENDANGERED, CANDIDATE, AND SPECIAL STATUS WILDLIFE

Affected Environment

Twenty-seven species of threatened, endangered, or special status wildlife may occur in the SLVRA (Table 6) based on reports from the Colorado Natural Heritage Program (CNHP), Natural Diversity Information Source (NDIS), BLM, Rio Grande National Forest, and personal observations. Federally threatened, endangered, and candidate species occurring within the analysis area include: Canada lynx (FT), Southwestern willow flycatcher (FE), Gunnison prairie dog (FC), yellow-billed cuckoo (FC), and Rio Grande cutthroat trout (FC). Based on life history information, all 19 special status species listed in Table 6 below are carried forward because they may have suitable foraging, nesting, and denning habitat in the area and/or cannot be completely discounted due to lack of occurrence data.

Table 6: Threatened, endangered, and special status wildlife species in the SLVRA

Species	Status	Species Occurrence	Herbicide/ Mechanical/ Biological treatments under all alternatives
FEDERALLY LISTED SPECIES			
Black-footed Ferret	FE	No known occurrence; Grassland and shrubland species that is usually associated with prairie dogs. Are extirpated from SLV.	NE
Canada Lynx	FT	Known occurrence; Early successional mixed conifer forest and also aspen/willow/shrub-steppe are used for foraging (generally on small mammals and snowshoe hares). Late successional forests are used for denning and winter foraging.	NLAA
Whooping Crane	FE	No known occurrence; historic use of wetland and agricultural area, no extirpated from area.	NE
Southwestern Willow Flycatcher	FE	Known occurrence; Riparian habitats along rivers, streams, and other wetlands, where dense growths of willows or other shrubs and medium sized trees are present, often with a scattered overstory of cottonwood or alder.	NLAA
Mexican Spotted Owl	FE	No known occurrence; Steep canyons with a Douglas fir, white fir, ponderosa pine/ piñon-juniper component.	NLAA
Yellow-billed cuckoo	FC	Known occurrence; Suitable habitat in dense, mature cottonwood stands with complex/ dense understory and large blocks of riparian habitat.	NLAA
Gunnison Prairie Dog	FC	Known occurrence; Suitable habitat includes stunted shrublands and grasslands and agricultural lands.	NLAA
Rio Grande Cutthroat Trout	FC	Known occurrences; Suitable habitat in streams that support fisheries across the project area.	NLAA
BLM SPECIAL STATUS SPECIES			
AMPHIBIANS AND REPTILES			
Northern Leopard Frog	SS	Known occurrences; Suitable habitat available along river corridors, some larger streams with backwaters, open waters, wetlands, wet meadows; banks and shallows of marshes,	MI

Species	Status	Species Occurrence	Herbicide/ Mechanical/ Biological treatments under all alternatives
		ponds, beaver ponds, reservoirs, lakes, streams, and irrigation ditches.	
Milk Snake	SS	Known limited occurrences in Alamosa County; considered rare in SLV; shortgrass prairie, sandhills, shrubby hillsides, canyons, ponderosa pine savannas, piñon-juniper woodlands.	MI
Texas Horned Lizard	SS	No known occurrence; Grasslands, plains with large patches of bare ground, loamy or sandy soils.	MI
INVERTEBRATES			
Great Basin Silverspot Butterfly	SS	No known occurrence due to limited inventory effort; Suitable habitat includes wet meadows near streams, permanent spring-feed meadows and seeps.	MI
BIRDS			
Bald Eagle	SS	Known occurrence; winters in the project area, roosts in large cottonwood and mixed conifer, ponderosa pine, in open branched trees near large lakes, streams, rivers, and reservoirs. Will forage along river corridors, open water, wetlands, and on open grasslands and shrub-steppe habitat for birds and mammals.	MI
American White Pelican	SS	Known occurrence; Suitable habitat near wetlands, open water, and in flood irrigated areas, shallow sheltered marshes, lagoons, rivers, roosts on sandbars.	MI
Barrow's Goldeneye	SS	Known occurrence; Suitable habitat near wetlands and open water, lakes and rivers, nests in cavities around shallow, marshy lakes and beaver ponds.	MI
White-faced Ibis	SS	Known occurrence; Suitable habitat near wetlands, marshes, agricultural areas, nests in low trees or reeds.	MI
Northern Goshawk	SS	Known occurrence; Suitable foraging and nesting habitat in	MI

Species	Status	Species Occurrence	Herbicide/ Mechanical/ Biological treatments under all alternatives
		aspen and mixed conifer, may forage on edge of shrub-steppe and grasslands or in clearings or wetlands within mixed conifer and aspen stands.	
Ferruginous Hawk	SS	Occurrence in the project area, may nest on ground or in lone trees in stunted shrub-steppe habitat, open grasslands, or agricultural lands; forages for small mammals.	MI
Peregrine Falcon	SS	Known occurrence in project area, nests on cliff ledges and rock outcroppings, forages over water and near agricultural areas as well as for small mammals and birds across shrublands and grasslands.	MI
Mountain Plover	SS	Known occurrence; Suitable habitat includes short or stunted grasslands and shrublands, agricultural lands.	MI
W. Snowy Plover	SS	Known occurrence; Suitable habitat along wetlands, sandy beaches, shallow inland lakes and playas; have been documented in SLV.	MI
Black Tern	SS	No known occurrence; sandbars, marshy ponds or wetlands.	MI
Burrowing Owl	SS	Known occurrence; Open grasslands, stunted semi-desert shrublands, and agricultural lands.	MI
Gunnison's Sage Grouse	SS	Known occurrence; Isolated population in the Poncha Pass area in Northern Saguache County in the sagebrush steppe/ semi-desert shrubland and riparian habitat in SLV.	MI
MAMMALS			
Big Free-tailed Bat	SS	Known occurrence; Rocky landscapes, cliff faces, tree cavities or buildings for day roosts, open country for foraging, suitable habitat in piñon-juniper, and sagebrush/ shrub-steppe.	MI
Yuma Myotis	SS	Rare occurrence; Open water, streams or ponds, semi-desert	MI

Species	Status	Species Occurrence	Herbicide/ Mechanical/ Biological treatments under all alternatives
		shrubland, piñon-juniper woodlands, riparian woodlands.	
Townsends' Big-eared Bat	SS	Known occurrence; Caves, mines, buildings for roosting; sagebrush, semi-desert shrubland, piñon-juniper woodland, ponderosa pine woodlands, and montane forests.	MI

**Species Status:* FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened; SS = BLM Special status Species

*Determinations for Federally listed (T&E) species: NE = No Effect; NLAA = Not Likely to Adversely Affect; MA = May Affect; LAA= Likely to Adversely Affect; None= Species or its habitat is not present.

*Determinations for State Sensitive Species: NI = No Impact; MI= May Impact (May Impact Individuals, but is not likely to cause a trend towards Federal listing or loss of viability in the planning area); BI= Beneficial Impact; LI= Likely Impact (Likely to result in a trend towards Federal listing or a loss of viability in the planning area); None= Species habitat is not present or species is known not to be present.

ENVIRONMENTAL CONSEQUENCES

Federally listed species occur or have primary habitat available within the project area.

Direct Effects of Herbicide Application

Possible adverse direct effects to individual animals include death, damage to vital organs, change in body weight, decrease in healthy offspring, and increased susceptibility to predation. The main risk to wildlife from herbicide use is habitat modification such as loss of forage and cover habitat. However, forage species and wildlife use of the treated areas are likely to recover two to several years after treatment. The impacts of herbicide use on wildlife would depend directly on the sensitivity of each species to the particular herbicides used, the pathway by which the individual animal was exposed to the herbicide, and indirectly on the degree to which a species or individual was positively or negatively affected by changes in habitat. Species that reside in an area year-round and have a small home range, would have a greater chance of being directly adversely impacted if their home range was partially or completely sprayed because they would have greater exposure to herbicides- either by direct contact upon application or indirect contact as a result of touching or ingesting treated vegetation (BLM PEIS, p. 4-101).

Direct effects to Canada lynx, Mexican spotted owl, or yellow-billed cuckoo are not anticipated from weed spraying and eradication due to the secretive nature and remote locations or general avoidance of these species of human presence. Direct effects to Gunnison prairie dog, Southwestern willow flycatcher are possible from direct spraying to burrows/nests and actually spraying individuals. Direct effects to Rio Grande cutthroat trout are not anticipated because of restrictions to applying herbicides directly to water bodies and flowing streams and rivers; also dilution of the herbicides would likely make them inert when applying them directly to water.

Direct effects to special status reptiles, amphibians, raptors, butterflies, bats, songbirds, and shorebirds include direct spraying of nesting/ roosting/ or foraging animals that could cause harm, damage, or death to these species listed above.

Direct effects to threatened, endangered, candidate, and special status species are more critical for species or population survival and viability due to the special status nature of their existence, the specificity of their habitat needs and requirements, and the limited numbers of individuals across the resource area. Direct effects such as reduction in species productivity or viability can set back these species and lead towards listing or extirpation more quickly than for more abundant species that can rebound from adverse actions due to population abundance and more general habitat requirements to meet their ecological needs.

Indirect Effects of Herbicide Application

Adverse indirect effects include reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; decrease in wildlife

population densities within the first year following application as a result of limited reproduction; habitat and range disruption (as wildlife may avoid sprayed areas for several years following treatment), resulting in changes to territorial boundaries and breeding and nesting behaviors; and increase in predation of small mammals due to loss of ground cover (BLM PEIS, p. 4-101).

Indirect effects to Canada lynx, Mexican spotted owl, and yellow-billed cuckoo are not anticipated with herbicide treatment. Indirect effects to Southwestern willow flycatcher include spraying nests directly, removal of nesting habitat (tamarisk), or removing available vegetation that provides forage for insects, a main prey item for flycatchers. Indirect effects to prairie dogs include spraying vegetation near burrows that may be clipped and ingested by prairie dogs, especially susceptible are young prairie dog that do not have tolerances to herbicides. Indirect effects to Rio Grande cutthroat trout include riparian spraying that can affect water quality for trout or remove overhanging riparian vegetation that constitutes a main terrestrial insect source for trout food.

Indirect effects to special status reptiles, amphibians, raptors, butterflies, bats, songbirds, and shorebirds include spraying of forage (vegetation that creates cover and harbors insects and small mammals or other prey species that are important forage species for special status species), and loss of habitat from removal of weeds and incidental removal of native vegetation that provides cover and forage for these species. Indirect impacts from spraying activities can include crushing of nests or burrows and disturbance to individual special status species. For more information on direct and indirect effects to special status species see the BLM PEIS, pp. 4-118 through 4-120. Impacts of BLM and Forest Service individually evaluated herbicides to wildlife can be found in the PEIS, pp. 4-102 through 4-109. The Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (BA) (2007) provides a description of the distribution, life history, and current threats for each federally listed animal species, as well as species proposed for listing. The BA also discusses the risks to federally listed terrestrial wildlife associated with each of the herbicides proposed for use by the BLM under the different alternatives.

A Summary of Herbicide Effects to special status species, effects under each alternative, and mitigation measures can be found in the BLM PEIS, pp. 4-119 through 4-124. Impacts to special status aquatic wildlife and mitigation measures can be found in the PEIS, pp. 4-94 through 4-96. There are potential risks to special status wildlife species associated with herbicide use. Although the predicted risks for adverse health effects to individual organisms are the same as those predicted for non special status wildlife, the associated population- and species-level effects would be much greater for many special status species because of their limited/fragmented distribution and limited population size. Risks to special status wildlife can be minimized by following certain SOPs, which can be implemented at the local level according to specific conditions (see the BLM PEIS, Table 2-8).

Manual/Physical Treatment
For individual treatments near the *Proposed Action* limit of 300 acres per individual treatment, manual or physical manipulations could make habitats less suitable for some special status species, displacing them to find suitable habitat elsewhere. There is a possible indirect effect of disturbance to nesting birds, burrowing animals, and denning animals. Some birds would be flushed during the nesting season by personnel that are conducting manual, mechanical, or cultural treatments. Dens and burrows should be flagged and avoided by treatment applicators. For manual or physical treatment for wildlife see the BLM PER, pp. 4-57 through 4-59.

Biological Control
The effects of biological treatment using insects and pathogens would be insignificant. In most cases, the target plants would remain standing, although weakened or unable to reproduce. One of the more promising research areas under investigation is the use of a biocontrol agent such as the seed fungus (*Ustilago bullata)* to control cheatgrass. This fungus causes head smut disease in cheatgrass by infecting its germinating seeds. Although the fungus allows cheatgrass to grow to maturity, when the cheatgrass plant flowers, the head smut pathogen prevents the plant from producing seeds and thus prevents it from reproducing. For biological control information on wildlife species see the BLM PER, pp. 4-57 through 4-59**.**

Effects Analysis and Determinations for Threatened and Endangered Species
NLAA: Not Likely to Adversely Affect

- For discussion of the effects and determination for herbicide, mechanical and biological treatments on Western snowy plover: BLM PEIS, p. 6-64; BA, pp. 6-61 through 6-64.
- For discussion of the effects and determination for herbicide, mechanical, and biological treatments on Southwestern willow flycatcher: BLM PEIS BA, pp. 6-68 through 6-71.
- For discussion of the effects and determination for herbicide, mechanical, and biological treatments on Mexican Spotted Owl: BLM PEIS BA, pp. 6-86 through 6-89.
- For discussion of the effects and determination for herbicide, mechanical and biological treatments on Canada lynx: BLM PEIS BA, pp. 6-141 through 6-144.

Effects analysis and determinations for special status species:
MI: May Impact Individuals, but is not likely to cause a trend towards federal listing or loss of viability in the planning area is based on wildlife and aquatic species effects analyses completed in the PER and PEIS as well as the BA that broadly discusses issues, effects, and determinations for many species or similar species to the ones listed above as special status species.

Cumulative Effects
Measurable contribution to TES species in terms of primary habitat is offered by this resource area. Cumulative effects to threatened, endangered, candidate, and special status species are possible. They include loss of habitat due to fragmentation from roads, human development, changes in land management, and an increase in noxious and invasive weeds across the SLVRA.

Weed infestation can result from private agricultural practices (irrigation, plowing, using heavy equipment that has not been decontaminated, introduction of non-native vegetation), county road and state highway roadside maintenance that spreads weeds and non-native vegetation and seed, use of pack animals or movement of livestock onto public lands that recently ate hay that harbored weeds or non-native vegetation, and use of BLM lands by recreationists who have weed seeds in their ATVs, vehicles, boats, and other recreational equipment. Weed or non-native vegetation infestations such as Russian knapweed, Canada thistle, tamarisk, Russian olive, cheatgrass, downy brome, and others can replace habitat that is important for threatened, endangered, candidate, and special status species. These species are more susceptible to the negative effects of habitat loss because they are usually specifically tied to certain habitat types and fill specific ecological niches.

Mitigation
Mitigation and conservation measures are listed in the BA under each animal name for threatened and endangered species (Canada lynx, Mexican spotted owl, Southwestern willow flycatcher, Western snowy plover). Mitigation measures for special status species and species of concern are listed in the PER and PEIS under the aquatic and wildlife sections as well as in the SOPs. Buffer zones for species are found in Appendix C, the Ecological Risk Assessment of the PEIS.

See Appendix E of this EA for a summary of mitigation measures by resource.

3.4C AQUATIC WILDLIFE

Affected Environment
Aquatic wildlife include fishes, amphibians, and invertebrates. Aquatic habitats include both lentic (still water, e.g. lakes) and lotic (moving water, e.g. rivers).

Most of the watersheds with aquatic wildlife are dependent on precipitation, mostly in the form of snowmelt and summer thunderstorms. These water bodies, marshes, wetlands, playas, and stream and riverine systems provide habitat for native fish (Rio Grande cutthroat trout, Rio Grande chub, flathead chub, and Rio Grande sucker) and non-native fish (white sucker, Eastern brook trout, German brown trout, rainbow trout, and a myriad of other warm and cold water species). These waters also provide habitat for terrestrial and aquatic insects, reptiles such as common garter snakes, and amphibians such as Great Plains toads, Western chorus frogs, and tiger salamanders.

Specific to Blanca Wetlands, there are key source populations of toads and frogs found within the ephemeral wetland system and around artesian well heads on the property. Several of the toad species found on the wetlands breed for only a short time after ephemeral pools form following rain events but emerge from hibernation sometime in late May and are still active in September. Preferred habitat for these species can be deceiving because it looks like a dry sandy basin. Also deceiving is the importance of the artesian well heads on both Blanca Wetlands and McIntire/Simpson Wetlands. The moist soil and warm water around these wells provide breeding, hibernacula, and foraging habitat for amphibians. Some of the highest detections of leopard frogs on Blanca Wetlands have been found around the well heads. There are 43 wells of this type on Blanca Wetlands and four on the Simpson property. These wells run year round, and amphibians can be found active from March through October as well as found hibernating in large numbers in these locations during the winter.

Riparian systems may be invaded by non-native species which can be detrimental to native aquatic species. In riparian areas, non-native plants often support fewer native insects than native plant species, which could affect food availability for insectivorous fish species such as trout. The replacement of native riparian plant species with some invasive species may adversely affect stream morphology, bank erosion, and flow levels. Removal of invasive species through herbicide use, when physical and climatic conditions and herbicide formulations allow treatments to be safe for native species and water quality, can help to restore a more complex vegetative and physical structure and natural levels of processes such as sedimentation and erosion.

ENVIRONMENTAL CONSEQUENCES

For a comprehensive, general review of impacts by treatment, impacts by alternative, and adverse and beneficial effects by bio-region to aquatic species please reference the documents below:

- Impacts by treatment to aquatic wildlife: BLM PEIS, pp. 4-80 through 4-89.
- Impacts by alternative to aquatic wildlife and mitigation measures: BLM PEIS pp. 4-89 through 4-94.
- Adverse and beneficial effects by bio-region to aquatic species: BLM PEIS, pp. 4-60 to 4-70.

Unique to Blanca Wetlands are the amphibian concerns within ephemeral basins and around well heads. Under either Alternative A or B, the deceivingly dry appearance of key habitat could result in direct effects from spraying within days of a rain event. In this case, risks would go beyond an individual being sprayed and affected by a chemical. Since habitat is limited in the area and the species tend to emerge and concentrate all at once for a few weeks a year for breeding, the risks could be more pronounced to a population if spraying occurred during this key time and considerations that go beyond the BLM PEIS are necessary to accommodate these species' habitat needs in order to meet the intent of the Plans listed above. Adding a mitigation measure that eliminates spraying within the key habitats in the ephemeral playas of the Closed Basin during

breeding would adequately address this concern under all alternatives (see the mitigation section below for more detail).

The other potential impact under all three of the alternatives is aquatic wildlife around artesian well heads. On Blanca Wetlands as well as the McIntire and Simpson properties, the wells release artesian warm water, and in most cases, have stable vegetation around them. Because of the high use all through the year either by burrowing, feeding, breeding, or hibernating amphibians near well heads, chemical and mechanical vegetative treatments identified in all alternatives could potentially affect the amphibian hibernacula habitat or directly impact individuals. Provided the same SOPs identified for wetlands and water bodies in the BLM PEIS (2007) apply on wetland artesian well heads, there would be only minimal impacts to amphibians from any of the alternatives and the threat of impacting a large population by a well head would be eliminated.

Cumulative Effects

Cumulative impacts to aquatic wildlife include private and state and federal land and water management including irrigation practices, water developments, removal of riparian vegetation, alteration of channel morphology, removal of natural structures including beaver dams, and additives to water to control weeds or undesirable fish species. Other impacts can include unforeseen future projects, travel management, sediment input into the streams and water bodies through removal of vegetation that filters stream inputs and locations of roads nearby that provide sources of sediment and contamination, and recreation.

Other impacts include weed infestations from private agricultural practices (irrigation, plowing, using heavy equipment that has not been decontaminated, introduction of non-native vegetation), county road and state highway roadside maintenance that spreads weeds and non-native vegetation and seed, and use of BLM lands by recreationists that have weed seeds in their ATVs, vehicles, boats, and other recreational equipment.

Effects on local amphibian populations, fisheries, and downstream water quality due to siltation from cumulative impacts may have long-term negative consequences if no mitigation is implemented and invasive species control is not applied.

Mitigation

This assessment of effects assumes that SOPs (listed in Table 2-5 of the PER and Table 2-8 of the PEIS) are used to reduce potential unintended effects to fish and other aquatic organisms. Minimum buffers and other herbicide use restrictions would be established based on guidance given in risk assessments prepared for the PEIS (see Appendix C of the PEIS) and the herbicide label.

See Appendix E of this EA for a summary of mitigation measures by resource.

3.4D TERRESTRIAL WILDLIFE

Affected Environment

The SLVRA is habitat for big game such as elk, mule deer, bighorn sheep, and pronghorn antelope; carnivores such as mountain lion, bobcat, fox, coyote, black bear, badger; small mammals; raptors; and songbirds. Semi-desert shrubland also supports a high diversity of reptiles. Amphibians may be present when water is available, although unique upland species such as the Plains spadefoot toad may utilize areas within terrestrial habitat types depending on the type of soils involved.

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

For a comprehensive, general review of impacts by treatments, impacts by alternative, and adverse and beneficial effects by bio-region to terrestrial wildlife please reference the documents listed below:

- For SOPs, adverse effects and beneficial effects of treatments and by bio-regions: BLM PER, pp. 4-75 through 4-91.
- Information on direct and indirect effects to wildlife species: BLM PEIS, pp. 4-99 through 4-101.
- Impacts of BLM and Forest Service individually evaluated herbicides to terrestrial wildlife: BLM PEIS, pp. 4-102 through 4-109.
- Impacts by alternative and mitigation measures: BLM PEIS, pp. 4-114 through 4-118.

Assumptions for risk factors include, but are not limited to: broadcast spraying; amount of absorption; and an assumption that 100% diet is contaminated food. Additionally, toxicological data does not exist for specific wildlife species. Consequently, toxicological data for surrogate wildlife receptors, obtained from a literature review, were evaluated and used to establish quantitative benchmarks (i.e., toxicity reference values for the ecological species of concern). Based on these factors, along with the proposed small treatment areas, incorporating the SOPs, by avoiding herbicide application during critical breeding or nesting/ denning periods, the potential risks to terrestrial wildlife would be significantly reduced.

In general, adverse indirect effects of herbicides to wildlife could include a reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; a decrease in population densities within the first year following application as a result of limited reproduction; habitat and range disruption (as wildlife may avoid sprayed areas for several years following treatment), resulting in changes to territorial boundaries and breeding and nesting behaviors; and an increase in predation due to loss of ground cover.

Manual/Physical Treatment

For individual treatments near the *Proposed Action* limit of 300 acres per individual treatment, manual or physical manipulations could make habitats less suitable for some

wildlife, displacing them to find suitable habitat elsewhere. There is a possible indirect effect of disturbance to nesting birds, burrowing animals, and denning animals. Some birds would be flushed during the nesting season by personnel that are conducting manual, mechanical or cultural treatments as well as dens and burrows flagged and avoided by treatment applicators.

Biological Control
The effects of biological treatment using insects and pathogens would be insignificant. In most cases, the target plants would remain standing, although weakened or unable to reproduce. One of the more promising research areas under investigation is the use of a biocontrol agent such as the seed fungus (*Ustilago bullata)* to control cheatgrass. This fungus causes head smut disease in cheatgrass by infecting its germinating seeds. Although the fungus allows cheatgrass to grow to maturity, when the cheatgrass plant flowers, the head smut pathogen prevents the plant from producing seeds and thus prevents it from reproducing.

Cumulative Effects
Herbicide use occurs on other federal, state, and county ownerships, state and private forestry lands, rangeland, utility corridors, road rights-of-way, agricultural lands and private residences. Herbicide use on BLM land within the SLVRA could contribute to some cumulative effects, but data is lacking that would permit any quantitative estimates of cumulative exposure or risk. Since most wildlife species are not tied only to lands managed by the BLM, they could be exposed to herbicides on adjacent lands or along their migration routes. They could be exposed to the same herbicide on multiple ownerships, or a combination of different herbicides. Most wildlife species could also be exposed to other chemicals, such as insecticides, rodenticides, fungicides, and others.

Mitigation
Mitigation measures can be referenced in the BLM PEIS, p. 4-118. This assessment of effects assumes that SOPs (listed in Table 2-5 of the PER and Table 2-8 of the PEIS) are used to reduce potential unintended effects to terrestrial wildlife species. Minimum buffers and other herbicide use restrictions would be established based on guidance given in risk assessments prepared for the PEIS (see Appendix C of the PEIS) and the herbicide label.

See Appendix E of this EA for a summary of mitigation measures by resource.

3.5 RIPARIAN/FLOODPLAIN/WETLANDS RESOURCES

Affected Environment
Riparian and wetland vegetative communities in the assessment area under BLM jurisdiction represent a small fraction (<1%) of the surface area administered by BLM in the SLV. That low relative land cover is counterbalanced by the extreme resource value of these riparian zones and wetlands, notably their provision of ecological services such

as drinking water sources, fisheries, wildlife habitat, migration corridors, flood protection, commercial ranching, irrigation, recreation, and forage for wildlife species and livestock. Areas such as Blanca and McIntire/Simpson are recognized as nationally significant areas for wildlife.

Riparian

The SLVRA comprises portions of the Rio Grande, Saguache Creek, San Luis Creek, Alamosa River, and Conejos River watersheds. The BLM monitors riparian conditions on 76 streams (91 reaches) equivalent to approximately 131 linear miles as well as 28 springs within smaller drainages that contribute to the aforementioned watersheds. The highest number of individual riparian segments administered by BLM in the SLVRA occurs in Saguache County, while the longest individual stretches occur along the Rio Grande Outstanding Natural Area in Conejos and Costilla counties.

Wetlands, including irrigated wetlands

BLM administers approximately 2,367 acres of wetlands in the SLVRA as described in Table 7. The majority of these wetlands, Blanca, McIntire/Simpson, and La Garita, are irrigated through a series of turnouts and ditches that regulate water flows.

Table 7: BLM-administered wetlands in the SLVRA

Wetland Name	Acres
Blanca Wetlands	1,388
Simpson/McIntire	769
O'Neal Spring	2.3
Mishak Lakes	208
La Garita	80
Total Acres:	**2,367.3**

Managed Wetlands

Of the wetlands described in Table 7—Blanca Wetlands, McIntire/Simpson, and La Garita—are actively managed through irrigation of river and Closed Basin water to achieve biological and vegetative objectives. Active irrigation on these properties provides tremendous resource benefits, but also presents challenges in terms of weeds. These wetlands can be categorized as either Closed Basin or Riverine Wetlands. Each has different functions and habitat typing; consequently, each type has a different response to weed infestations.

Blanca Wetlands (Unit #1; see Appendix B for map) is a Closed Basin wetland located at the sump of the SLV. There is no outflow from this property, and the habitat comprises a system of interconnected large and flat playa basins surrounded by sandy greasewood dunes. Managed Closed Basin wetlands often fluctuate between successional stages, which leads to hundreds of acres in transitional habitat at any given time and consequent weed infestations characteristic of that transitional period. This transitional

period is essential for productivity of a managed wetland, so weed treatments are incorporated into the management of the site.

The Closed Basin has become more susceptible to both tamarisk and Russian knapweed infestations over time. The surrounding private land to the west of Blanca Wetlands has become a sea of knapweed with little headway from county spraying efforts. Patches are becoming more prevalent on Blanca Wetlands. Tamarisk has always been limited on the wetlands and the surrounding areas, but becomes more prolific during drought periods. New plants are establishing not only on Blanca Wetlands, but on the private land both to the north of the wetlands and south of Lane 6.

La Garita Creek and McIntire and Simpson Wetlands (Units 13 and 2; see Appendix B for maps) are riparian systems very different than those within the Closed Basin. These wetlands are also highly dynamic, but more driven by runoff events than water table changes. On La Garita Creek, thistle patches are widespread. On McIntire and Simpson, perennial pepperweed, Canadian thistle, small patches of *Phragmites*, and some scattered Russian knapweed patches are of concern. Current efforts include biological controls, use of water, and chemical methods to limit spread of the weeds, and in some cases to reduce the overall infested acreage.

Current management of these wetlands includes pulsed irrigation to match the timing allowed by the State Engineer's Office. This timing typically starts in April and ends in July, but is on and off depending on the volume of flow available on the rivers and the status of the Rio Grande Compact. Therefore, weed treatment planning must incorporate timing of proposed irrigation and goals for different pastures prior to application.

Cumulatively, the areas surrounding these riverine wetlands are not as infested as the areas within the Closed Basin because of the grazing and spraying practices being implemented in the actively farmed and grazed areas near the rivers.

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

Alternative A – Proposed Action

Direct and Indirect Effects

Alternative A is an IPM proposal that includes herbicide, manual/physical, and biological control treatment categories (see Table 1). Direct and indirect effects on riparian and wetland resources are described below for each treatment category.

Herbicide

The direct and indirect effects of herbicide treatment on riparian and wetland resources under the Proposed Action are described in the BLM PEIS, pp. 4-35 to 4-44. Specific effects of the 17 herbicide active ingredients on aquatic resources vary (see individual

A.I. Ecological Risk Assessments [ERAs] at http://www.blm.gov/wo/st/en/prog/more/veg_eis.html).

BLM's SOPs (Appendix D) are intended to reduce adverse impact and risk to riparian and wetland resources up front from the non-selective effects of herbicide active ingredients. This impact assessment assumes agency adherence in the SLV to SOPs for application of herbicides not labeled for aquatic use. BLM's SOPs are based on risk assessment guidance in the ERAs and specify herbicide-free buffer zones including minimum width of 25 feet for vehicle and 10 feet for hand spray applications. Buffers would reduce the potential for transport of terrestrial herbicides into wetland and riparian habitats.

Specific to managed wetlands, this alternative as opposed to Alternative C would be beneficial due to the ability to treat wetlands in the transitional stage at dry times with chemicals. The ability to treat wetlands with chemicals provides more flexibility in wetland management. Flexibility is provided by allowing managers to dry areas, burn areas, and mechanically treat wetlands to set back succession and free up nutrients without the risk of weed infestations following wetland management.

Also, due to the scale of Russian knapweed infestation to the west of Blanca Wetlands on private lands and the increasing patches occurring on the wetlands, this alternative would provide the greatest degree of protection to the wetlands by authorizing additional chemical options that are more effective on knapweed.

In areas of La Garita Wetlands and the McIntire and Simpson properties, water is turned on and off pending direction by the Division of Water Resources and the ditch companies. Because an area can dry within weeks and there is little notice prior to turning the ditch back on, there is the potential under either Alternative A or B to spray an area that appears dry but would be wet within days. Mitigation that addresses this risk is identified in the mitigation section below.

In summary, Alternative A could result in the most extensive impacts, both adverse and beneficial, to riparian and wetland resources in the SLV, when compared with Alternatives B and C, given that Alternative A proposes the greatest total herbicide treatment acreage (Table 1). However, impacts in any given year, both adverse and beneficial, would be limited based on annual acreages proposed for treatment relative to the location and extent of invasive species present in the study area and their proximity to riparian zones and wetlands (see Appendix B Maps 1-10 and Table 7 above). The notable exceptions are Blanca Wetlands and McIntire/Simpson properties that include both riparian and wetland resources as well as considerable noxious weed and invasive species. Because of the more widespread weed problem on these parcels and degree of risk from surrounding infestations, this alternative allows a degree of protection over Alternative B or C due to the ability to actually reduce acreage infected more quickly and thoroughly through the use of more options of types of chemicals.

The direct and indirect effects of herbicides on riparian and wetland resources could include both beneficial impacts such as improved water quality and fishery habitat from the elimination of noxious invasive aquatic species, as well unintended adverse impacts to non-target species. (See sections 3.4B and 3.4C for more discussion on species impacts.)

The adverse risk of herbicide use under Alternative A – Proposed Action could include direct impacts to wetland and riparian species diversity, competitive interactions, species dominance, and vegetation distribution. Herbicide applications under Alternative A could temporarily reduce plant cover, and result in increased erosion and sedimentation, increased nutrient loading, alterations in native vegetation, and changes to temperature and hydrologic conditions. Upland reduction of noxious weeds and invasive species could result in minor sedimentation to wetlands and riparian areas down slope from a herbicide treatment area.

Of the active ingredients considered, imazapyr, glyphosate, triclopyr, 2,4-D, diquat, and fluridone are approved for use in aquatic systems by the U.S. Environmental Protection Agency (EPA), including wetlands and riparian areas. The BLM's ability to use these chemicals (fluridone and diquat for aquatic applications, and imazapic and Overdrive® for terrestrial applications) would provide new tools for controlling problematic invasive species. Control or elimination of invasive species in the SLV both upslope and within riparian and wetlands could include indirect beneficial impacts to those resources assuming reseeding, restocking, and/or reestablishment of native plant communities succeed. Overdrive® and imazapic would primarily be used on uplands, but their use could still provide greater benefits to riparian and wetland areas, relative to Alternative B – No Action and Alternative C – No Herbicide. Overdrive® would be used to treat thistles and knapweeds, while imazapic could be used to control downy brome (cheatgrass). These invasive plant species degrade riparian habitats and can lead to shortened fire cycles, followed by soil erosion and sedimentation.

Manual/Physical Treatment

The direct and indirect effects of manual/physical treatment on riparian and wetland resources under Alternative A are described in the BLM PER, pp. 4-27 to 4-33. In summary, Alternative A could result in the most extensive impacts, both adverse and beneficial, to riparian and wetland resources in the SLV, when compared with Alternatives B and C, given Alternative A proposes the greatest total manual/physical treatment acreage (Table 1).

The direct effects of manual treatment on targeted small areas involves less adverse risk to riparian and wetland species than mechanical methods. Both manual and mechanical methods include soils disturbance which could result in increased erosion and, potentially, increased sedimentation in riparian and wetland areas. The use of heavy equipment could also pose risk of increased soil compaction, particularly in areas of

moist soils, thus increasing surface runoff from the surrounding treated areas. The magnitude of effects to riparian areas and wetlands in the SLV would depend on soil compaction and weather. BLM's SOP's in the SLV would include the use of low-pressure tires, which distribute vehicle weight over a larger area, reduce pressure on soil, and minimize the effect of heavy equipment on soil involves. Treatment by mechanical methods during dry months can also minimize the effects to wetlands by reducing the potential for surface water runoff into wetlands. Spills resulting from fueling, equipment maintenance, and operation could adversely affect water quality and the health of wetland or riparian areas. These risks would be minimized by having provisions for incident response in the SOPs.

Under Alternative A up to 1,000 acres/year would experience some level of risk described above, or roughly five times the direct impact of Alternative B, and twice the impact of Alternative C. While degradation of aquatic habitats, including riparian areas and wetlands, is a risk of manual/physical treatments of noxious weed and invasive species, particularly where treatments are performed on slopes above those resources, the relative surface area exposed to soil disturbance under the Alternative A is minor in proportion to the study area (< $1/5^{th}$ of 1%) and limited in relation to the study area's riparian and wetland areas (Appendix B, Maps 1-10).

Biological

Under Alternative A there is some potential to use prescribed grazing to contain noxious weeds and invasive species in riparian or wetland habitat as a biological control. The use of livestock such as goats to control vegetation in riparian and wetland habitats in the SLV would require very careful planning and execution to avoid impacts to other resources. In these habitats the timing, amount, and duration of grazing would be very specifically designed to impact the growth and reproduction of target plant species without inhibiting the ability of native vegetation to reproduce and re-vegetate the treatment area. The potential impacts, both adverse and beneficial, of biological control of noxious weeds and invasive species in riparian and wetland habitats would be highest in Alternative A in comparison with Alternatives B and C based on projected annual treatment acreages defined in Table 1.

Alternative B – Continue Present Management (No Action)

Direct and Indirect Effects

Direct and indirect impacts to riparian and wetland resources, both adverse and beneficial, from herbicide treatments under Alternative B would be similar to those described under Alternative A but limited to the four active ingredients currently approved for use by the BLM. However, total annual acreages treated under Alternative B represents only $1/8^{th}$ of the surface area treated relative to those proposed under Alternative A. Assuming risks described previously increase with total area treated, impacts risk to riparian and wetland resources under Alternative B would be less than under the proposed action. However, given the more narrow range of herbicide active ingredients available for use by the BLM, the risk to continued expansion of invasive

species in riparian areas and wetlands would be expected to be higher under Alternative B than under Alternative A. Adverse risks associated with herbicides would be higher under Alternative B than under Alternative C.

Impacts under Alternative B would account for no more than 1/5th of the surface area impacted compared to Alternative A, based on proposed acreage treated for manual/mechanical treatments, and 1/3rd of the surface area for biological controls. Impacts to riparian areas and wetlands from biological controls under Alternative B would be roughly equal to Alternative C based on acreage. Alternative B's mechanical/manual treatments would represent less than half the surface area of Alternative C.

Effects to managed wetlands under this alternative are similar to Alternative A. The use of chemicals would provide more flexibility in wetland management, but this alternative provides less ability to treat knapweed than Alternative A, which is likely to be the greatest emerging issue on Blanca Wetlands.

Alternative C – No Herbicide Use
Direct and Indirect Effects
Direct and indirect impacts to riparian and wetland resources, both adverse and beneficial, from herbicide treatments would not be present under Alternative C. Relative impacts from manual/mechanical and biological treatments from Alternative C relative to the other two alternatives have been discussed.

For managed wetlands, applying weed treatments (biological, chemical, and mechanical) is an essential part of the dynamics of wetland management in the SLV. Without some level of chemical weed treatment, driving wetland systems into productive transitional periods puts the system at risk for noxious weed infestations. Without transition periods, the productivity of wetlands become stagnant, then eventually drops.

Because of risks to the wetlands from Russian knapweed and the limited ability to curtail this species by biological or mechanical treatments, this alternative poses a risk to Blanca Wetlands habitat and the ability to offer disturbance to the system. Currently, burning, disking, and drying set back succession. With these methods, there are exposed soils and therefore sites for knapweed to invade. Without some spot spraying, these methods that provide flexibility in management would have to be greatly reduced or risk allowing knapweed to establish and spread.

Cumulative Effects
Other past, present, and reasonably foreseeable actions on public lands in the SLV or private lands in the vicinity that would be cumulative to the effects on riparian and wetland species of the actions considered in Alternatives A, B, and C include grazing, recreation, timber harvest, road development, center-pivot agricultural, urbanization,

among other forces. The level of herbicide application or manual/ mechanical/ biological treatment, under any of the three alternatives would be cumulative to other activities that occur in riparian and wetland resources (grazing, recreation, center pivot irrigation, urbanization etc.) but marginal relative to the total area of all riparian areas and wetlands in the SLV. The cumulative effects of continued spread of noxious and invasive plant species on public lands from any of the alternatives could be dramatic and irreversible.

The referenced BLM PEIS, PER, and ERAs, including risk analyses to terrestrial and aquatic organisms for 18 active herbicide ingredients, are viewable at http://www.blm.gov/wo/st/en/prog/more/veg_eis.html.

Mitigation

Mitigations to reduce adverse risk in riparian and wetlands from IPM treatments considered in Alternatives A, B, and C are defined in the SOPs. See Appendix E for a summary of mitigation measures by resource.

No chemical or mechanical work shall occur from April 15th through September 30th in basins with known toad populations or key sites as identified by the wetland managers. If work is planned in these areas, annual maps will be generated by wetland managers demonstrating potential habitat. This habitat could change annually depending on the water application during any given year, so new maps identifying potential habitat must be generated each time treatments are planned in a new year.

Treat artesian well heads as a “wetland” or “water body” and use the same protection as identified in the SOPs for these structures.

The weed program manager must coordinate with the wetlands site manager during the irrigation season from March through October on McIntire/Simpson and La Garita systems to prevent conflicts between timing of spraying and irrigation.

In key areas for toads—dry basins with a perched water table and low-lying pools—do not use mechanical or chemical treatments from April 15th through September 30th to protect Plains spadefoot or Great Plains toads during the active season. If projects are necessary in these areas during this time period to meet specific weed eradication objectives, maps can be generated by wetland managers showing key areas and known toad populations. Because key areas and toad populations could change annually depending on the water application, new maps identifying potential habitat must be generated each time treatments are planned in a new year.

Do not initiate weed treatments on riverine wetland areas that have surface water rights and can be irrigated during the following periods without consultation and coordination with the wetland manager:

Simpson/McIntire properties: Avoid weed treatments from March through October unless coordinated with the wetland's manager.

La Garita Creek: Avoid weed treatments from April through July unless coordinated with the wetland's manager.

Apply the same protection offered under the SOPs identified for "wetlands" and "water bodies" in BLM PEIS's Table 2-5 on wetland artesian well heads located on Simpson and Blanca Wetlands.

3.6 CULTURAL AND PALEONTOLOGICAL RESOURCES

Affected Environment

The cultural resources within the SLVRA include a diverse array of prehistoric and historic archaeological sites that make up a unique cultural landscape. Prehistoric site types include open lithic sites, open camp sites, open and sheltered architectural sites, rock art, and Traditional Cultural Properties, which include areas of cultural significance identified by extant Native American Cultures. Historic site types include homesteads, prospecting/mining adits, and historic roads and trails.

The cultural site density is high within the BLM lands, which includes a foothills ecotone known for its diversity of plant and animal species desirable in ancient and historic subsistence regimes. The potential for paleontological sites within the resource area is low, but does exist. A local paleontological overview is currently underway to increase the understanding of what types of resources may be present and where they are within the unit. Within the analysis area, there are a high number of sites *eligible* to the National Register of Historic Places (NRHP).

ENVIRONMENTAL CONSEQUENCES

Invasive plants may have long-term negative impacts on cultural and paleontological resource sites by displacing native vegetation and increasing the potential for soil erosion, potentially leading to the loss of these resources. The removal of invasive vegetation could contribute to the restoration and maintenance of historic and ethnographic cultural landscapes.[6]

Before proceeding with weed treatments, the effects on cultural resources would be addressed through compliance with the National Historic Preservation Act (NHPA), as implemented through a national Programmatic Agreement and state-specific protocol agreement with the Colorado State Historic Preservation Office; see Appendix C.

[6] USDI National Parks Service, Invasive Exotic Plant Management Plan and Environmental Assessment. Rocky Mountain National Park, Colorado (2003)

The processes for identifying and managing cultural resources are addressed in USDI BLM manuals 8100. The program also ensures close consultation with Native American tribal governments, as required by law, for the maintenance, preservation, and promotion of native cultural heritage and resources, including plant and animal subsistence resources and the use of vegetation for religious and ceremonial purposes. The SLVRA is in the process of initiated consultation with Native American tribes to identify cultural values and/or traditional practices that could be affected by BLM actions. Consultation will occur through the bi-annual Tribal Consultation Bulletin that will be sent to all tribes and groups that could be directly affected by vegetation treatment activities, and requesting information on how the proposed activities could impact Native American interests, including the use of vegetation and wildlife for subsistence, religious, and ceremonial purposes. *Currently, there are no known traditional plant collecting areas within or adjacent to the project area.*

Effects on paleontological resources would be addressed as outlined in the San Luis Resource Area Record of Decision and Approved Management Plan (1991).

Impacts of Chemical Treatments: Herbicides

The effect of herbicide treatments on cultural resources depends on the method of herbicide application and the herbicide type used. Some chemicals can cause soil acidity to increase, which would result in deterioration of artifacts—even some types of stone from which artifacts are made. Application of chemical treatments can also result in impacts such as altering or obscuring the surfaces of standing wall masonry structures, pictograph or petroglyph panels, and organic materials. While chemicals may affect the surface of exposed artifacts, they can generally be removed without damage if treated soon after exposure. Organic substances used as inactive ingredients in herbicide formulations, such as diesel fuel or kerosene, may contaminate the surface soil and seep into the subsurface portions of a site. These organic substances could interfere with the radiocarbon or Carbon 14 (C-14) dating of a site (BLM SLRA Record of Decision, 1991). Herbicides could also harm traditional use plants, or threaten the health of the people gathering, handling, or ingesting recently treated plants, fish, or wildlife that are contaminated with herbicides. *Currently, there are no known traditional plant collecting areas within or adjacent to the project area.*

With regard to paleontological resources, the effect of herbicide treatments on fossil material would vary with respect to: 1) fossil type; 2) minerals; 3) degree of fossilization; and 4) whether the fossil is exposed or buried. Although it may be possible for chemicals found in herbicides to impact unique fossil material, herbicide treatments are more likely to affect researchers, students, or other field personnel conducting paleontological research than the paleontological resources. More likely, damage to fossil materials, if present, would result from the use of wheeled equipment to apply herbicides. The potential for impacts to fossils would depend on the attributes of the fossil material, whether the fossil is buried or exposed, and the method of herbicide

application. Methods involving the use of vehicles driving cross-country would potentially crush fossil material exposed on the surface.

Impacts of Mechanical, Manual, and Biological Treatments

Mechanical and manual treatments have the potential to create ground disturbance resulting in vegetation removal, compaction and chiseling that could undermine paleontological resource sites and the cultural contexts of a prehistoric or historic sites. Heavy equipment and ATVs used off roads and trails can have the greatest impacts. Ground disturbance can also result in the unintended effect of the loss of vegetation cover and soil erosion that can result in the erosion of buried cultural deposits. Biological treatments utilizing livestock grazing can also have negative impacts on cultural and paleontological resources that can include trampling, compaction, obliteration, or displacement of artifacts or features.

Alternative A – Proposed Action

Direct and Indirect Effects

The treatments proposed in Alternative A have the highest potential for direct and indirect effects to cultural and paleontological resources given the increased number of acres treated and the utilization of biological, mechanical and chemical methods. As noted in the *Environmental Consequences* section above, cultural and paleontological resources can be negatively impacted by all forms of the proposed treatments. The highest potential for negative direct and indirect effects would occur through mechanical treatments utilizing mowing with heavy equipment and herbicide treatment utilizing ATVs off trails and roads.

However, site-specific analysis before treatment and a close adherence to Section 106 of the NHPA and the BLM's protocol with the COSHPO[7] can easily mitigate any undue impacts to these resources through avoidance or documentation and/or data recovery. More aggressive treatment of invasive weed species can also have positive direct and indirect effects by replacing invasive vegetation with native vegetation and decreasing the potential for soil erosion, potentially leading to the protection of these resources. As mentioned above, the removal of invasive vegetation could contribute to the restoration and maintenance of historic and ethnographic cultural landscapes.

Alternative B – Continue Present Management (No Action)

Direct and Indirect Effects

The treatments proposed in Alternative B have a lower potential for direct and indirect effects to paleontological and cultural resources given the much smaller amount of treatment acres. The highest potential for negative direct and indirect effects would

[7] COSHPRO is the acronym for 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.

occur through mechanical treatments utilizing mowing with heavy equipment and herbicide treatment utilizing ATVs off trails and roads. Site-specific analysis before treatment and a close adherence to Section 106 of the NHPA and the BLM's protocol with the COSHPO can easily mitigate any undue impacts to these resources through avoidance or documentation and/or data recovery.

Alternative C – No Herbicide Use

Direct and Indirect Effects

Fewer acres of treatment would result in a lower potential for direct and indirect effects to paleontological and cultural resources. However, biological and mechanical treatments such as livestock grazing and various mechanical treatments have a higher potential to affect these resources than the use of herbicides, except when herbicides are distributed off road via ATVs.

Cumulative Effects

The cumulative effect is that over time fewer archaeological resources will be available to learn about past human lifeways, to study changes in human behavior through time, and to interpret the past to the public. Past and future actions that include historic grazing regimes, recreational grazing, off-road vehicle use and other recreational activities can result in substantial ground disturbance and cause cumulative, long-term, irreversible adverse effects to paleontological and cultural resources. While it is hard to determine cumulative effects on unidentified archaeological sites, proposed treatments for all alternatives should not increase the potential for cumulative effects within the analysis area if site-specific analysis is implemented in concert with to Section 106 of the NHPA and the BLM's protocol with COSHPO. Currently, there are no known traditional plant collecting areas within or adjacent to the project area. Consultation is being initiated to determine any possible locales that have not been previously identified.

3.7 WATER RESOURCES

Affected Environment

The SLVRA is topographically bounded by the La Garita Mountains to the north, San Juan Mountains to the west, and Sangre de Cristo Mountains to the east. With the exception of approximately 160 acres in the north end of the valley near Poncha Pass, all watersheds flow to the Rio Grande River (HUC 1301000). The 160 acres near Poncha Pass flow into the Arkansas River (HUC 1102000). The project area includes 39 5^{th} and 118 6^{th} level watersheds. These watersheds are tributary to several main streams including Saguache Creek, San Luis Creek, Alamosa River, Rio Grande River, Conejos River, and Arkansas River.

Surface water quality within the SLVRA is generally meeting water quality standards and is influenced by the type of rock and soils with which the water has been in contact, vegetation, groundwater interaction, and pollutants discharged into water bodies from point and non-point sources. Water quality impacts within the SLVRA may be associated with agricultural runoff, road maintenance, removal of riparian vegetation,

channel modification, stream bank destabilization, atmospheric deposition, resource extraction, urban runoff, and grazing activities.

Groundwater quality in the SLVRA is highly variable, in part reflecting the complex geologic history of the region. In most areas within the SLVRA, the shallow groundwater is suitable for livestock. However, these waters can be only marginally suitable or even unsuitable for domestic or irrigation uses, mainly due to high total-dissolve solids concentrations. Groundwater quality tends to deteriorate as the distance from recharge sources and the ground surface increases.

Water rights held by BLM within the SLVRA are mainly springs. Many of the streams that flow through public lands have private irrigation water rights associated with them upstream and downstream of public lands. These diversions change natural flow systems to a great extent and are factors that are outside of BLM control and management.

Threat to developed water facilities on public lands was a major factor considered during analysis of individual weed treatment methods.

ENVIRONMENTAL CONSEQUENCES

Alternative A – Proposed Action

Direct and Indirect Effects

Effects on water quality and quantity are greatest under this alternative as more acres would be treated. Noxious and invasive plants can create conditions that modify water quantity and quality. Directly or indirectly, invasive plants can affect streambank stability, sediment, turbidity, shade and stream temperature, dissolved oxygen, and pH. Noxious and invasive plants can also reduce water quantity. For example, salt cedar can alter stream form and transpires more water than native vegetation.

Weed treatments could affect both surface water and groundwater quality and quantity. Noxious and invasive plant eradication has the potential to temporarily leave treatment areas with reduced ground cover, which in turn can increase erosion that results in increased sedimentation. Herbicide treatments do not kill all invasive plants immediately. Repeated treatments over several years are often needed. Litter created from the dead and decaying plants provide some erosion protection, especially when it is incorporated into the ground by ungulates. Short-term erosion would be mitigated by creation of a restoration plan that would identify specific measures to ensure protection against erosion and resulting sedimentation. These measures would be implemented as part of the project.

Herbicides registered for use in terrestrial habitats may affect surface water and groundwater, primarily as a result of unintentional spills or movement of herbicides from upland sites into aquatic systems.

Herbicide drift can degrade surface water quality. Herbicides can reach water through drift, the airborne movement of herbicides beyond the treatment area. Three factors contribute to drift: 1) application technique; 2) weather conditions; and 3) applicator error. Spot and localized applications are less likely to result in drift because these applications are targeted to specific plants, and less herbicide is applied. Wind speed and air temperature, and their effect on herbicide evaporation, affect the potential for drift. When winds are greater than 10 mph and temperatures exceed 85 degrees Fahrenheit, the potential for drift is greater. The BLM typically uses nozzles that produce large droplets, and requires 100-foot or wider buffers, to minimize the risk of herbicides drifting into surface waters. The potential for spray drift to impact perennial and intermittent streams would be low because minimum 10-foot (ground-hand application), 25-foot (ground-vehicle), or 100-foot (aerial) buffers would be provided between treatment areas and water bodies.

Proposed manual, mechanical, and biological treatment measures such as hand pulling, mowing, weed whacking, or grazing by goats are not likely to cause much soil disturbance or increase the potential for measurable surface erosion/sedimentation. When noxious and invasive plants are hand pulled, some surface soil may be exposed, but the amount of off-site sediment movement is expected to be insignificant due to the small amount of soil exposure expected. Standard operating procedure for manual/ mechanical/ biological control prohibits the use of these methods after seed set if there is a potential for further weed spread.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Potential negative effects to water quality would be less than discussed under Alternative A because fewer acres would be treated.

The BLM currently uses one herbicide in riparian and aquatic habitats in the SLVRA, 2,4-D. The remaining herbicides available, or proposed for use, are registered for use on terrestrial sites. The aquatic labeled herbicides would not impact water quality if used according to label rates of application.

Alternative C – No Herbicide Use
Direct and Indirect Effects
The most pronounced effect of the *No Herbicide Use* alternative on aquatic organisms and ecosystems is the continued existence and spread of noxious and invasive plants that could out-compete native vegetation. Severe infestations of some invasive plants could negatively affect a variety of riparian functions at the site-specific scale, including shade, hyporrheic zones, and soil stability. Although not every infestation would reduce aquatic habitat quality, there is an increased risk of accelerated impairment without aggressive treatment.

Cumulative Effects

Even if the noxious and invasive weed treatments are occurring at the same time on both federal and nonfederal lands, the potential for sediment-related cumulative effects is very low considering the negligible amount of sediment expected to reach perennial streams from biological, manual, or mechanical treatments of noxious and invasive plants.

The potential for cumulative effects from herbicides is negligible considering the insignificant amount of herbicide or sediment that may reach surface water. Implementation of SOPs (Appendix D) would minimize the amount and type of herbicides that actually reach surface water, and the distance between potential treatment areas.

3.8 SOIL RESOURCES

Affected Environment

Soil resources on public lands administered by the BLM in the SLV, including their associated physical, biological, and chemical properties, have been described at a coarse scale by BLM.[8] Within the Environmental Assessment area, soils on the same lands were mapped and characterized at a finer scale by the USDA Natural Resources Conservation Service (Figure 1 below).

The 23 mapped NRCS soil series on public lands in the SLV provide the foundation for plant and animal productivity, air and water quality, and human health. These soils have developed over long time frames based on climate, geologic parent material, and organic forces including woodland, riparian, desert-shrubland, and grassland vegetation; animals; and micro-organisms including biological crusts. Soils in the assessment area range from fine-textured clays and loams along the flanks of the San Juan, La Garita, and Saguache mountains to coarse-textured soils along the Sangre de Cristo range.

Soils across the SLVRA are quite variable. They include shallow-to-deep and fine-to-coarse-textured soils. Soils vary in salt content, organic matter content, parent material and risk to erosion. Soil erosion risk and productivity represent key soil resource values in the SLVRA. These values dictate the kinds of plant communities on which wildlife habitat is based in combination with precipitation and temperature; drive plant growth conditions; potentially limit stocking rates for livestock; and may determine reclamation potential in areas of surface disturbance.

[8] BLM PEIS, pp.3-7 to 3-10 and PER, pp. 3-9 to 3-12). The referenced BLM PEIS, PER, and Ecological Risk Assessments, including analyses to representative soils for 18 active herbicide ingredients, are viewable at http://www.blm.gov/wo/st/en/prog/more/veg_eis.html.

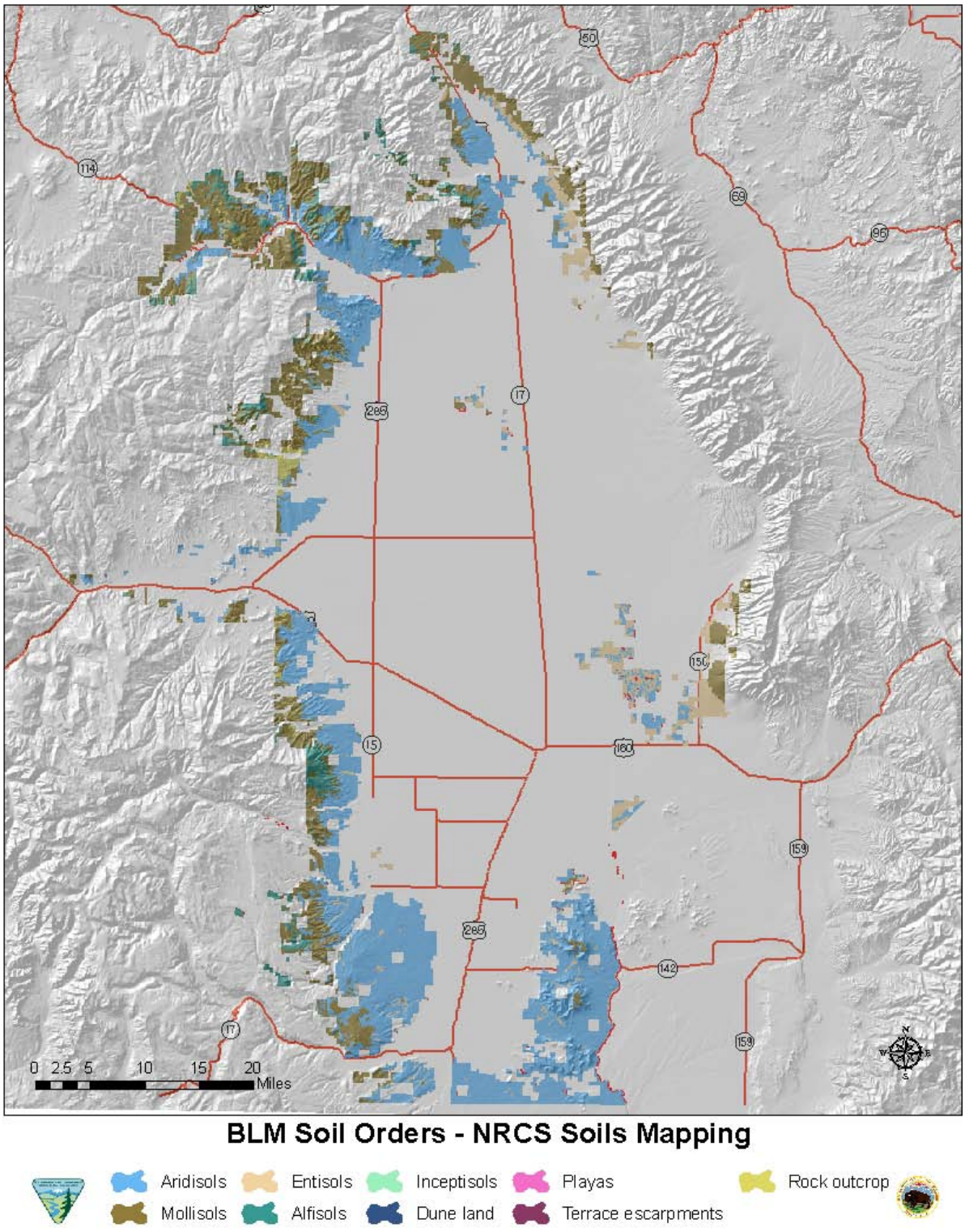


Figure 1: BLM soil orders in the SLVRA

Soil productivity on BLM lands in the assessment area both affect and/or are affected by land use and land cover. A land use such as motorized travel in clayey soils of Rio Grande County or a new land cover such as an invasive plant on coarse soils in Saguache County may subtly or dramatically affect soil properties such as its structural stability, nutrient content, and biological activity. Land use and land cover may also influence other physical and chemical soil properties such as soil porosity through compaction, soil nutrient cycling, and soil organic matter content accumulation.

These same soil properties may affect plant growth, susceptibility to erosion, or the fate of herbicides in soils. For example, disturbances that result in increased susceptibility to erosion would affect the off-site movement of certain herbicides. Soil erosion, compaction, or surface disturbance may affect plant uptake of nutrients. Filtration, buffering, degradation, immobilization, and detoxification properties of soils may also be affected by land use and land cover.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects Common to All Alternatives

Mechanical Treatment

Mechanical treatments under Alternatives A, B, or C would result in soil disturbance and compaction at the localized treatment site. The specific effects to soils would depend on the type and area of treatment, site soil texture and structure, and soil moisture at the time of treatment. Use of certain mechanical treatments would directly disrupt biological soil crusts. Crusts are susceptible to compaction by vehicles and other heavy equipment. The removal or destruction of biological soil crusts could adversely affect soil quality by increasing susceptibility to erosion, reducing nitrogen inputs, infiltration, and potentially encouraging weed establishment.

In general, use of heavy equipment on treatment sites would be expected to result in increased soil compaction, and heavy equipment can shear and rut wet soils. Compaction by vehicles and other heavy machinery can reduce soil pores and limit water infiltration, soil aeration, and root penetration. Although the manual treatment of invasive plants removes vegetation, loosens soil, and creates a potential source for wind and water erosion and stream sedimentation, the planned amount of treatments in the SLVRA is very limited and site specific. There is a low risk that treatment would result in adverse effects to soil quality. Replacement of invasive plants with native plants would maintain soil quality in the long term. Implementation of appropriate project designs would result in maintaining water quality and not causing an adverse effect. Mechanical treatments that ultimately result in improved plant cover and diversity can improve habitat for soil organisms.

Biological Control
Biological control of vegetation under Alternatives A, B, or C using domestic animals would result in some effects to soil on public lands. The effects would be dependent on the type of animal used and the intensity and duration of the treatment in a particular area. Goats and other browsing animals are used more frequently than cattle. The action of animal hooves would cause some disturbance, shearing, and compaction of soil, increasing its susceptibility to both water and wind erosion. These effects can be severe in heavily grazed areas, but may be less so under light and moderate grazing intensities.

Direct and Indirect Effects Common to Alternatives A – Proposed Action and Alternative B – Continue Present Management (No Action)
The direct effects to reducing the spread of noxious/invasive species, detecting and treating new species would be greatest under Alternative A.

The direct and indirect effects of a herbicide treatment on the soil, as considered in Alternatives A and B, depends on the particular characteristics of the herbicide used, how it is applied, and soil physical, chemical, and biological conditions. Herbicides may indirectly affect soil through plant removal resulting in changes in physical and biological soil parameters. As vegetation is removed, there is less plant material to intercept rainfall and less to contribute organic material to the soil. Loss of plant material and soil organic matter can increase the risk of soil susceptibility to wind and water erosion. The risk for increased erosion would be temporary, lasting only until native vegetation was reestablished. If herbicide treatments lead to revegetation with native plants, soil stability may be improved relative to sites dominated by noxious and invasive plants.

Of the herbicides most often used by the BLM considered under Alternatives A and B, chlorsulfuron, picloram, and tebuthiuron are persistent in soil for a year or more, while glyphosate and 2,4-D are relatively non-persistent in soil. Imazapyr includes properties that persist in the soil for one year and could potentially impact off-site plant growth. None of these herbicides appears to result in severe adverse impacts to soil. Of these, glyphosate has been shown to have little or no impact on biological crusts cover after one year. Soil organisms are important to the human environment because they could affect soil productivity.

None of the herbicides under consideration has notable effects to overall long-term soil productivity or permanent impairment of soil ecosystems. Information about specific herbicide effects to each of the myriad of soil organisms is scarce. Therefore, caution will be used when applying these chemicals to soils supporting biological soil crusts. To reduce the impacts to soil productivity, treatments would be minimized or eliminated in areas of the SLVRA that have steep slopes or the potential for significant soil mobility.

Herbicide treatments would benefit soil by removing invasive plants and other unwanted vegetation and allowing restoration of native vegetation and return of

natural fire regimes. In many situations, herbicides are the only, or the most effective, method for controlling invasive vegetation. For many of the small or spot treatments of invasive plants along roadways in the SLVRA, manual or physical treatments may not be the most cost-effective and efficient treatment option. Positive effects to soils associated with the presence of invasive plants could be greater because more acres would be treated under this alternative, particularly cheatgrass.

Alternative A – Proposed Action
Direct and Indirect Effects
Herbicide Use
The effects to soils, both adverse and beneficial, would be greatest under Alternative C based on the extent of acres treated and expansion of herbicide active ingredients applied for noxious weed treatment. Short-term direct effects may include spray site declines in soil productivity and live plant cover, and an indirect temporary increase in erosion risk during the brief period until native plant cover reestablishes. The potential use of imazypyr under Alternative A for cheatgrass control would require adherence to SOPs, which would reduce increased risk of off-site runoff of this ingredient. Long-term beneficial direct and indirect impacts to soil productivity and soil erosion under Alternative A would be expected to ultimately return soil stability to pre-noxious weed state.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
The effects to soils, both adverse and beneficial, would be less under Alternative B than A but more than under C based on the extent of acres treated and the continued use of currently approved herbicide active ingredients applied for noxious weed treatment. Long-term adverse effects to soils associated with the presence of noxious and invasive plants could be greater in Alternative B than A because fewer acres would be treated, particularly of cheatgrass. Research has shown that cheatgrass alters physical and biological properties of soils, thus impairing ecosystem health.[9] Additionally, cheatgrass-infested areas are prone to wildfires that would potentially alter the physical properties of soil by consuming organic matter, modifying soil structure, and harming soil organisms (see the BLM PEIS). All other direct and indirect effects under this alternative are addressed in the *Proposed Action.*

Alternative C – No Herbicide Use
Direct and Indirect Effects
The effects to soils, both adverse and beneficial, from herbicide treatment resulting from broadcast herbicide application would be non-existent under Alternative C. Noxious and invasive plants would have long-term negative effects on soil properties.

[9] *Cheatgrass Invasion Alters Soil Morphology and Organic Matter Dynamics in Big Sagebrush-Steppe Rangelands.* USDA Forest Service Proceedings RMRS-P-31. 2004. Jay B. Norton, Thomas A. Monaco, Jeanette M. Norton, Douglas A. Johnson, Thomas A. Jones

These plants may increase the proportion of bare ground, increase or decrease the amount of organic matter in the soil, deplete the soil of nutrients or enrich the soil with certain nutrients, change fire frequency, and produce toxic herbicides that affect soil organisms. Some of these changes may be difficult to reverse and could lead to long-term soil degradation and difficulty in reestablishing native vegetation.

Cumulative Effects

The cumulative effects of a noxious and invasive plant infestation could be dramatic and irreversible. Soil lost to erosion may take years to replace. The loss of soil biota also could lead to degradation of soil properties that are not easily reestablished. Changes in the soil biota could lead to changes in nutrient cycling that lead to a loss of nutrients from the ecosystem. Although very little research has been done on the restoration of soil biological communities, it stands to reason that large persistent invasive plant infestations would detrimentally affect the reestablishment of soil biota and native plant communities. Preventing the spread of invasive plants would have a positive impact on soils.

Cumulative effects of each alternative would be similar to its direct effects. Non-herbicide treatments may result in nutrient decrease, erosion, reduction in mycorrhizal hyphae, increased bare ground, and decreased litter layer, which are transient effects given revegetation with native or non-invasive species. Soil compaction, loss of microbiotic crusts, formation of hydrophobic surface layer on soil, and loss of volatized nitrogen, phosphorus, and potassium may have longer term effects and need to be minimized or eliminated through site-specific SOPs. Some herbicides are metabolized by soil bacteria, while others are toxic to soil microorganisms or no information about effects to these organisms is available. Picloram, chlorsulfuron, and imazapic are relatively water soluble and could move off-site in water. These herbicides are moderately adsorbed to soil particles and could be moved off-site with wind or mass soil movement.

Many other natural (i.e., wildland fire) and human influences (land development and use) may result in adverse effects on soils and soil productivity. The potential adverse effects to soils from the *Proposed Action* are small in comparison to the potential effects of noxious and invasive plants themselves and other influences. In the long term, restoration of healthy native plant communities proposed in this EA would have beneficial impacts on soils.

3.9 AIR QUALITY

Affected Environment

Air quality and resources on public lands administered by the BLM in the SLV, Clean Air Act federal regulatory requirements, and BLM goals including maintenance of National Ambient Air Quality Standards (NAAQS), visibility protection in mandatory Class I areas, and herbicide drift were described in the BLM PEIS (pp. 3-3 to 3-6) and PER (pp. 3-4 to 3-7).

Air quality directly impacts human health and welfare. Improvement of air quality in the U.S. is an important regulatory goal that binds BLM actions in the SLV. The Clean Air Act (1955, and as amended) established a mandate to reduce emissions of specific pollutants via uniform federal standards. Under the Act, the U.S. Environmental Protection Agency (EPA) has set standards to ensure that BLM, like all local agencies, complies with the Act.

EPA's NAAQS were established for six primary and secondary pollutants to protect public health and welfare. These *criteria pollutants* are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), lead (Pb), and particulate matter (PM). Particulate matter (PM) is a broad class of substances that exist as discrete particles over a wide range of sizes. For regulatory purposes, PM is further sub-classified by the particle's aerodynamic diameter. PM_{10} includes all PM with an aerodynamic diameter of 10 microns or less and is referred to as inhalable PM. $PM_{2.5}$ includes all PM with an aerodynamic diameter of 2.5 microns or less, called fine PM, and is by definition a subset of PM_{10}.

All areas of the U.S., including the six counties in the SLV, have been classified by the EPA in terms of air quality, based on their *attainment* or *non-attainment* of NAAQS status. The EPA designates areas as being in attainment for a criteria pollutant if ambient concentrations of that pollutant are below the NAAQS. Areas are in nonattainment if criteria pollutant concentrations violate the NAAQS. Once nonattainment areas comply with the NAAQS, they are designated as maintenance areas.

All counties in the SLV are designated as attainment areas for the six criteria pollutants. Nevertheless, PM is a recognized and seasonally important pollutant affecting human health in the SLV. PM concentrations are monitored by Alamosa County Nursing Services and health advisories routinely issued in Alamosa County for inhalable PM. These advisories are most commonly issued between the April-June periods when winds are high and fallow agricultural fields dominate the valley floor, creating conditions conducive to extreme dust storms (Alamosa County Nursing Services, 2009).

The Clean Air Act also established visibility protection for mandatory federal Class I areas, and specifically, requirements for *prevention of significant deterioration* (PSD). Class I areas that require PSD for visibility protection include large national parks and wilderness areas that were in existence on August 17, 1977. Three mandatory federal Class I visibility protection areas are designated on public lands near and or adjacent to BLM-administered public lands in the SLV. They are the Great Sand Dunes National Park and Preserve, the Weminuche Wilderness, and La Garita Wilderness.

The EPA has established regional haze regulations, and encouraged states to coordinate their implementation efforts through regional planning organizations. The Western Regional Air Partnership (WREP) is the voluntary organization that performs these functions in the SLV. The WREP is comprised of 13 western governors (including Colorado), 11 tribal leaders, and two federal departments (USDA and USDI, including BLM). In the 1990 amendments to the Clean Air Act, the U.S. Congress directed the EPA to develop regional haze regulations to achieve the national visibility goal of "the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I federal areas, which impairment results from manmade air pollution." The EPA developed the Regional Haze Rule in 1999 to improve visibility in 156 mandatory federal Class I national parks and wilderness areas, including the three SLV Class I areas, where visibility is an important value. Improvement in visibility must be made every 10 years for the 20% most impaired (haziest) days, and there must be no degradation for the 20% best (clearest) days, until the national visibility goal is reached in 2064.

The BLM understands herbicide application may lead to unintended transport of an active ingredient beyond the target invasive plant through airborne drift. The factors that influence the risk of herbicide drift include herbicide droplet size, wind speed, humidity, formulation of the herbicide, height of emission, equipment and application techniques, and the size of the area treated. Droplet size has the greatest influence. SOPs that the BLM employs in the SLV to reduce risk herbicide drift include: 1) using a lower spray nozzle height; 2) using the lower end of the pressure range; 3) increasing the spray nozzle size; 4) using drift-reducing nozzles; 5) using drift control additives; and 6) using sprayer shields.

ENVIRONMENTAL CONSEQUENCES

The Proposed Action (Alternative A) is an IPM proposal that includes herbicide, manual/physical, and biological control treatment categories (see Table 1). Direct and indirect effects on air resources are described below for each treatment category.

Alternative A – Proposed Action

Direct and Indirect Effects

Herbicide Use

The direct and indirect effects of herbicide treatment on air quality in the SLV under Alternative A – Proposed Action would be greatest and are described in the BLM PEIS, pp. 4-4 to 4-13. Air quality impacts were assessed with the CALPUFF-lite model, while the herbicide impacts were assessed with AgDrift (in association with the appropriate risk characterization models or methods). Both models were run for five representative locations in the western U.S. While meteorological and climatic conditions in any location are unique, the BLM considers the five modeled locations assessed in the PEIS broadly representative of conditions in the SLV.

This impact assessment tiers to the BLM PEIS and assumes that herbicide application under Alternative A – Proposed Action in the SLV, including equipment used, levels of application of the active ingredient, and application method, would be conducted in a manner that does not differ from that analyzed in the five representative locations. Overall, air quality impacts under the Proposed Action would account for approximately $1/5^{th}$ of air quality impacts assessed for Colorado in the PEIS, based on maximum acreage treated of 4,000 acres/year (BLM PEIS, Table 3-4). Under the Proposed Action, potential emissions of criteria pollutants, primarily from vehicles used in herbicide application, would be highest in comparison with other alternatives considered, based on the acreage treated. However, the potential impacts from herbicide applications on local and regional air quality would be minor and compose a fraction of the BLM's predicted annual emissions by pollutant for Colorado, let alone the 17 Western States.

Atmospheric concentrations of herbicides resulting from spray drift from ground vehicle and/or hand application would be highest in the Proposed Action when compared with Alternatives B or C. The BLM modeled maximum average herbicide concentrations, 24 hours after treatment, at various distances from the point of application. The BLM found herbicide concentrations in the air tended to increase up to 1.5 kilometers (km) from the point of application (concentrations may double between 0.6 and 1.5 km from the application site), but then decrease slowly at greater distances. However, these effects would be temporary and most predominant at the time and location of treatment. Given that no aerial application is proposed in the SLV, and assuming the BLM's modeling is representative of the study area, impacts to air quality from herbicide drift in the SLV would be highly localized and marginal. In terms of impacts to regional haze and proximity to Class 1 areas in the SLV, some BLM-administered parcels occur south of the Great Sand Dunes NP. Driving to and from sites on unpaved surfaces to treatment areas would be expected to generate some marginal levels of fugitive dust.

Manual/ Physical Treatment

Direct effects would be highest under Alternative A – Proposed Action in comparison to Alternatives B and C since more acreage would be treated. Direct impacts on air quality would include generation of fugitive dust and particulate matter associated with operation and use of mechanical and hand-held equipment and driving on unpaved roads to and from the treatment site. Power equipment and machinery exhaust would emit some CO, SO_2, NO_2, VOCs, and other minor pollutants. However, emissions would be small, localized, and temporary. The direct and indirect effects of manual and physical treatments on air quality under the Proposed Action are described in the BLM PER, pp. 4-4 to 4-11.

Alternative B – Continue Present Management (No Action)

Direct and Indirect Effects

The direct and indirect effects of herbicide treatment on air quality in the SLV under the Alternative B (No Action) would be similar to Alternative A but smaller in scale by eight-fold (see Table 1) and limited to volatilization effects from the more limited number of

herbicide active ingredients. Direct and indirect effects on air quality in the SLV resulting from manual/ mechanical treatments under Alternative B would also be similar to effects described in Alternative A – Proposed Action. However given 1/5th of the comparative acreage would be treated under Alternative B, generation of fugitive dust would be less extensive. Among alternatives considered, Alternative B would generate the least impact to air quality from manual/ mechanical methods.

Alternative C – No Herbicide Use

Direct and Indirect Effects

There would be no direct and indirect effects from herbicide treatment on air quality in the SLV under the Alternative C – No Action. The effects on air quality from manual/ mechanical and biological treatments would be similar to those described in Alternative A but smaller in scale by one-half (see Table 1) and double the level under Alternative B.

Cumulative Effects

Other past, present, and reasonably foreseeable land-disturbing actions on SLV public lands or private lands that would be cumulative to the effects on Air Quality of the actions considered in Alternatives A, B, and C include grazing, recreation, timber harvest, road development, center-pivot agricultural, urbanization, among other forces. The level of herbicide application or mechanical treatment, either in concentration or physical area, under any of the three alternatives is marginal relative to other sources of air pollution in the study area including conventional center-pivot agriculture, transportation, and other non-point sources of air pollutants.

3.10 RECREATION

Affected Environment

Public lands provide visitors with a wide range of recreational opportunities, including hunting, fishing, camping, hiking, OHV driving, mountain biking, birding, viewing scenery, and visiting natural and cultural heritage sites. There are new changes to the natural and cultural resources as increased visitation occurs. There are varying degrees of needs and desires for many different types of recreation. Some of the more popular areas managed by the BLM include the Rock Garden, Penitente Canyon, Witches Canyon, Sidewinder Canyon, Zapata Falls, Rio Grande Natural Area, and McIntire-Simpson and Blanca Wetlands. These areas now have almost continuous use, and over the last 20 years there has been an increase in user conflicts, resource damage, and vandalism.

Traffic counter data collected over the last five years indicates that these Special Recreation Management Areas (SRMAs) have a fairly high visitation rate for the SLV. Blanca Wetlands recorded 4,500 vehicles in 2004 and Penitente Canyon and Witches Canyon recorded approximately 20,000 to 30,000 vehicles. Zapata Falls SRMA typically has high use due to its proximity to the Great Sand Dunes National Park and Preserve. Traffic counter data has shown up to 70,000 vehicle visits in one year. This is nearly ¼ of

the total visitors passing by on the way to the Great Sand Dunes National Park and Preserve, which has visitor days totaling more than 300,000.

ENVIRONMENTAL CONSEQUENCES

Although there are impacts to recreation caused by all three alternatives, it was determined that the impacts would be minimal to recreation users and recreational infrastructure. Vegetation treatments would have short-term negative impacts and long-term positive impacts on recreation. During treatments, there would be some scenic degradation, as well as distractions to users (e.g., noise from machinery). In addition, there would be some human health risks to recreationists associated with exposure to herbicides. Because impacts would be minimal, the following environmental consequences and mitigation are analyzed in minor detail. For a more in depth analysis on recreation, please refer to the BLM PEIS and PER, to which this EA is closely tiered.

Alternative A – Proposed Action

Direct and Indirect Effects

Under Alternative A, where applicable, noxious and invasive species control would be accomplished by using an integrated pest management (IPM) approach, utilizing a combination of biological, mechanical, and chemical methods individually, or in the best possible combination to achieve weed control goals. This alternative would provide for the largest treatment of acreage, possibly resulting in short-term impacts on recreation, primarily resulting in the temporary closure of public lands during treatment periods if deemed necessary. However, this alternative would also have the largest positive impact on recreation, since it would reduce the risk of visitor contact with undesirable plant species over the largest acreage possible. Under Alternative A, the short-term negative and long-term positive environmental consequences would include:

- Short-period site closures, which include closure for sites, roads, trails, developed sites, etc.
- Dead brown vegetation could temporarily reduce recreation potential, impair scenic value, and if large amounts were present could result in hazardous fuels build up.
- Chemical treatments could cause health risks, which could be greater for aerial applications, and to users ingesting food sources that may have come in contact with treatments.
- Increasing native plant diversity can improve recreational experiences in developed and non-developed recreation sites, as well as improve wildlife diversity which can improve recreation activities such as fishing, hunting, and wildlife scenic values.
- Removal of weedy vegetation would return public lands to a more “natural” or “desirable” condition, which hikers and nature enthusiasts would likely value over degraded lands.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Under Alternative B, where applicable, noxious and invasive species control would be accomplished by allowing the BLM to use two previously approved herbicide active ingredients. Impacts to recreation areas under Alternative B as a result of herbicide treatments would be similar to those that are currently experienced. Assuming a steady increase in number of recreational users of public lands, there would be more impact to lands from human activities (e.g., spreading weeds, starting fires), but the same level of treatment. The environmental consequences under Alternative B would be closely associated with those of Alternative A; however treatments and techniques would not be sufficient enough to keep up with the increasingly high levels of weed proliferation, allowing a smaller number of treatment areas.

Alternative C – No Herbicide Use
Direct and Indirect Effects
Under Alternative C, no herbicide use would occur. The BLM would be able to treat vegetation using mechanical, manual, and biological control methods. Alternative C would have the positive benefit of protecting recreationists from accidental exposure to herbicides. However, certain plants that can be injurious to humans are most easily controlled or eradicated using herbicides (e.g., Russian knapweed, purple loosestrife, Canada thistle, yellow star-thistle). Therefore, Alternative C could negatively impact recreation activities, particularly camping, hiking, and other activities that would present opportunities for easy contact with these noxious weeds. Under Alternative C, the environmental consequences would include:

- Fewer recreationists because of dominance by undesirable plant species.
- Higher concentrations of visitors could occur in other less infested areas, resulting in greater impacts elsewhere.
- Other forms of treatment could impact recreation users greater than herbicide treatments (i.e., prescribed fires).
- Lower ecosystem quality, limiting attraction to recreationists.
- Lower plant and wildlife diversity could lead to a decline in fishing, hunting and scenic values.

Mitigation
Mitigation measures that may apply to recreational resources are associated with human and ecological health. Please refer to the mitigation measures in Appendix D of this EA, as well as referring to the BLM PEIS and PER, to which this EA is closely tiered for mitigation measures.

See Appendix E of this EA for a summary of mitigation measures by resource.

3.11 WILDERNESS

Affected Environment

There are no designated wilderness areas within the SLVRA. The San Luis Hills Wilderness Study Area (WSA) is located approximately nine miles southeast of La Jara, Colorado. The WSA includes approximately 10,240 acres of public lands.

Environmental Consequences

Effects Common to All Alternatives

The direct, indirect and cumulative impacts of the alternatives on the San Luis Hills WSA would be minimal; therefore there would be little noticeable change to the wilderness characteristics of the San Luis Hills WSA if mechanical, chemical, or biological weed treatment was applied. Because impacts from all the alternatives would be minimal, there is no need for environmental consequences and mitigation analysis in this document. However, for a more in-depth analysis on wilderness, please refer to the BLM PEIS and PER, to which this EA is closely tiered.

3.12 ENVIRONMENTAL JUSTICE

Affected Environment

According to the Council on Environmental Quality's "1997 Social Economic Profile of Colorado by County," counties in the SLV are listed as a "low income counties," and southern Saguache County is depicted as an area of "50% or more of the population being of minority status," as defined by the Census Bureau.

ENVIRONMENTAL CONSEQUENCES

During the course of this analysis, no alternative considered resulted in any identifiable effects or issues specific to any minority group or low-income population or community. The BLM considered all input from persons or groups regardless of age, race, income status, or other social and economic characteristic. None of the alternatives has any civil rights-related effects because consideration of IPM has no effect on rights protected under civil rights law. Finally, there were no identifiable effects or issues specific to consumers or women.

3.13 SOCIAL ECONOMIC

Affected Environment

Herbicide treatments have the potential to affect people, communities, and economies in the SLV. The susceptibility of these entities to social and economic effects stems from the importance of public lands to the lives of the people and communities in the SLV. Public lands commonly provide a major portion of economic sustenance and social context, especially in rural areas, by supporting farming, ranching, mining, active and passive recreation, and many other activities that residents rely on.

ENVIRONMENTAL CONSEQUENCES

Actions that affect federal lands, such as the application of herbicides, have little potential to affect the economic and social environment of the region. The extent of

potential effects would vary because the treatment area in each county would vary, both in acreage and in percentage of land area treated, depending on local issues and needs. The most pervasive effects would likely occur in counties with large amounts of public land. Based on past treatments and inventory information, it is estimated that nearly two-thirds of herbicide treatments proposed under the Preferred Alternative would occur in Saguache and Conejos counties, which are dependent on farming and ranching as their main source of income.

Alternative A - Proposed Action
Direct and Indirect Effects
Under Alternative A, the use of the new herbicides where appropriate could have an impact on farming and ranching practices. There is a potential for injury to non-target vegetation due to herbicide drifting and non-target herbicide applications. This could result in profit losses due to agricultural crop value and native plant species that livestock heavily depend on for forage. On the other hand, Alternative A's new herbicides offer control of stubborn noxious and invasive weeds, preventing their spread on private land and lowering control expenses for ranchers and farmers.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Under Alternative B, there would be the same risks, potential impacts and benefits described in Alternative A; however, because of the fewer number of acres treated, profit losses (and benefits) to farmers and ranchers would presumably be lower.

Under Alternative C – No Herbicide Use
Direct and Indirect Effects
Under Alternative C, no herbicide use would occur. The BLM would use mechanical, manual, and biological control methods. Alternative C would have the least impact on agricultural and ranching profit losses due to these methods.

Under this alternative the risk of noxious and invasive species spreading from public lands onto private property would be highest due to the BLM's inability to use the most efficient and cost-effective control method, herbicides. This would result in farmers, ranchers, and other landowners controlling noxious weeds at their own expense.

4.0 MITIGATION MEASURES

The *Proposed Action* incorporates planning processes that include: compliance with statutory mandates and other BLM program guidance pertaining to vegetation management; compliance with vegetative management goals outlined in the SLVRA's RMP utilizing IPM; coordination with other local, state, federal agencies, private landowners, and industry; requiring soil and vegetation disturbances be minimized in all BLM actions; requiring preventative measures to reduce invasive plant introductions in all BLM actions; and education and outreach. Appendix E lists general mitigation

measures associated with analysis. Other specific vegetation treatment measures include:

1) compliance with label requirements for herbicide use;
2) following the *Conservation Measures, SOPs, Mitigation Measures*, addressed in the V*egetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision (BLM 2007);*
3) post treatment monitoring;
4) and restoration, if applicable.

5.0 RESIDUAL EFFECTS

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Most adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The majority of the residual effects would be associated with herbicide use. The possible adverse residual effects are detailed in Chapter 4 of the PEIS.

6.0 MONITORING AND/OR COMPLIANCE

The monitoring framework for the *Proposed Action* in accordance with the *Record of Decision*, *Appendix D (Monitoring*) of the PEIS and the *BLM National Monitoring Strategy (2006).*

This framework describes the monitoring needed to assure the desired future condition and treatment strategies are achieved. The framework includes implementation / compliance and effectiveness monitoring components. Some components of the framework are outlined below.

Implementation/Compliance Monitoring

• Develop a project work plan for herbicide use.
• Ensure contracts and agreements include appropriate prescriptions and that herbicide ingredients and application rates meet label requirements and that all *SOPs* are followed.
• Document and report herbicide use and certified applicator information in the Pesticide Use Proposals and Pesticide Application Records.

Effectiveness Monitoring

• Implementation monitoring would occur to ensure objectives of the *Proposed Action* are implemented as planned. Post-treatment reviews would occur on a sample basis to determine whether treatments were effective and whether or not passive/active restoration occurred as expected.

• Post-treatment monitoring would be used to detect whether the *Standard Operating Procedures* were appropriately applied.
• Contract and agreement administration and other existing mechanisms would be used to correct deficiencies.
• Herbicide use would be reported to the Environment Protection Agency, as required by BLM regulations.
• Re-treatment and active restoration prescriptions would be developed based on post treatment results. Changes in treatment methods would occur based on effectiveness of treating the invasive plant infestations. For example, a noxious or invasive plant population treated with a broadcast herbicide may be retreated with a spot spray or hand pulled, once the size of the infestation is reduced.

Site-Specific Invasive Plant Treatments
Monitoring requirements would be accomplished using trained BLM employees or through partnership with the herbicide applicators, such as the counties located within the SLVRA, and/or private applicators working for industry. Currently, the herbicide applicators who work on BLM lands complete a herbicide treatment and *Pesticide Application Record* that documents and monitors the site treated, treatment methods, herbicide used, and method of application. The monitoring records require a follow-up visit and an assessment of effects on non-target species.

Similar records may be developed in the future to meet the monitoring needs. Additional monitoring would be completed as part of the *BLM National Monitoring Strategy (2006)* and other required monitoring processes.

7.0 CONSULTATION AND COORDINATION

Persons, Groups, and Agencies Consulted

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

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
U.S. Fish & Wildlife Service (US FWS	Information on Consultation, under Section 7 of the Endangered Species Act (16 USC 1531)	The Service agrees, by letter dated ____, that the proposed action may affect but would not adversely affect listed species because…… (Refer to Appendix __)

BLM/Forest Service Specialists

Dario Archuleta	Range Technician	Preparer, Environmental Justice, Social Economic,
Melissa Garcia	Wildlife Fisheries Biologist	Aquatic Wildlife, Terrestrial Wildlife, TES/Wildlife, Migratory Birds, Fisheries
Angie Krall/Ken Frye	Archeologists	Cultural Resources, Native American Religious Concerns
Steve Sanchez	Natural Resource Specialist	Hydrology, Water Rights, Water Quality
Joe Vieira	Natural Resource Specialist	Soils, Air Quality, Riparian/Flood Plain, TES/Plants
Melissa Shawcroft	Rangeland Management	

	Specialist	Rangeland Management
Mark Swinney	Resource Advisor, Acting Rangeland Specialist	Rangeland Management
Jeremiah Martinez	Supervisory Natural Resource Specialist in Recreation	Recreation, Wilderness, Wild and Scenic Rivers
Jill Lucero/Sue Swift Miller	Wetland Biologists	Blanca Wetlands, Simpson McIntire
Jim Jaminet	FMO	Fuels
Mary Nelson	Forester	Forestry Management
Diann Gese/Nick Sandoval	Geologists	Geology, Minerals, Hazardous Materials
Leon Montoya	Lands Specialist	Lands, Realty

APPENDIX A

REFERENCES

Colorado Natural Heritage Program (CNHP), 2001, Colorado Master Plant List, Colorado State University, Fort Collins, Colorado.

Bureau of Land Management (BLM), November 2007, Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision-PEIS , Washington, D.C.

BLMa, November 2007, Vegetation Treatments on BLM Lands in 17 Western States, Programmatic Environmental Report-PER, Washington, D.C.

BLMb, San Luis Resource Area (SLRA), December 18, 1991, Record of Decision and Approved Resource Management Plan, Canon City, Colorado

BLMc, 2005 Environmental Assessment Record NUMBER: CO-500-2005-016-EA, San Luis Resource Area Travel Management Plan

BLMd, A Final Environmental Impacts Statement Vegetation Treatment on BLM Lands in 13 Western States, Wyoming State Office, Casper, Wyoming.

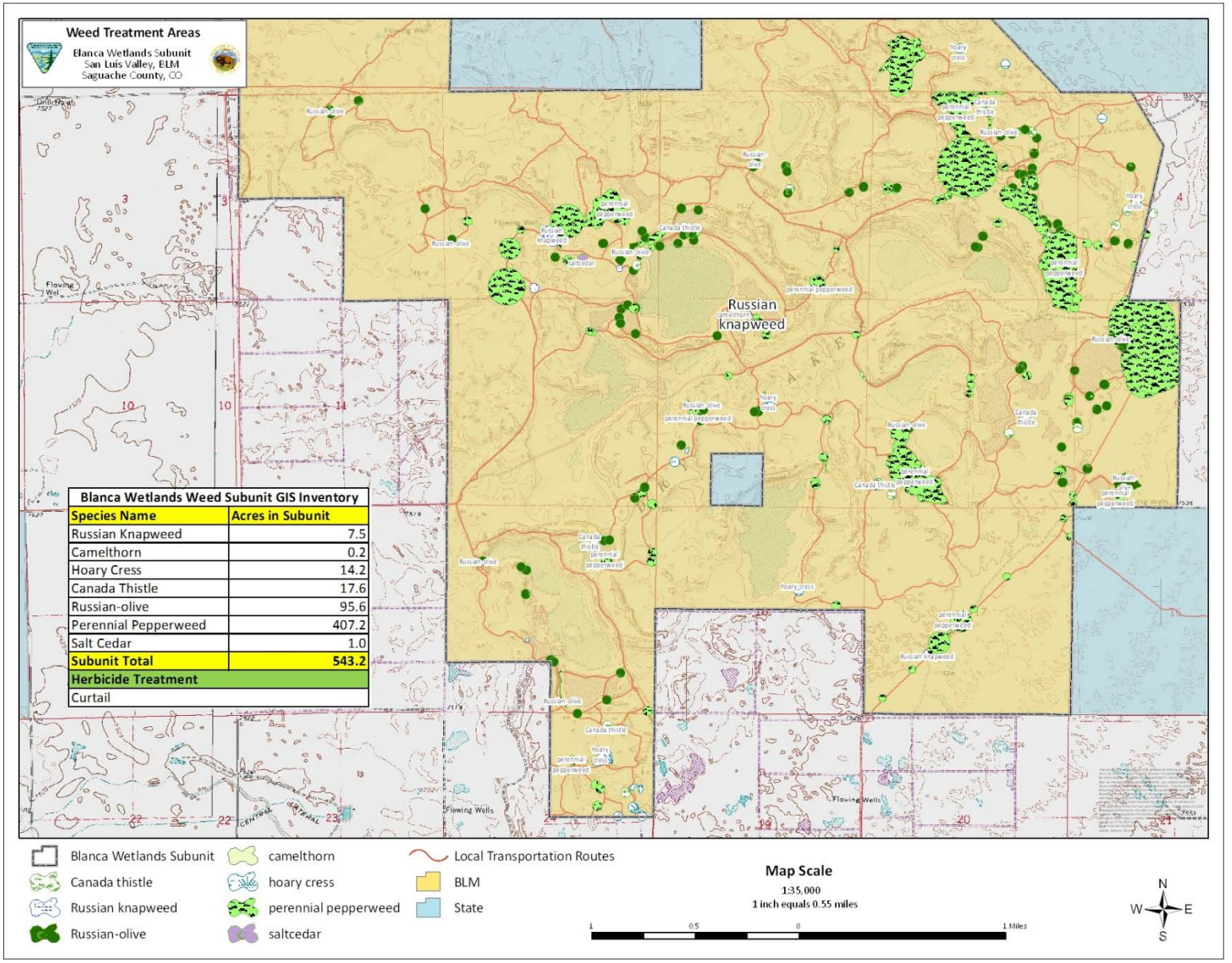
Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act [COSHPRO])

U.S. Department of the Interior National Parks Service, 2003, Invasive Exotic Plant Management Plan and Environmental Assessment. Rocky Mountain National Park, Colorado

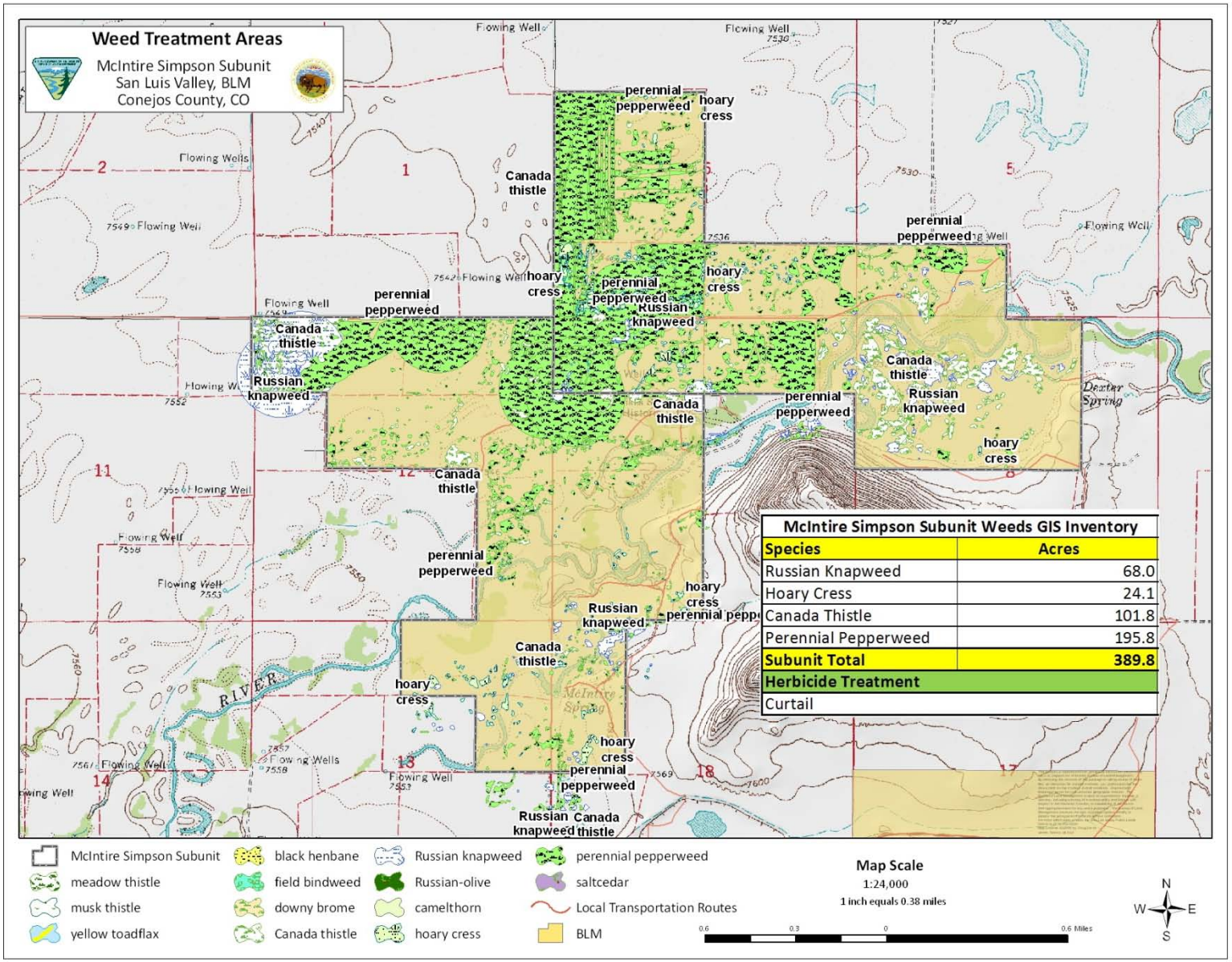
APPENDIX B

WEED TREATMENT UNIT MAPS

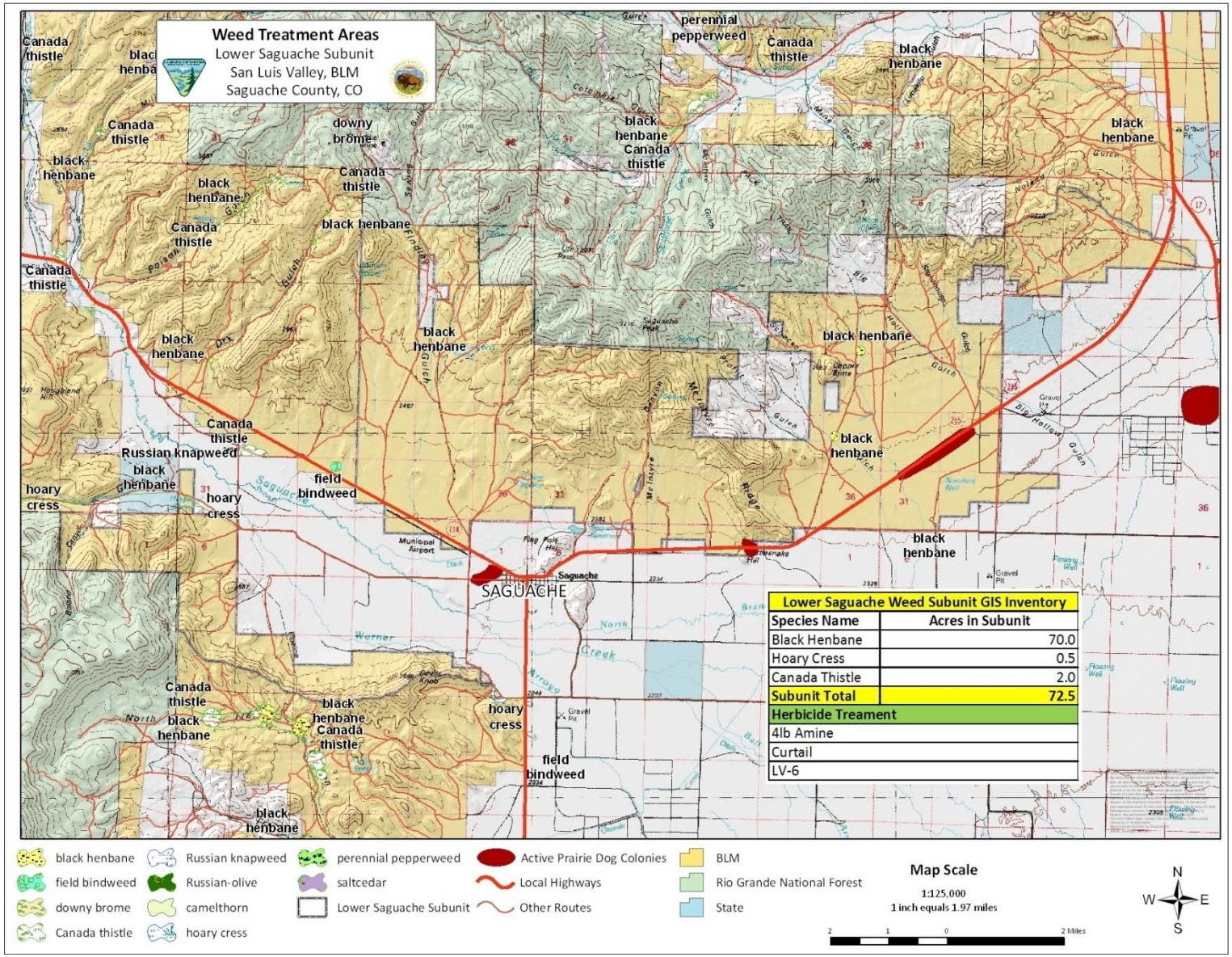
Unit #1: Blanca Wetlands



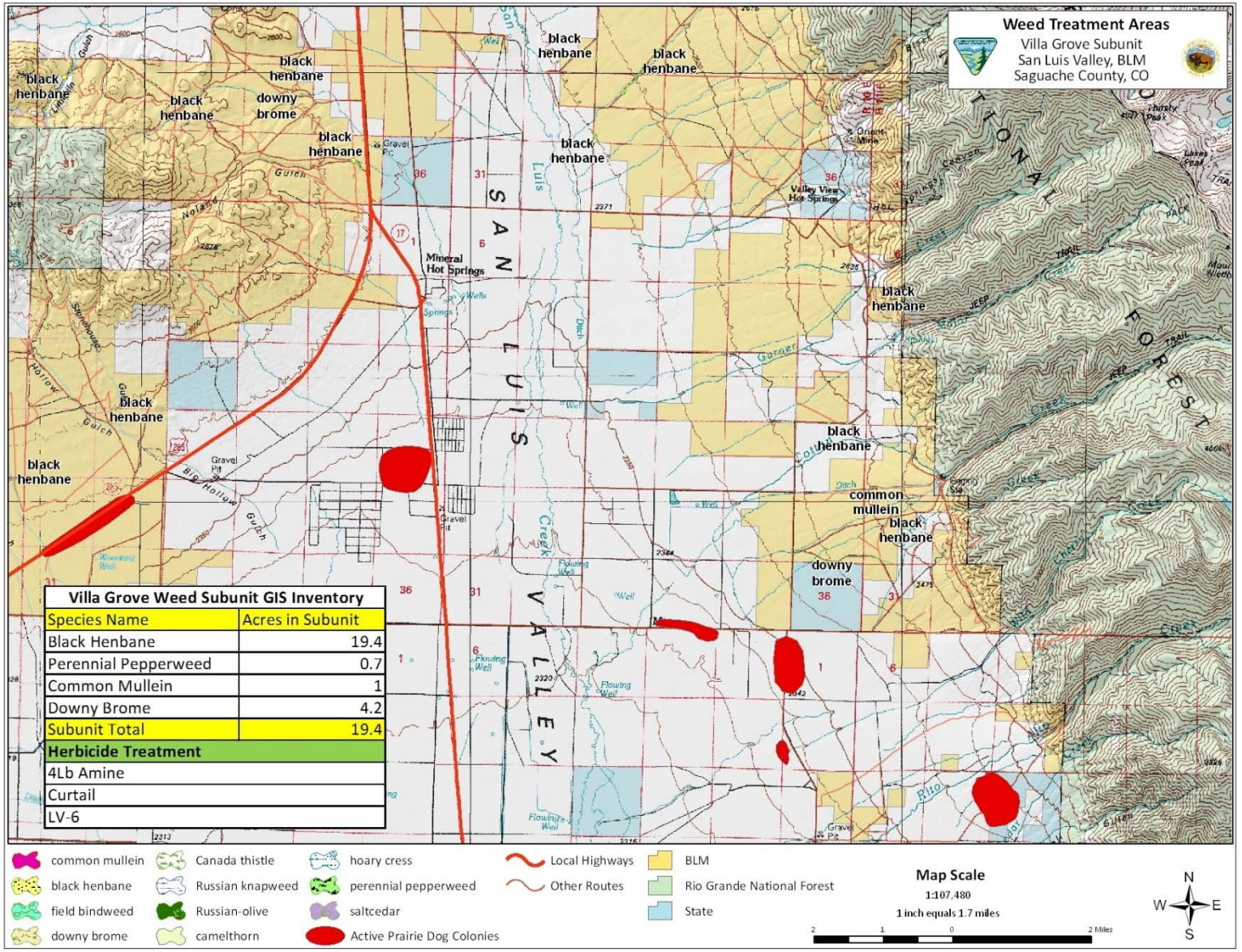
Unit #2: Simpson and McIntire



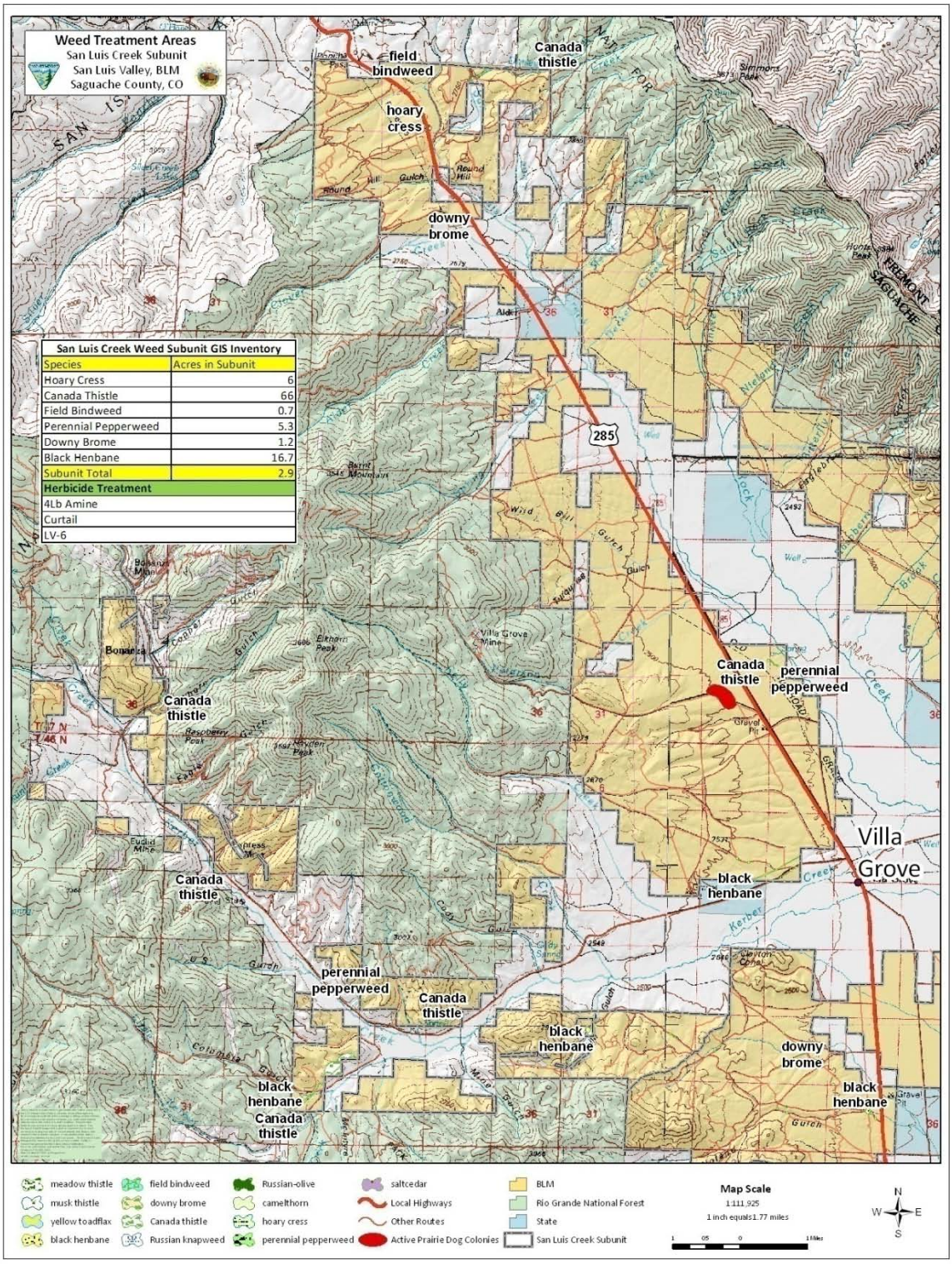
Unit #3: Lower Saguache



Unit #4: Villa Grove

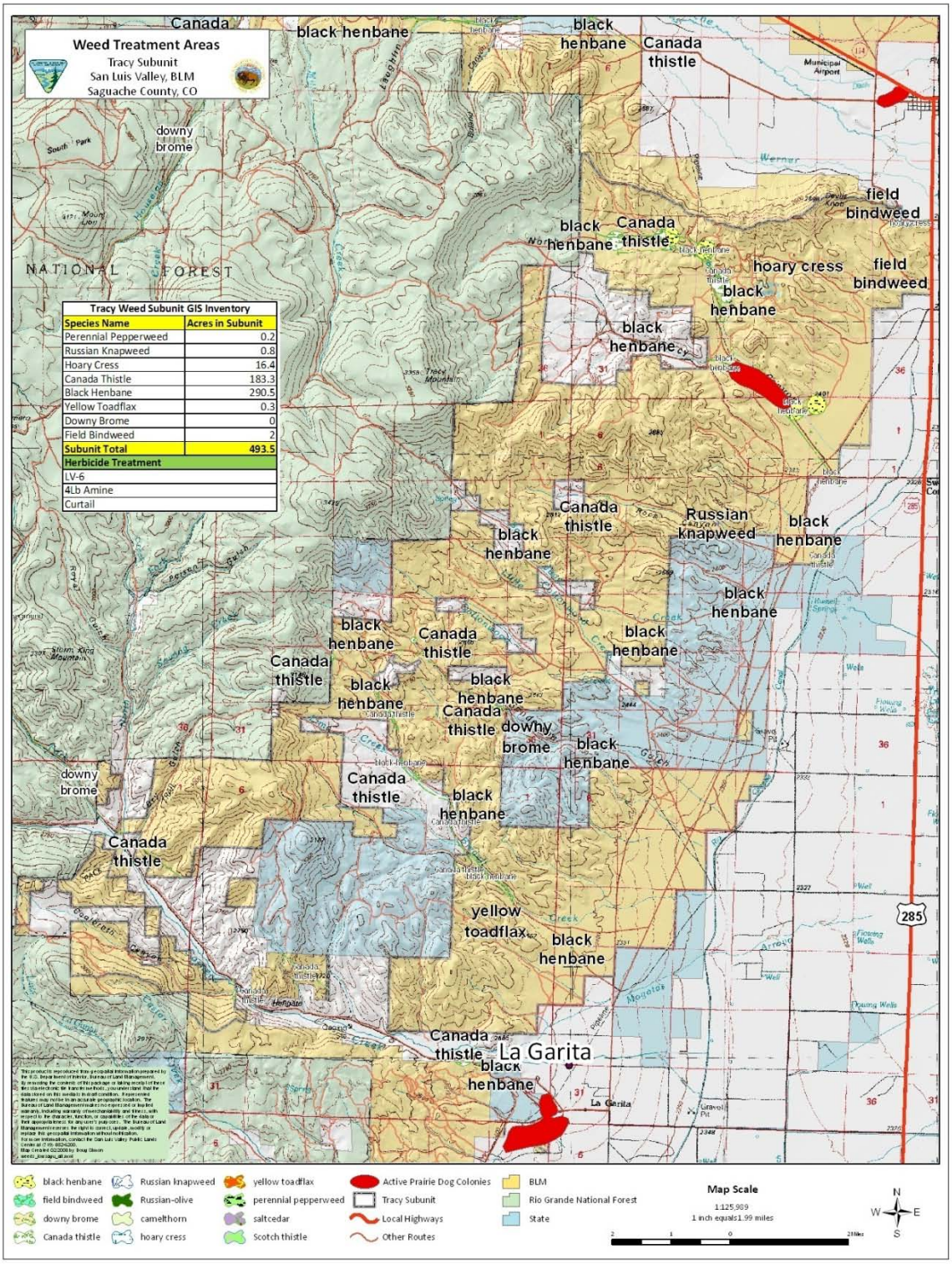


Unit #5: San Luis Creek



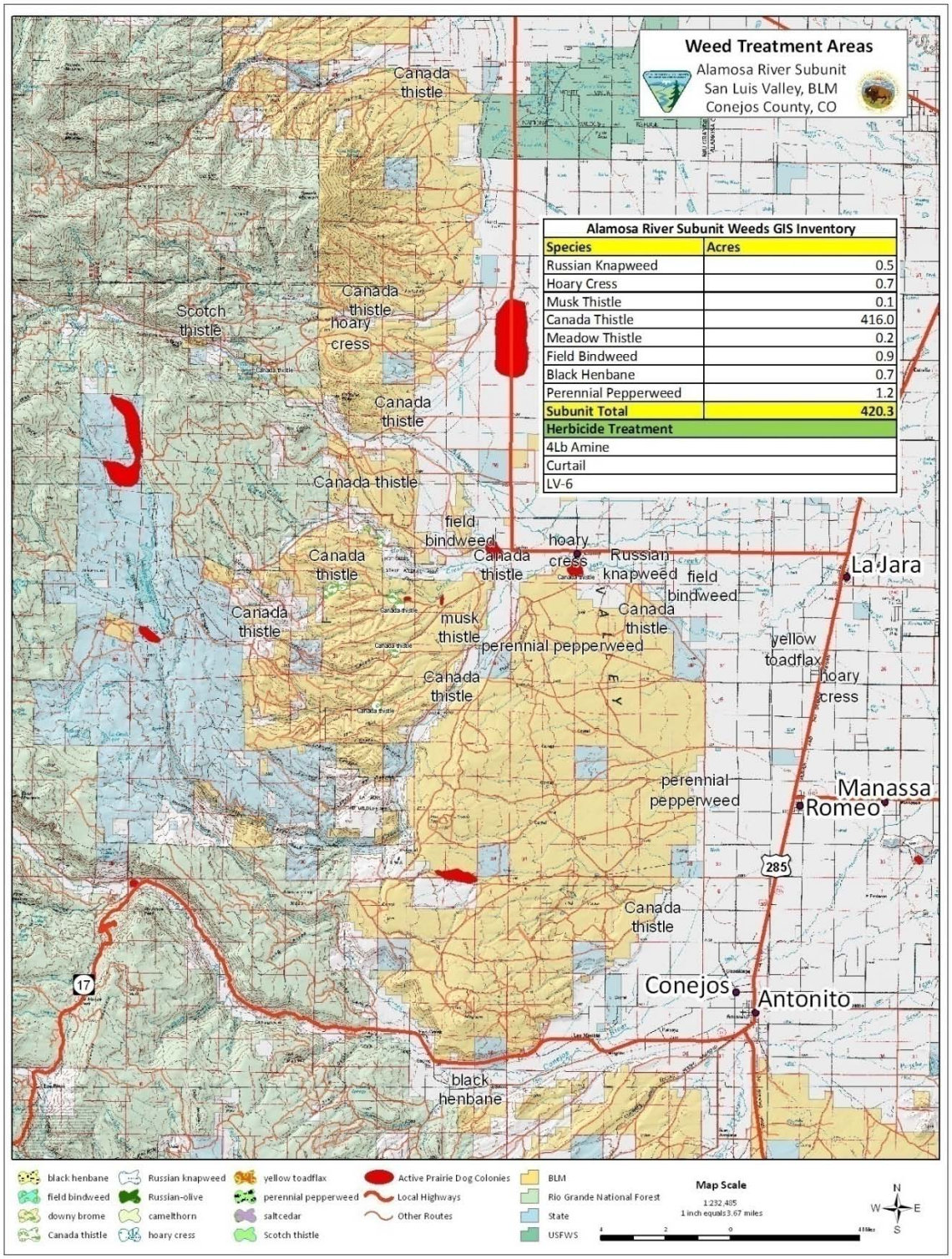
San Luis Creek Weed Subunit GIS Inventory	
Species	Acres in Subunit
Hoary Cress	6
Canada Thistle	66
Field Bindweed	0.7
Perennial Pepperweed	5.3
Downy Brome	1.2
Black Henbane	16.7
Subunit Total	2.9
Herbicide Treatment	
4Lb Amine	
Curtail	
LV-6	

Unit #6: Tracy

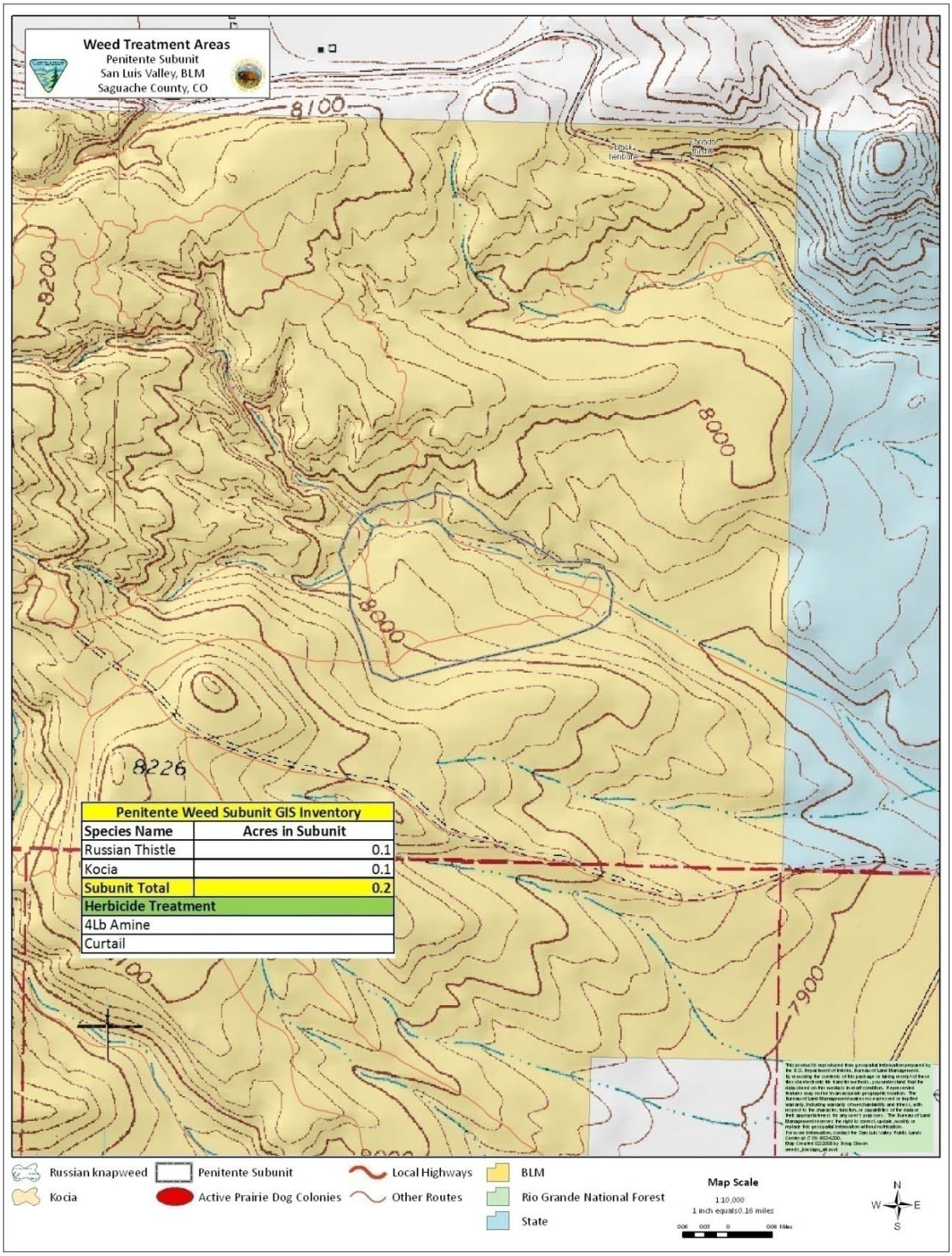


Tracy Weed Subunit GIS Inventory	
Species Name	**Acres in Subunit**
Perennial Pepperweed	0.2
Russian Knapweed	0.8
Hoary Cress	16.4
Canada Thistle	183.3
Black Henbane	290.5
Yellow Toadflax	0.3
Downy Brome	0
Field Bindweed	2
Subunit Total	**493.5**
Herbicide Treatment	
LV-6	
4Lb Amine	
Curtail	

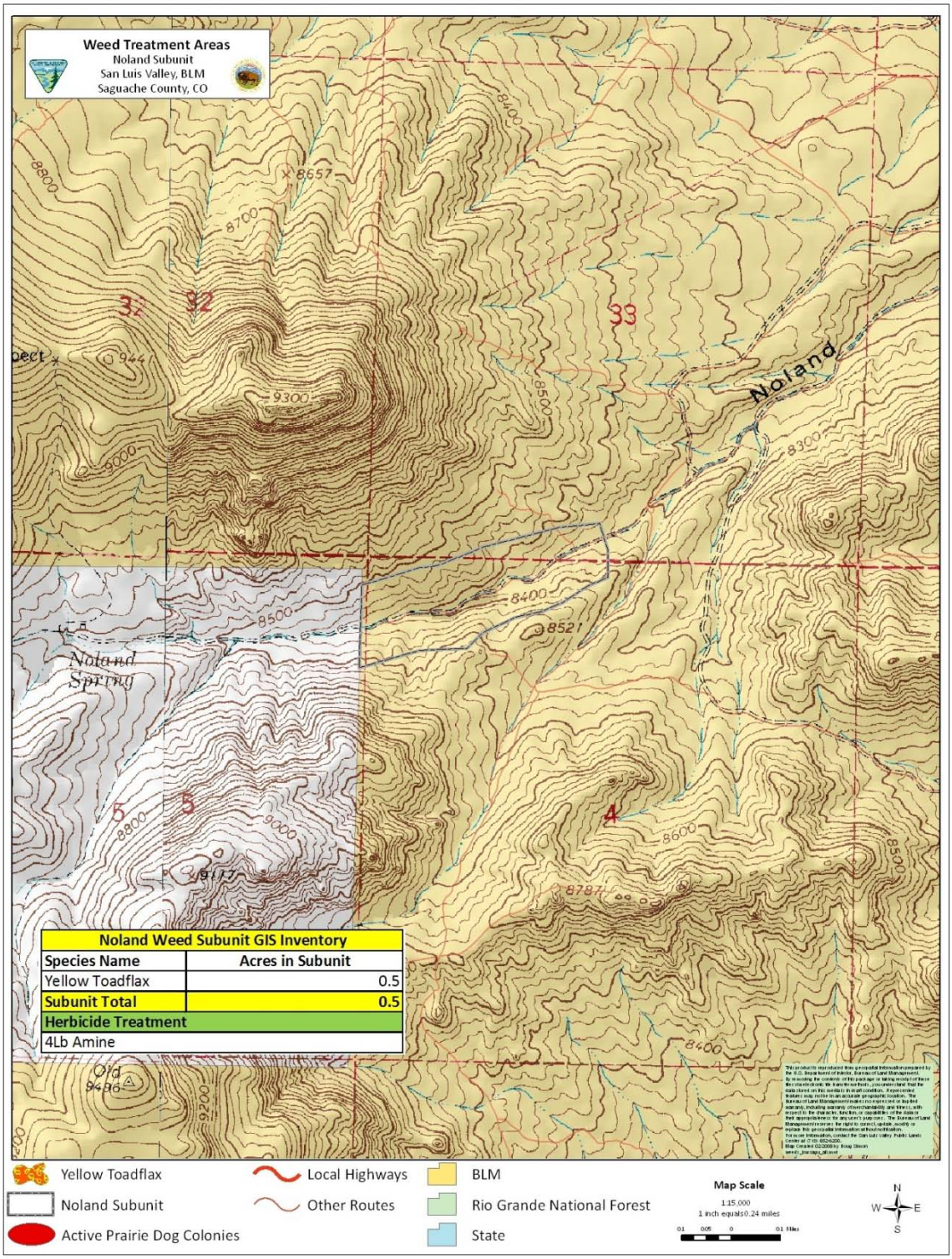
Unit #7: Alamosa River



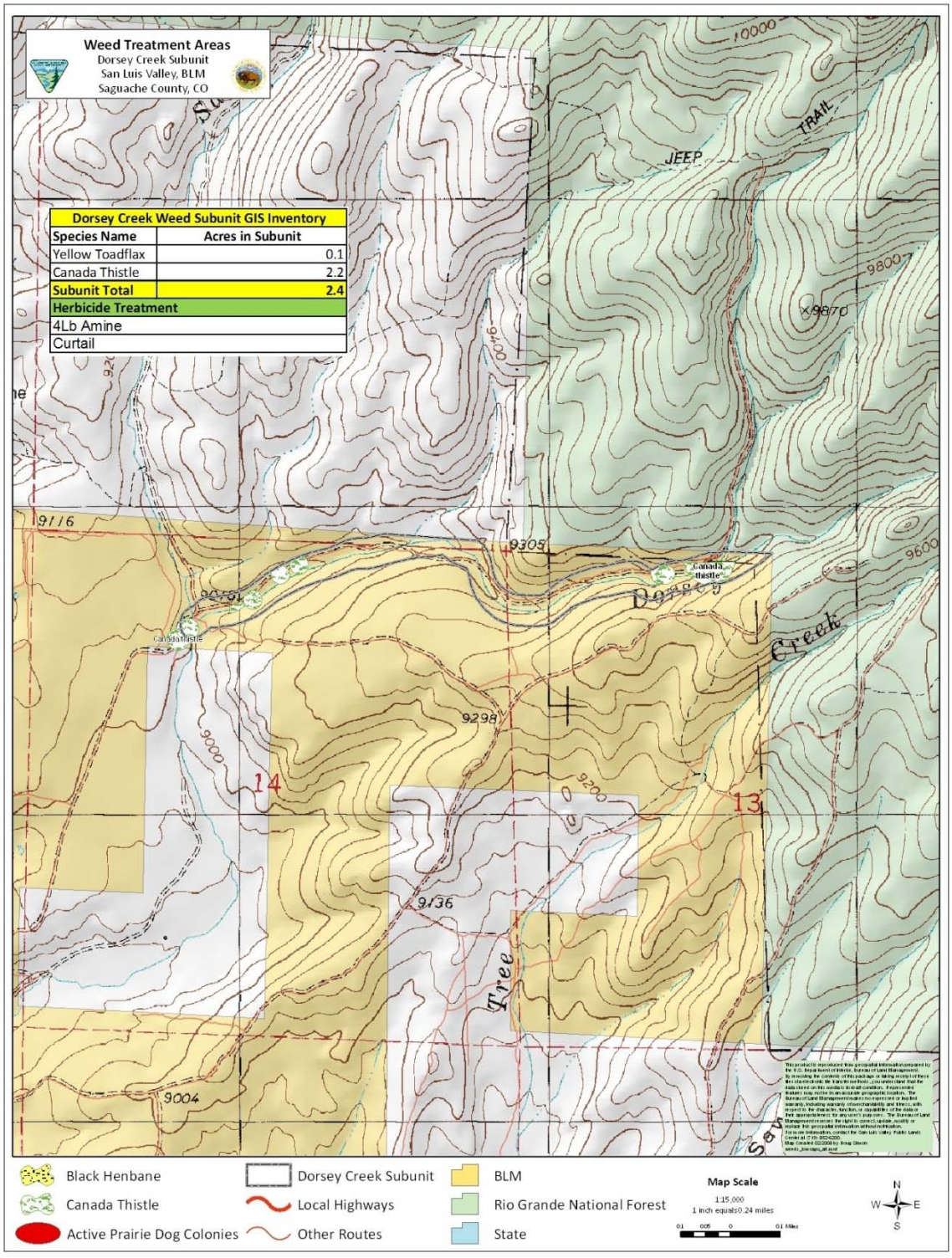
Unit #8: Penitente Canyon



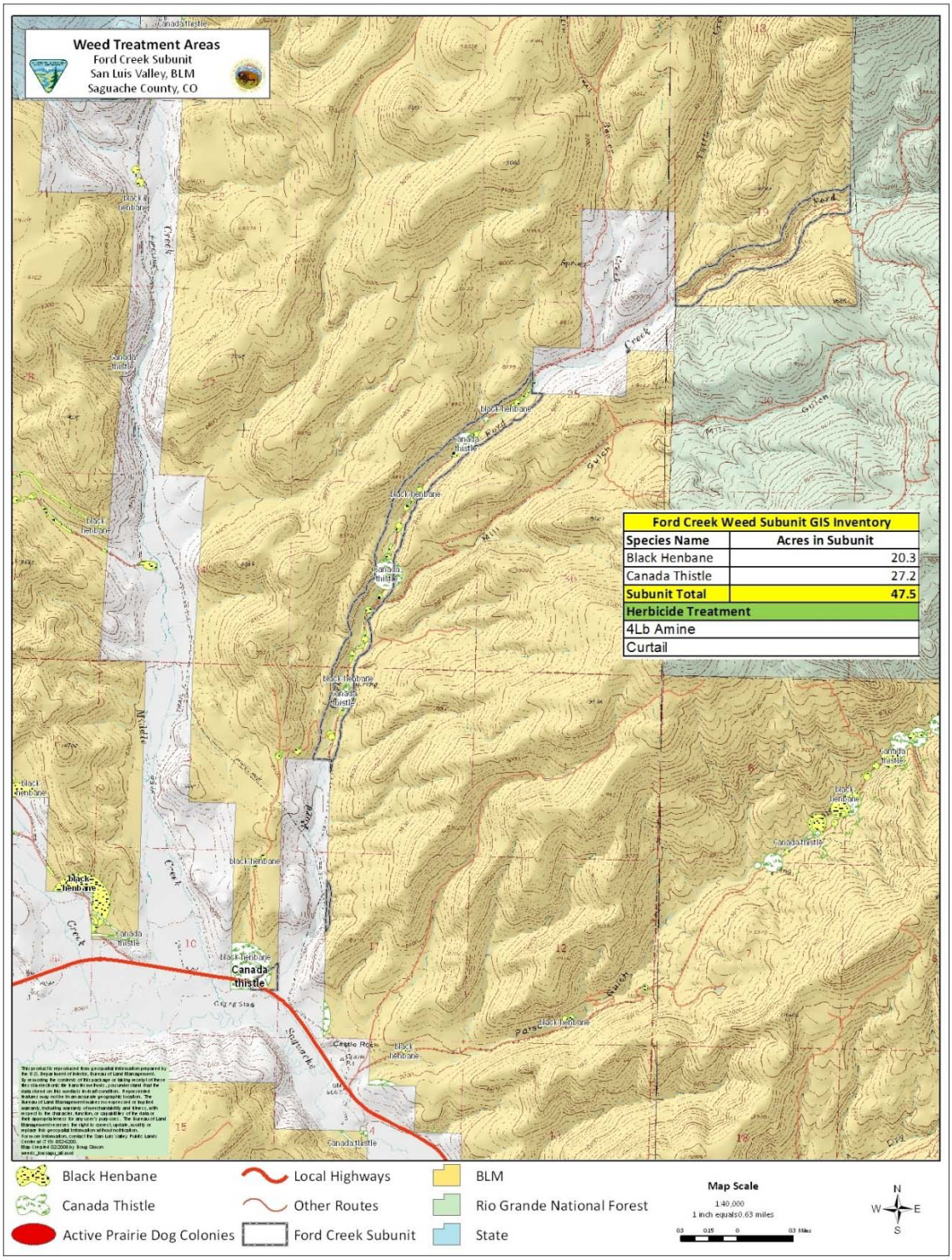
Unit #9: Noland



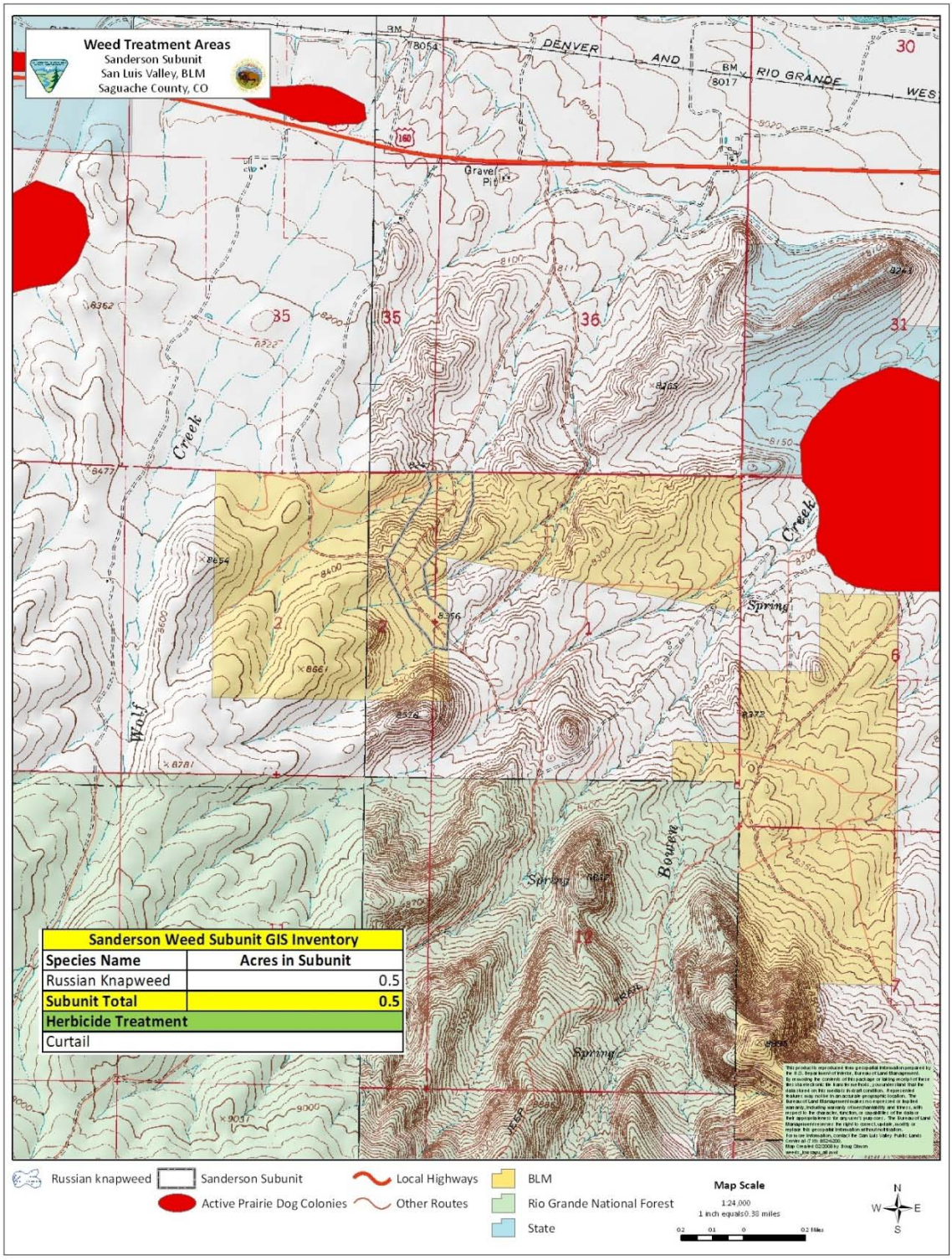
Unit #10: Dorsey Creek



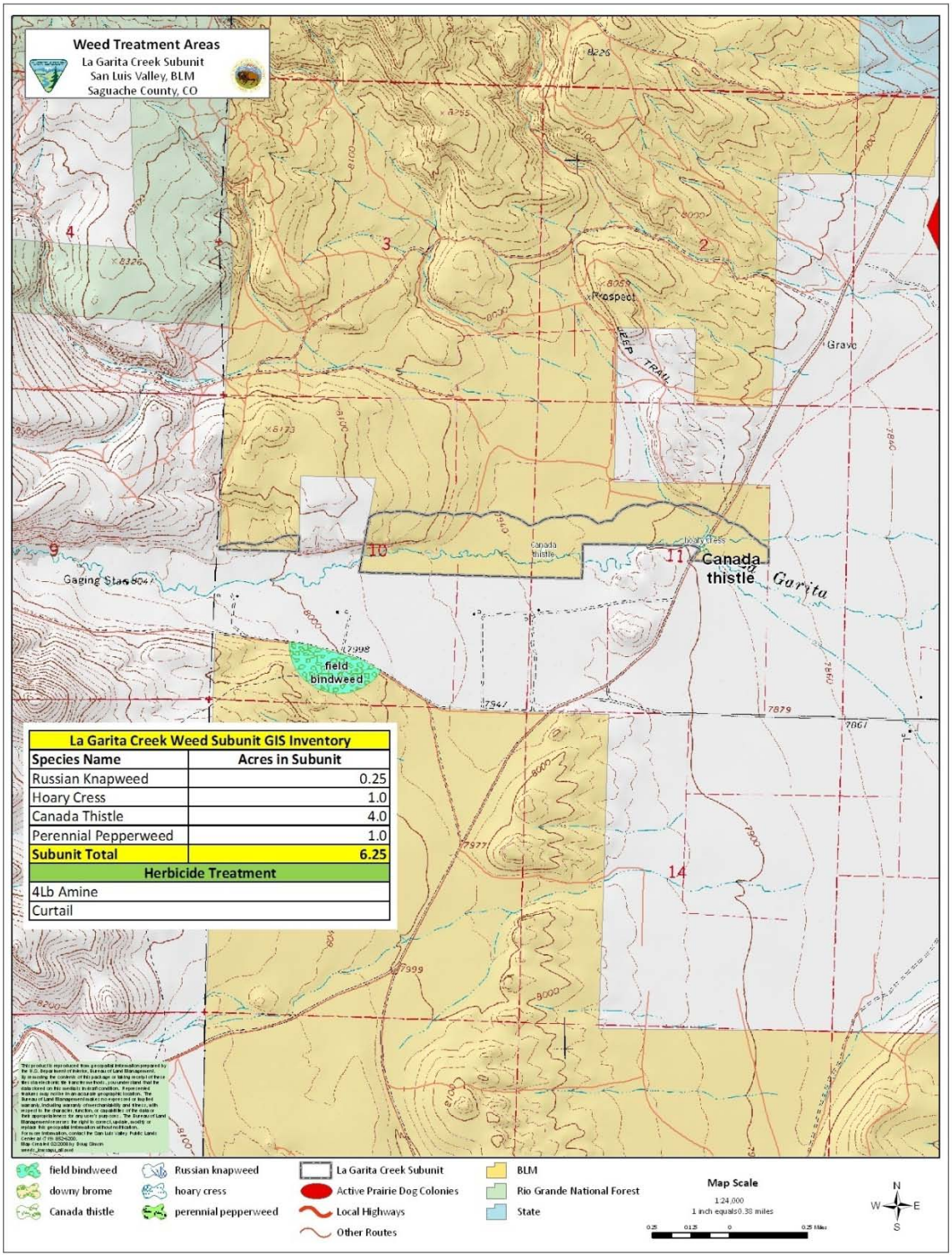
Unit #11: Ford Creek



Unit #12: Sanderson

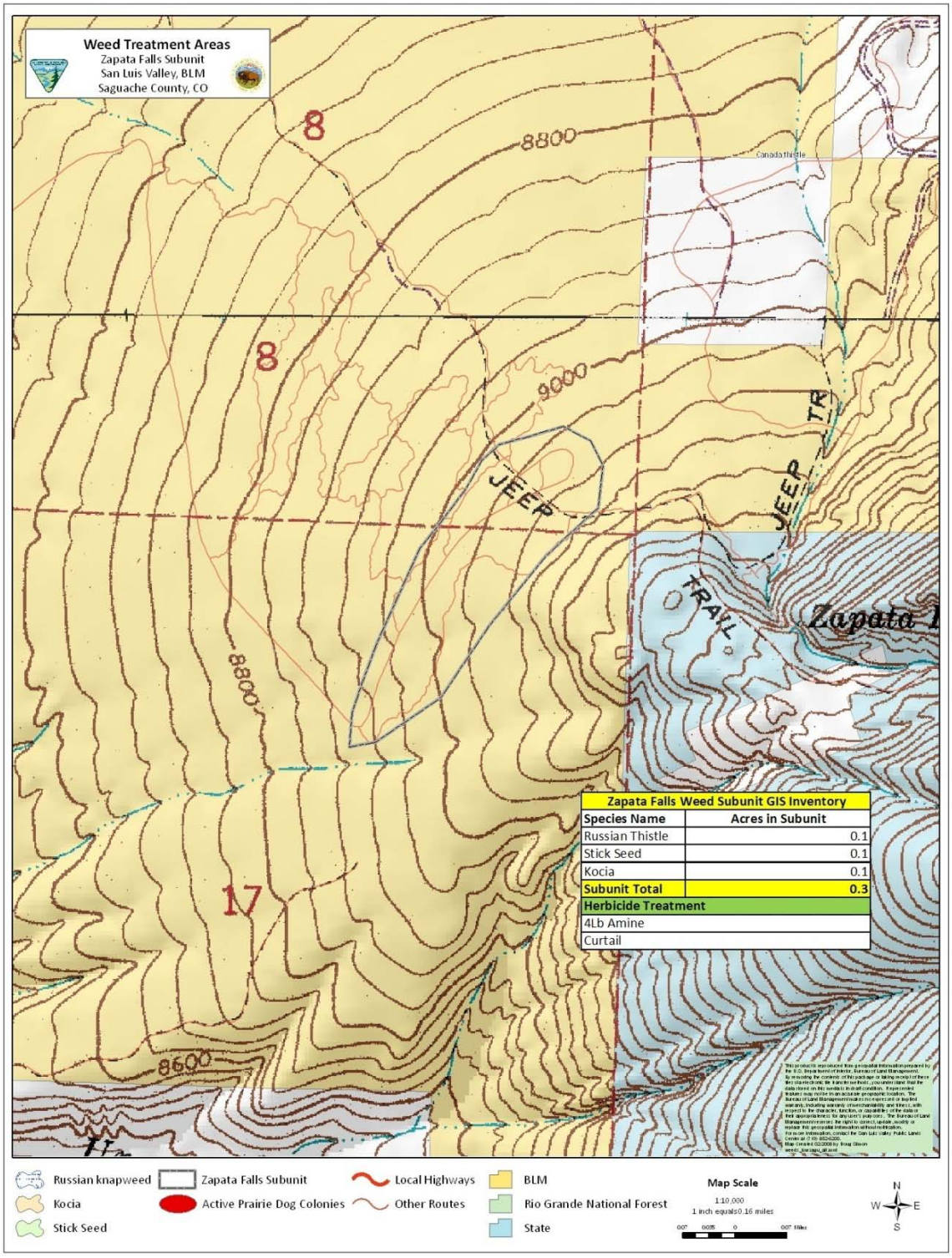


Unit #13: La Garita Creek

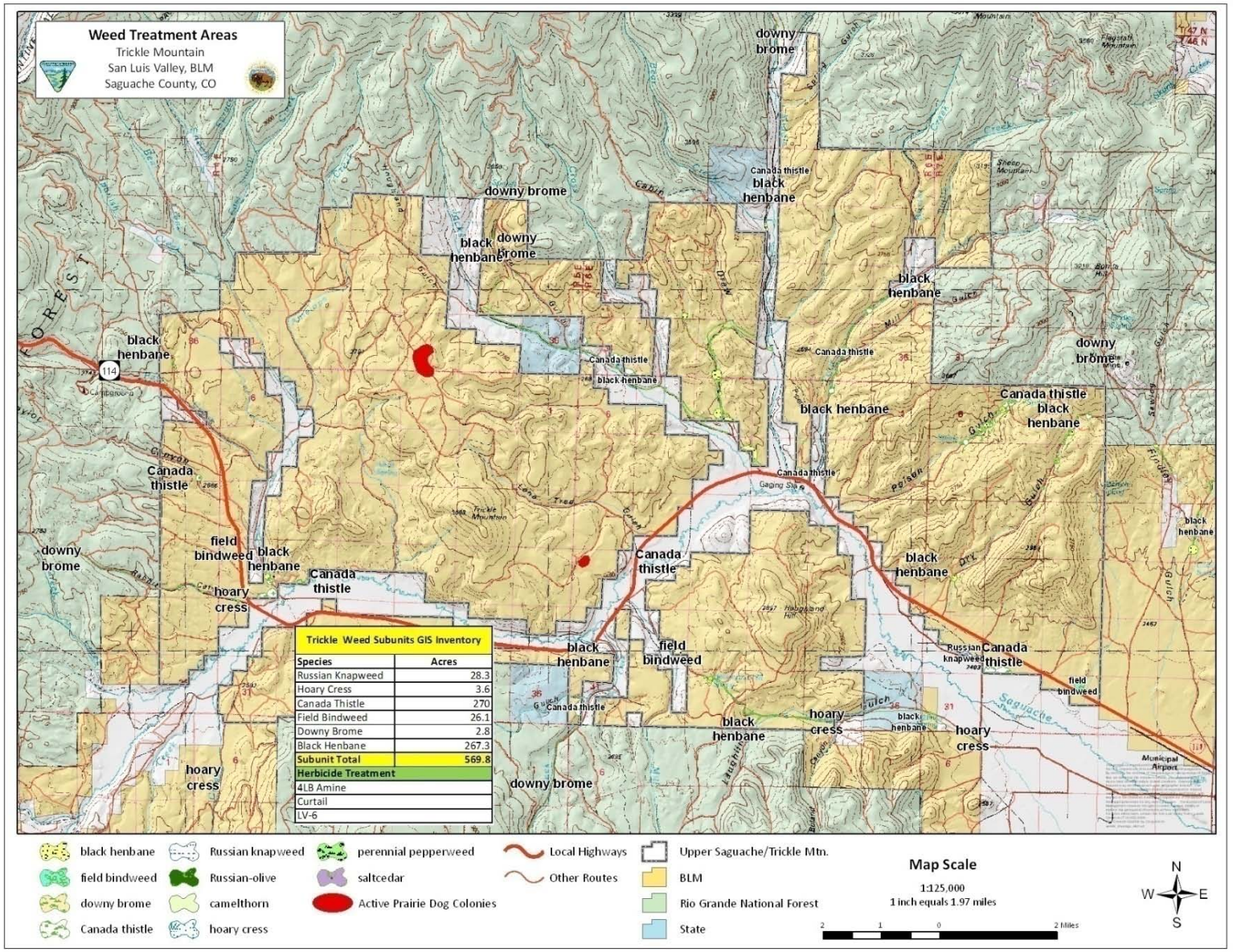


La Garita Creek Weed Subunit GIS Inventory	
Species Name	**Acres in Subunit**
Russian Knapweed	0.25
Hoary Cress	1.0
Canada Thistle	4.0
Perennial Pepperweed	1.0
Subunit Total	**6.25**
Herbicide Treatment	
4Lb Amine	
Curtail	

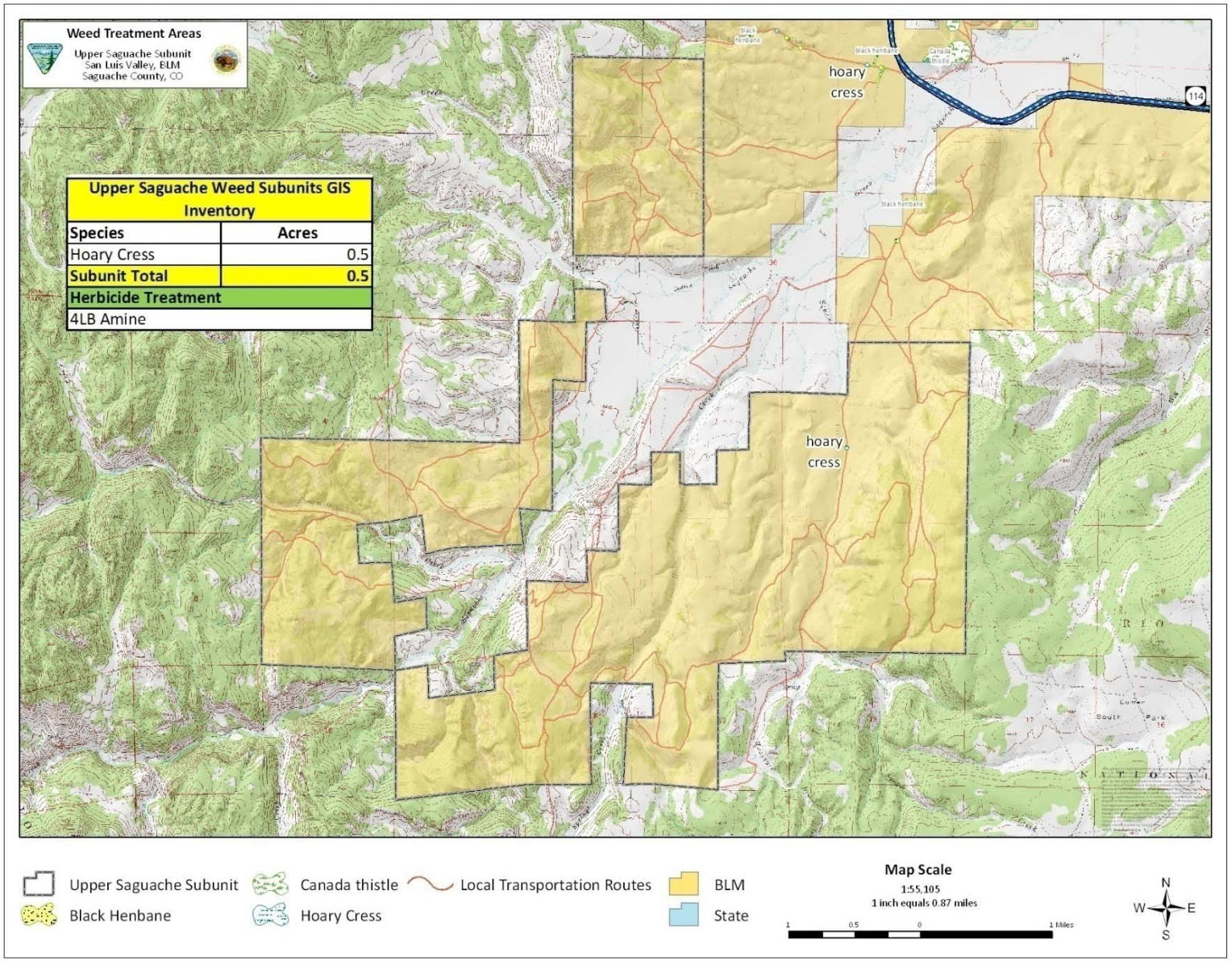
Unit #14: Zapata Falls



Unit #15: Trickle Mountain



Unit #16: Upper Saguache



APPENDIX C

AUTHORITIES, LAWS, AND POLICIES

The following provides a description of the authorities that apply to *Proposed Action*. This is not an all-inclusive list of statutes, limitations, and guidelines, but is a representative list of the types of laws and policy that guide the management of the public land. All laws, regulations, and policies, including BLM manuals, handbooks and internal memoranda, would be followed unless otherwise stated.

Federal Land Policy and Management Act of 1976, which directs the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resources, and archeological value." ***Executive Order 13112, Invasive Species*** directs federal agencies to prevent the introduction of noxious and invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. Several other federal acts provide for management and control of invasive plants. Two weed control acts, the ***Carlson-Foley Act of 1968*** and the ***Plant Protection Act of 2000*** (Public Law 106-224; includes management of undesirable plants on federal lands; authorizes the BLM to manage noxious or invasive weeds and to coordinate with other federal and state agencies in activities to eradicate, suppress, control, prevent, or retard the spread of any noxious weeds on federal lands.

The ***Federal Noxious Weed Act of 1974*** established and funded an undesirable plant management program, implemented cooperative agreements with state agencies, and established integrated management systems to control undesirable plant species. The objectives of the ***Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the Bureau of Land Management in the State of Colorado (1997)*** are to "promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions…and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands."

In addition to federal mandates, the State of Colorado, **Noxious Weed Act Title 35 Article 5.5 (1996)**, requires the federal government to control undesirable plant species by the use of integrated weed management.

Reducing the number of infested acres of noxious or invasive plants would meet the objective of sustaining biological communities as directed by the **BLM Operating Plan 2004-2008**. It would also meet the objectives set for the **SLVRA**, which includes best management practices for surface disturbances, roads, vehicles, livestock grazing, recreation sites, and wild land or prescribed fire, that are designed to eliminate or minimize impacts from noxious and invasive species.

Other objectives of the *Proposed Action* are to provide methods for noxious and invasive vegetation treatment on public lands within the SLVRA and to describe the conditions and limitations that apply to their use.

The proposed action would also allow for vegetation manipulation for proposed projects as long as that manipulation follows the agency's management plan and meets agency objectives. This could include treating invasive native species in recreation areas such as Zapata Falls (Unit Map #14, Appendix B) and Penitente Canyon (Unit Map #8, Appendix B).

Relationship to Statutes, Regulations, or other Plans

ENVIRONMENTAL POLICY

The National Environmental Policy Act (1969)

- requires the preparation of Environmental Impact Statements (EIS) for federal projects that may have a significant effect on the environment
- requires systematic, interdisciplinary planning to ensure the integrated use of natural and social sciences and environmental design arts in making decisions about major federal actions that may have a significant effect on the environment

LAND USE AND NATURAL RESOURCES MANAGEMENT

Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision-*PEIS* (BLM, 2007)

The Record of Decision (ROD) approved:

- the use of 18 herbicide active ingredients
- the use of a scientific protocol to guide the analytical methodology for consideration of the use or non-use of herbicides by the BLM

Vegetation Treatments in 17 Western States, Programmatic Environmental Report-*PER* (BLM, 2007)

The Programmatic Environmental Report (PER) will be referenced in this EA to address the general effects on the environment of using non-herbicide treatment methods, including mechanical, manual, and biological control methods.

Federal Land Policy and Management Act (1976)
Directs the BLM to "take any action necessary to prevent unnecessary and undue degradation of public land."

Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the Bureau of Land Management in the State of Colorado (1996)
The objectives of the rangeland health regulations are to:

- promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions;
- provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands.

Carlson-Foley Act (1968)
This Act directs agency heads to enter upon land under their jurisdiction with noxious plants and destroy noxious plants growing on such land.

Federal Noxious Weed Act (1974), as amended by Sec. 15, Management of Undesirable Plants on Federal Lands, 1990
Congress amended the Federal Noxious Weed Act of 1974, and this amendment was signed into law November 28, 1990. This Act requires that each federal agency:

- designate a lead office and person trained in the management of undesirable plants;
- establish and fund an undesirable plant management program;
- complete and implement cooperative agreements with state agencies; and
- establish integrated management systems to control undesirable plant species.

Executive Order 13112, Invasive Species (1999)
Directs federal agencies to prevent the introduction of invasive species and provide for control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

Public Rangelands Improvement Act (1978)
This Act requires the BLM to manage, maintain, and improve the condition of the public rangelands so that they become as productive as feasible.

BLM Manual 9014 – *Use of Biological Control Agents of Pests on Public Lands* – This manual outlines policy, defines responsibilities, and provides guidance for the release, maintenance, and collections of biological control agents for IPM programs on the lands administered by the BLM.

BLM Manual 9220 – *IPM* – This manual outlines policy, defines responsibilities, and provides guidance for implementing IPM programs on lands administered by the BLM.

BLM Manual 9011 and **Manual Handbook H-9011-1** - *Chemical Pest Control* – This manual and handbook outline policy and provide guidance for conduction pest control programs on public land.

BLM Manual 9015 – *Integrated Weed Management* – This manual addresses the BLM's policy relating to the management and coordination of noxious weed activities among activities of the BLM, organizations, and individuals.

AIR QUALITY

The **Clean Air Act (1990),** as amended (42 U.S.C. 7401, 7642), requires BLM to protect air quality, maintain federal- and state-designated air quality standards, and abide by the requirements of the State Implementation Plans.

Colorado Air Quality Standards and Regulations specify the requirements for air permitting and monitoring to implement Clean Air Act and state ambient air quality standards.

CULTURAL RESOURCES

The Paleontological Resource Protection Preservation Act provides for the protection of paleontological resources on federal lands, to promote the systematic compilation of baseline paleontological resource data, science-based decision-making, and accurate public education, to provide for a unified management policy regarding paleontological resources on federal lands, to promote legitimate public access to fossil resources on federal lands, to encourage informed stewardship of the resources through educational, recreational, and scientific use of the paleontological resources on federal lands, and for other purposes.

The **Historic Sites Act** (16 U.S.C. 461) declares national policy to identify and preserve historic sites, buildings, objects, and antiquities of national significance, thereby providing a foundation for the National Register of Historic Places.

The **National Historic Preservation Act** (**1966**), as amended (16 U.S.C. 470), expands protection of historic and archeological properties to include those of national, state, and local significance. It also directs federal agencies to consider the effects of proposed actions on properties eligible for or included in the National Register of Historic Places.

The **Archaeological Resources Protection Act** (**1979)**, as amended (16 U.S.C. 470a, 470cc, 470ee), requires permits for the excavation or removal of federally administered archeological resources, encourages increased cooperation among federal agencies and private individuals, provides stringent criminal and civil penalties for violations, and requires federal agencies to identify important resources vulnerable to looting and to develop a tracking system for violations.

The **Native American Graves Protection and Repatriation Act (1990)** (Public Law 101-601) provides a process for federal agencies to return certain Native American cultural items (e.g., human remains, funerary objects, sacred objects, and objects of cultural patrimony) to lineal descendants and culturally affiliated Native American tribes.

Protection and Enhancement of the Cultural Environment (EO 11593) directs federal agencies to locate, inventory, nominate, and protect federally owned cultural resources eligible for the National Register of Historic Places and to ensure that their plans and programs contribute to preservation and enhancement of nonfederally owned resources.

HAZARDOUS MATERIALS

The **Comprehensive Environmental Response, Compensation, and Liability Act (1980)** (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601–9673), provides for liability, risk assessment, compensation, emergency response, and cleanup (including the cleanup of inactive sites) for hazardous substances. The Act requires federal agencies to report sites where hazardous wastes are or have been stored, treated, or disposed and requires responsible parties, including federal agencies, to clean up releases of hazardous substances.

The **Resource Conservation and Recovery Act** (RCRA), as amended by the federal Facility Compliance Act of 1992 (42 U.S.C. 6901–6992), authorizes the Environmental Protection Agency (EPA) to manage, by regulation, hazardous wastes on active disposal operations. The Act waives sovereign immunity for federal agencies with respect to all federal, state, and local solid and hazardous waste laws and regulations. Federal agencies are subject to civil and administrative penalties for violations and to cost assessments for the administration of the enforcement.

The **Emergency Planning and Community Right-To-Know Act (1986)** (42 U.S.C. 11001–11050) requires the private sector and federal, state, local, and tribal governments to inventory chemicals and chemical products, to report those in excess of threshold planning quantities, to inventory emergency response equipment, to provide annual reports and support to local and state emergency response organizations, and to maintain a liaison with the local and state emergency response organizations and the public.

PESTICIDE REGULATIONS

Federal Insecticide, Fungicide, and Rodenticide Act (EPA)

- provides for the registration of pesticides, certification of applicators to apply restricted use pesticides, and enforcement of pesticide regulations
- provides for individual states to obtain primacy for enforcement of FIFRA regulations as long as the states' requirements are at least equal to federal requirements

STATE REGULATION

Colorado Noxious Weed Act CRS Title 35 Article 5.5 (1996) requires the federal government to control undesirable plant species by the use of integrated weed management.

WATER QUALITY

The **Clean Water Act** (**1987**), as amended (33 U.S.C. 1251), establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water. The Act also requires permits for point source discharges to navigable waters of the United States and the protection of wetlands and includes monitoring and research provisions for protection of ambient water quality.

Protection of Wetlands (EO 11990) requires federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Floodplain Management (EO 11988) provides for the restoration and preservation of national and beneficial floodplain values, and enhancement of the natural and beneficial values of wetlands in carrying out programs affecting land use.

WILDLIFE

Executive Order 13186 -- Responsibilities of Federal Agencies to Protect Migratory Birds

The **Endangered Species Act (1973)** (ESA), as amended (16 U.S.C. 1531, et seq.), directs federal agencies to ensure that their actions do not jeopardize threatened and endangered species, and that through their authority they help bring about the recovery of such species.

The **Bald Eagle Protection Act (1940)** (16 U.S.C. 668), amended in 1962 to include the golden eagle, prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions.

Fish and Wildlife Coordination Act (1958) (16 U.S.C. 661 et seq.) provides that, whenever the waters or channel of a body of water are modified by a department or agency of the United States, the department or agency first will consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur, with a view to the conservation of wildlife resources.

Fish and Wildlife Improvement Act (1978) (16 U.S.C. 742l) authorizes the Secretary of the Interior and the Secretary of Commerce to assist in training of state fish and wildlife enforcement personnel, to cooperate with other federal or state agencies for

enforcement of fish and wildlife laws, and to use appropriations to pay for rewards and undercover operations.

Fish and Wildlife Conservation Act (1980), as amended, (16 U.S.C. 2901–2911, commonly known as the Nongame Act) encourages states to develop conservation plans for nongame fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic, or scientific value. The states may be reimbursed for a percentage of the costs of developing, revising, or implementing conservation plans approved by the Secretary of the Interior. Amendments adopted in 1988 and 1989 also direct the Secretary to undertake certain activities to research and conserve migratory nongame birds.

Migratory Bird Treaty Act (1918) (16 U.S.C. 703–711) manages and protects migratory bird species through consultation with state and local governments and protection of land and water resources necessary for the conservation of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.

The Sikes Act (1960) (16 U.S.C. 670a–670o), as amended, Public Law 86-797, provides for cooperation by the departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States. Public Law 93-452, signed in 1974, authorized conservation and rehabilitation programs on BLM lands. Public Law 97-396, approved in 1982, provided for the inclusion of endangered plants in conservation programs developed for BLM lands. It also defined "cooperative agreements" with states and clarified section 209 concerning purchases and contracts for property and services from states.

WILDERNESS STUDY AREAS

Invasive plant control on public lands within Wilderness Study Areas (WSAs) must comply with and be managed consistent with BLM's Interim Management Policy Handbook (H-8550-1) For Lands Under Wilderness Review. The law provides for, and the BLM's policy is to allow, invasive species control on lands under wilderness review in the manner and degree that does not degrade wilderness quality. Invasive plant control methods within WSAs are subject to reasonable regulations, policies, and practices.

APPENDIX D

STANDARD OPERATING PROCEDURES (SOPs)

BLM Activity	Preventative Measures
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

BLM Activity	Preventative Measures
	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. • 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. • 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

BLM Activity	Preventative Measures
	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.
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 (IPM)*
General	• Prepare operational and spill contingency plan in advance of treatment. • 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.

BLM Activity	Preventative Measures
	• 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. • 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 ttp://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. • Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph 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.
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

BLM Activity	Preventative Measures
	minimize drift. For example, do not treat when winds exceed 10 mph) 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

BLM Activity	Preventative Measures
	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.
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.

BLM Activity	Preventative Measures
	• 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,

BLM Activity	Preventative Measures
	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.
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	• 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.

BLM Activity	Preventative Measures
Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation	
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.
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.

BLM Activity	Preventative Measures
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.

APPENDIX E

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 • 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 nonchemical 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 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*.

Resource	Mitigation Measures
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 • 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. • 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. • 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 to limit contamination of off-site

Resource	Mitigation Measures
	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 to limit contamination of off-site rangeland vegetation.
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
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).
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.

Resource	Mitigation Measures
	• 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.

All other mitigation measures not discussed can be found in the PEIS, p. 2-40.

APPENDIX F

SUMMARY OF POSSIBLE TREATMENT METHODS

Method	Description
Manual	
Hand pulling	Pulling or uprooting plants can be effective against some shrubs, tree saplings, and herbaceous noxious or invasive plants. Annuals and tap-rooted plants are particularly susceptible to control by hand pulling. It is not as effective against many perennial invasive plants with deep underground stems and roots that are often left behind to re-sprout. The advantages of pulling include its small ecological impact, minimal damage to neighboring plants, and low (or no) cost for equipment or supplies. The key to effective hand pulling is to remove as much of the root as possible while minimizing soil disturbance. For many species, any root fragments left behind have the potential to re-sprout, and pulling is not effective on plants with deep and/or easily broken roots.
Pulling Using Tools	Most plant-pulling tools are designed to grip the plant stem and provide the leverage necessary to pull its roots out. Tools vary in their size, weight, and the size of the invasive plant they can extract. The Root Talon is inexpensive and lightweight, but may not be as durable or effective as the all-steel Weed Wrench, which is available in a variety of sizes. Both tools can be cumbersome and difficult to carry to remote sites. Both work best on firm ground as opposed to soft, sandy, or muddy substrates.
Clipping	"Clipping" means to cut or remove seed heads and/or fruiting bodies to prevent germination. This method is labor-intensive and effective for small and spotty infestations.
Clipping and pulling	"Clipping and pulling" means cutting a portion of the noxious or invasive plant stem and pulling it from its substrate, generally the bole of a tree. This method is labor intensive, but can be effective for larger infestations.
Stabbing	Some plants can be killed by severing or injuring (stabbing) the carbohydrate storage structure at the base of the plant. Depending on the species, this structure may be a root corm, storage rhizome (tuber), or taproot. These organs are

Method	Description
	generally located at the base of the stem and under the soil. Cutting off access to these storage structures can help "starve" or greatly weaken some species
Mechanical	
Mowing, cutting, brushing, trimming, weed eating, disking, plowing	Mowing and cutting can reduce seed production and restrict noxious or invasive plant growth, especially in annuals cut before they flower and set seed. Some species, however, re-sprout vigorously when cut, replacing one or a few stems with many that can quickly flower and set seed. These treatments are used as primary treatments to remove aboveground biomass in combination with herbicide treatments to prevent resprouting, or as follow up treatments to treat target plants missed by initial herbicide use. Also, mowing and cutting can be used, in conjunction with herbicide treatments, to reduce vegetative materials and to promote vigorous growth in order to decrease the amount of herbicide application needed, and to increase herbicide effectiveness. Disking, plowing, and cutting (thinning) help eliminate undesirable vegetation and are used to promote a desired plant community for healthy wildlife and resource management.
Biological	
Grazing goats, sheep, livestock Classical biological control (insects, pathogens, nematodes, mites)	Grazing could either promote or reduce noxious and invasive plant abundance at a particular site. When grazing treatments are combined with other control techniques, such as herbicides, severe infestations could be reduced and small infestations may be eliminated. Grazing animals may be particularly useful in areas where herbicides cannot be applied (e.g., near water) or are prohibitively expensive (e.g., large infestations). Animals also could be used as part of a restoration program by breaking up the soil and incorporating in seeds of desirable native plants. Goats prefer broadleaf herbs and have been used to control leafy spurge *(Euphorbia esula)*, Russian knapweed *(Acroptilon repens)*, and toadflax *(Linaria spp.)*. These animals appear to be able to neutralize the phytochemicals toxic to other animals that are present in these and other forbs. Goats could control woody species because they climb and stand on their hind legs, and browse on vegetation other animals cannot reach. Classical biological control agents can be introduced to an

Method	Description
	invasive plant infestation to directly damage plant tissue. Although noxious and invasive plants do not die quickly, increasing plant stress allows native plants to compete better. Biological control treatments are best used in larger infestation sites where noxious or invasive plants are well established and where short term control is not a management objective. Biological control does not eradicate invasive plants and is commonly used in conjunction with herbicide applications.
Herbicide	
Hand/Selective Treatment	Selective treatment of individual plants to avoid spraying other desirable plants. There is a low likelihood of drift or delivery of herbicides away from treatment sites. This method is used in sensitive areas, such as near water, to avoid getting any herbicide on the soil or in the water. Hand/Selective methods could be done under more variable conditions than spot spraying or broadcast spraying. *Specific methods include*: a. *Wicking and Wiping* - Involves using a sponge or wick on a long handle to wipe herbicide onto foliage and stems. Use of a wick eliminates the possibility of spray drift or droplets falling on non-target plants. Herbicide can drip or dribble from some wicks. b. *Foliar Application* - These methods apply herbicide directly to the leaves and stems of a plant. An adjuvant or surfactant is often needed to enable the herbicide to penetrate the plant cuticle, a thick, waxy layer present on leaves and stems of most plants. There are several types of foliar application tools available. c. *Basal Bark* - This method applies a 6 to 12 inch band of herbicide around the circumference of the trunk of the target plant, approximately one foot above ground. The width of the sprayed band depends on the size of the plant and the species' susceptibility to the herbicide. The herbicide can be applied with a backpack sprayer, hand-held bottle, or wick. d. *Frill or Hack and Squirt* - The frill method, also called the "hack and squirt" treatment, is often used to treat woody species with large, thick trunks. The tree is cut using a sharp knife, saw, or ax, or drilled with a power drill or other device. Herbicide is then immediately applied to the cut with a backpack sprayer, squirt bottle, syringe, or similar equipment. e. *Stem Injection* - Herbicides can be injected into herbaceous

Method	Description
	stems using a needle and syringe. Herbicide pellets can also be injected into the trunk of a tree using a specialized tool. f. *Cut-stump* - This method is often used on woody species that normally resprout after being cut. Cut down the tree or shrub, and immediately spray or squirt herbicide on the exposed cambium (living inner bark) of the stump. The herbicide must be applied to the entire inner bark (cambium) within minutes after the trunk is cut. The outer bark and heartwood do not need to be treated since these tissues are not alive, although they support and protect the tree's living tissues. The cut stump treatment allows for a great deal of control over the site of herbicide application, and therefore, has a low probability of affecting non-target species or contaminating the environment. It also requires only a small amount of herbicide to be effective.
Spot Spraying	Spot applicators spray herbicide directly onto small patches or individual target plants only and avoid spraying other desirable plants. These applicators range from motorized rigs with spray hoses to backpack sprayers, to hand-pumped spray or squirt bottles, which can target very small plants or parts of plants.
Broadcast (Boom) Spraying	A boom, a long horizontal tube with multiple spray heads, may be mounted or attached to a tractor, ATV (all terrain vehicle) or other vehicle. The boom is then carried above the invasive plants while spraying herbicide, allowing large areas to be treated rapidly with each sweep of the boom. Offsite movement due to vaporization or drift and possible treatment of non-target plants can be of concern when using this method. The herbicide is carried in a tank and reaches the nozzles via tubing. All herbicides are metered out from the nozzles in a controlled manner. The nozzle controls the droplet size, the area (or cone) being covered by the herbicide and it could be turned on/off with ease. Some nozzles could rotate. All this flexibility permits the operator to carefully apply herbicide at specific rates over specific areas. Many of the new boom spray operations have very sophisticated electronic monitoring that delivers exact amounts of herbicides and keeps records on rates and areas covered. Offsite movement due to drift and possible treatment of non-target plants could be of concern when using this method. Not all broadcast methods include a boom; boom-less nozzles are currently in use that can reduce the risk of non-target

Method	Description
	effects. Backpacks may also be used as a broadcast tool, if not directed at individual plants.

APPENDIX G

KEY ISSUES IDENTIFIED DURING THE SCOPING OF THE *VEGETATION TREATMENTS USING HERBICIDES IN 17 WESTERN STATES, PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT*

Program Purpose and Need
1. Focus on long-term ecosystem sustainability and biological diversity; clearly define restoration objectives 2. Need to address all invasive plants, not just weeds 3. Evaluate land use impacts, such as grazing and fire suppression, on the decline of ecosystem health 4. Focus on addressing the causes rather than treating the symptoms 5. Address how PEIS will impact Resource Management Plans and other local planning 6. Work closely with agencies, conservation groups, and private landowners on vegetation management
Proposed Action
1. Ensure that adequate funds are available to treat enough land and monitor treatment success 2. Consider all treatment methods 3. Naturally-occurring fires should be allowed to burn and restored to public lands 4. Use newer, less toxic herbicides where feasible, and limit use or avoid use of herbicides 5. Describe how herbicides were chosen and evaluated in the PEIS 6. Describe where acres will be treated and method of accounting for acres that receive multiple treatments
Other Potential Alternatives
1. Reduce or eliminate the use of herbicides; apply from the ground rather than from the air 2. Fuels reduction should only occur in WUI or where there is a threat of significant wildfire 3. Treat more acres; treat fewer acres 4. Develop a no-grazing alternative; develop a no-logging alternative; develop a no-OHV alternative

5. Develop restrictions on motorized vehicle use on public lands
6. Develop an alternative based on an ecosystem management approach

Restoration Goals and Best Management Practices

1. Identify restoration objectives and focus on preventative measures to eliminate the causes of land degradation
2. Restoration efforts should focus on restoring natural disturbance regimes and ecosystem processes
3. Improve management of public lands for multiple use and maximum public benefit
4. Use native plants and certified native seed, where practical, for revegetation
5. Restrict grazing on lands that are being rehabilitated or that have not been impacted by livestock
6. Monitor success of treatments and establish performance measures to determine treatment success
7. Include public education as part of the vegetation treatment program

Environmental Consequences

1. Address the impacts on air quality from prescribed burning
2. Address the impacts of herbicides on water quality
3. Assess the role of fire in contributing to weed growth
4. Evaluate the effects of herbicide treatments on non-target species
5. Address the role of grazing in controlling weeds and other invasive vegetation and hazardous fuels
6. Vegetation treatments should focus on restoring habitat and natural ecological processes
7. Address the impacts of treatments on species of concern
8. Describe how treatments will occur in wilderness areas
9. Address the impacts of prescribed fire on powerline operations and safety
10. Evaluate the impacts to subsistence crops used by Native Americans and Alaska Natives
11. Address the risks to humans and fish and wildlife from use of herbicides and smoke from prescribed fire
12. Address how will vegetation treatments will affect the local economy