

To: Benjamin Gaddis[bgaddis@gaddisconsultingllc.com]
Cc: William (Allan) Bate[abate@blm.gov]; Sean Stewart[s2stewar@blm.gov]; Jason Bybee[jmbybee@blm.gov]; Scott Evans[sevans@cirruses.com]; Paul Leatherbury[pleather@blm.gov]; Shakespear, Paula[pshakesp@blm.gov]; Amber Hughes[ahughes@blm.gov]
From: Betenson, Matthew
Sent: 2017-08-15T16:44:30-04:00
Importance: Normal
Subject: Re: GSENM Range EAs - follow up from 8/8 introductory call between Allan and Ben
Received: 2017-08-15T16:45:07-04:00
[Fivemile EA Long Form Final Adobe.pdf](#)
[EA Center Knoll Riparian Enhancement Project 3.2014 scanned.pdf](#)

Hi Ben,

In the CC: are the requested emails for Paul Leatherbury, GIS Specialist; Paula Shakespear, Resource Clerk; Amber Hughes; Planning & Environmental Coordinator

Also attached are the Five Mile Sagebrush Restoration EA and

Thanks.

On Tue, Aug 8, 2017 at 4:45 PM, Benjamin Gaddis <bgaddis@gaddisconsultingllc.com> wrote:

Allan,

Thanks for taking the time this afternoon on the telephone to start to get things rolling for the range EAs we'll be working on. Below is a brief synopsis of our conversation (in no particular order). Sean and Jason, I left voicemails for both of you this afternoon as well. The items I was going to talk with you about are also reflected in the synopsis below. Feel free to call back if you'd like but I suspect the information here will cover things.

- Allan will be the COR for this contract. He'll send official NTP to the Cirrus Team in a reply to this email.
- It would be useful to have a brief (~30-60 minute) teleconference to kick things off. Allan suggested Tuesday August 15th at 1:00 p.m. MT. Will that work for everyone? If so, Ben will send a calendar invitation with call in information and an agenda.
- Ben asked Allan to provide electronic data/information (reports, etc.) related to the projects, associated allotments, etc. in a "data dump". Ideally this would be provided in an email or series of emails but an FTP option can be worked out if needed. Basically the request is for all relevant information associated with these projects. We will sort out getting items that are not in electronic format later.
- Allan indicated that at a minimum the following publicly available (downloadable) documents would also be needed: Kane County and Garfield County plans and GSENM Monument Management Plan.

- Ben also asked for blank EA templates (short form and long form); whatever is typically used internally within the BLM when someone starts work on an EA from scratch. Allan indicated he would also send recent EAs completed for well/pipeline, water catchment, and seeding/restoration projects.
- Allan and Ben discussed that when Ben or Scott email the BLM concerning these projects the email list at the BLM will include all BLM folks on this email – Allan, Sean, Jason, and Matt. Likewise, when emailing the Cirrus Team always include Ben and Scott.

I think that covers it. Did I miss anything important, Allan?

We are looking forward to working on these EAs with you all!

Thanks!

Ben

Benjamin Gaddis, M.E.M., C.P.F.

Consulting Facilitation Training

Gaddis Consulting, LLC

(801) 259-3257

bgaddis@gaddisconsultingllc.com

Linked in profile

--

Matt Betenson

Associate Monument Manager

Grand Staircase-Escalante National Monument

669 South HWY 89A, Kanab, UT 84741

435-644-1205 435-644-1250 fax

United States Department of the Interior Bureau of Land Management

Environmental Assessment UT-030-04-010-EA

August 17, 2006

Five Mile Mountain Sagebrush Restoration Project

Location: R2W T41S Sections: 25, 26, 34, 35, 36
R2W T42S Sections: 1-10, 12, 16-21, 27-32
R1W T41S Sections: 31, 32
R3W T41S Sections: 16-18, 20-22, 28, 29
R3W T42S Sections: 1-4, 8, 10-15, 17-34
R3W T43S Sections: 4-9

U.S. Department of the Interior
Bureau of Land Management
Grand Staircase-Escalante National Monument
190 East Center Street
Kanab, UT 84741
Phone: (435) 644-4300
FAX: (435) 644-4350



Five Mile Mountain Sagebrush Restoration Project

UT-030-04-010-EA

	<u>Page</u>
1.0 PURPOSE & NEED.....	4
1.1 Introduction.....	4
1.2 Background.....	4
1.3 Need for the Proposed Action	6
1.4 Conformance with BLM Land Use Plan(s)	9
1.5 Relationship to Statutes, Regulations, or other Plans (s).....	11
1.6 Identification of Issues.....	11
1.6.1 Cultural/Native American Religion Concerns	11
1.6.2 Invasive/Non-Native Species.....	12
1.6.3 Fish and Wildlife.....	12
1.6.4 Livestock Grazing/Rangeland Health Standards and Guidelines	12
1.6.5 Soils and Biological Crusts	12
1.6.6 Vegetation Including Special Status Plant Species.....	12
1.7 Summary	12
 2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION	 14
2.1 Introduction.....	14
2.2 Alternative A – No Action.....	15
2.3 Alternative B – Proposed Action	16
2.4 Alternative C – Range Seeding Emphasis	25
2.5 Alternative D – Intensive Vegetation Management.....	27
2.6 Alternatives Considered, but Eliminated from Further Analysis.....	28
2.7 Mitigation Measures Common to All Alternatives.....	29
2.7.1 General.....	29
2.7.2 Cultural Resources	29
2.7.3 Herbicide Application.....	29
2.7.4 Hydrology	29
2.7.5 Mechanical Methods	30
2.7.5.1 Anchor Chain.....	30
2.7.5.2 Bullhog.....	30
2.7.5.3 Dixie Harrow	30
2.7.5.4 Hand Thinning	31
2.7.5.5 Interseeding.....	31
2.7.5.6 Rangeland Drill	31
2.7.6 Monitoring	31
2.7.7 Seed Selection.....	32
2.7.8 Soils and Biological Crusts	32
2.7.9 Vegetation.....	33
2.7.10 Weeds.....	33
2.7.11 Wildlife	33

Five Mile Mountain Sagebrush Restoration Project

UT-030-04-010-EA

	<u>Page</u>
3.0	AFFECTED ENVIRONMENT34
3.1	Introduction.....34
3.2	General Setting.....34
3.3	Critical Elements of the Human Environment and Other Resources/Issues Brought Forward for Analysis35
3.3.1	Cultural/Native American Religious Concerns35
3.3.2	Invasive/Non-native Species.....36
3.3.3	Fish and Wildlife.....36
3.3.4	Livestock Grazing/Rangeland Health Standards and Guidelines37
3.3.5	Soils and Biological Crusts.....42
3.3.6	Vegetation Including Special Status Plant Species.....45
3.3.6.1	Special Status Plants45
3.3.6.2	Vegetation46
3.3.7	Visual Resource Management.....46
4.0	ENVIRONMENTAL IMPACTS.....49
4.1	Introduction.....49
4.2	Direct/Indirect Impacts49
4.2.1	Alternative A – No Action.....49
4.2.1.1	Cultural/Native American Religious Concerns49
4.2.1.2	Invasive/Non-native Species.....49
4.2.1.3	Fish and Wildlife.....49
4.2.1.4	Livestock Grazing/Rangeland Health Standards and Guidelines ..49
4.2.1.5	Soils and Biological Crusts.....50
4.2.1.6	Vegetation Including Special Status Plant Species.....50
4.2.1.7	Visual Resource Management51
4.2.2	Alternative B – Proposed Action.....51
4.2.2.1	Cultural/Native American Religious Concerns51
4.2.2.2	Invasive/Non-native Species.....51
4.2.2.3	Fish and Wildlife.....54
4.2.2.4	Livestock Grazing/Rangeland Health Standards and Guidelines ..56
4.2.2.5	Soils and Biological Crusts.....60
4.2.2.6	Vegetation Including Special Status Plant Species.....62
4.2.2.7	Visual Resource Management62
4.2.3	Alternative C – Range Seeding Emphasis63
4.2.3.1	Cultural/Native American Religious Concerns63
4.2.3.2	Invasive/Non-native Species.....63
4.2.3.3	Fish and Wildlife.....64
4.2.3.4	Livestock Grazing/Rangeland Health Standards and Guidelines ..64
4.2.3.5	Soils and Biological Crusts.....67
4.2.3.6	Vegetation Including Special Status Plant Species.....67
4.2.3.7	Visual Resource Management68

Five Mile Mountain Sagebrush Restoration Project

UT-030-04-010-EA

	<u>Page</u>
4.2.4 Alternative D – Intensive Vegetation Management.....	68
4.2.4.1 Cultural/Native American Religious Concerns	68
4.2.4.2 Invasive/Non-native Species.....	68
4.2.4.3 Fish and Wildlife.....	68
4.2.4.4 Livestock Grazing/Rangeland Health Standards and Guidelines ..	68
4.2.4.5 Soils and Biological Crusts.....	72
4.2.4.6 Vegetation Including Special Status Plant Species.....	72
4.2.4.7 Visual Resource Management	73
4.3 Cumulative Impacts Analysis	73
4.3.1 Past and Present Actions	73
4.3.2 Reasonably Foreseeable Action Scenario (RFAS)	73
5.0 CONSULTATION AND COORDINATION	75
5.1 Introduction.....	75
5.2 Persons, Groups, & Agencies Consulted	75
5.3 Summary of Public Participation	76
5.3.1 List of Commenters.....	76
5.3.2 Response to Public Comment	76
5.4 List of Preparers.....	81
6.0 REFERENCES AND ACRONYMS	82
6.1 References Cited	82
6.2 List of Acronyms Used in this EA.....	83
 APPENDICES	
Appendix A – Interdisciplinary Team Analysis Record Checklist.....	84
Appendix B – Seed List	87
Appendix C – Detailed Monitoring Protocol.....	105
Appendix D – Vegetation Type Map.....	110
Appendix E – Soil Interpretation Maps and Soil Survey Details	112
Appendix F – Alternative Maps 2.1, 2.2, 2.3 (11X17)	116

Five Mile Mountain Sagebrush Restoration Project

UT-030-04-010-EA

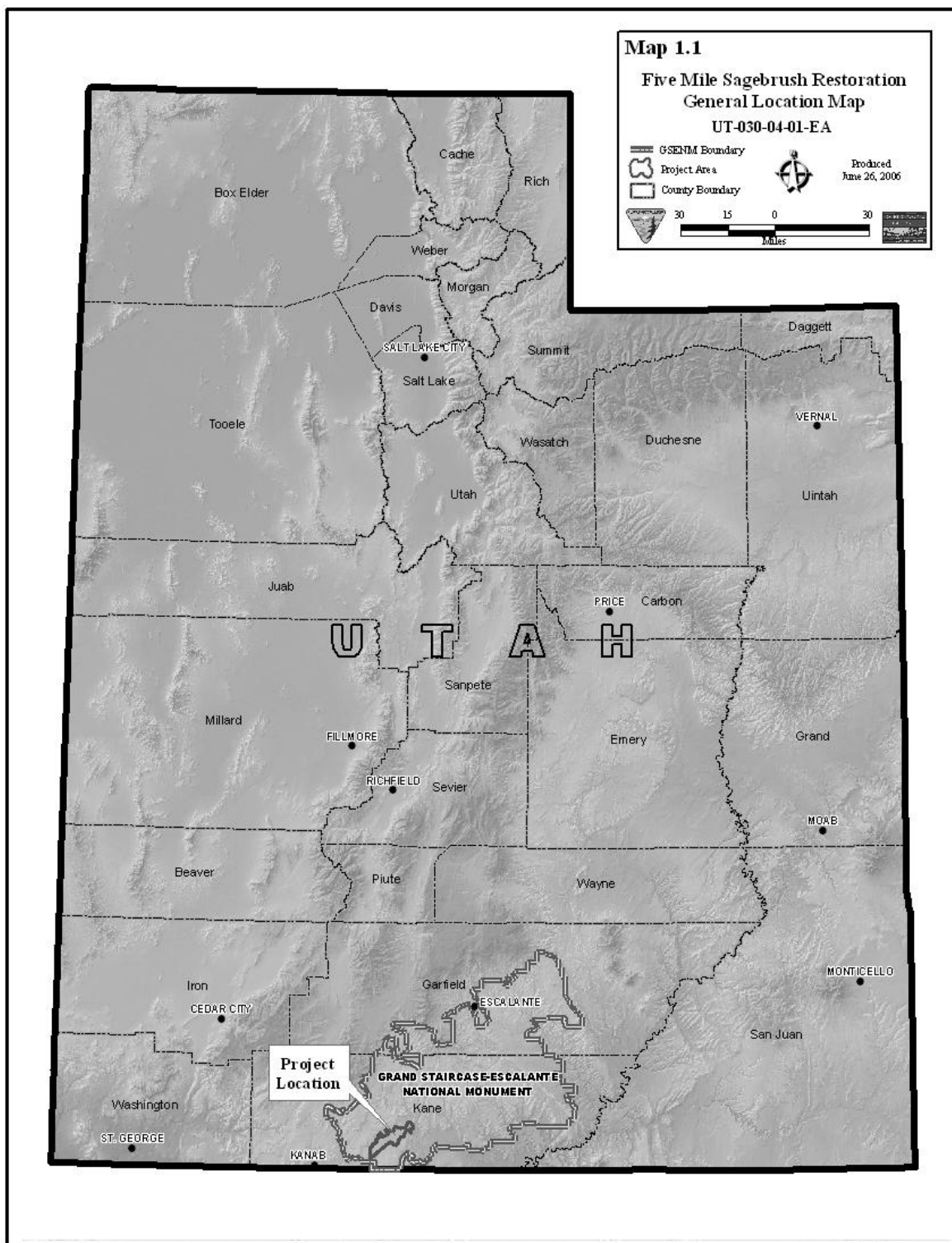
1.0 PURPOSE & NEED

1.1 Introduction:

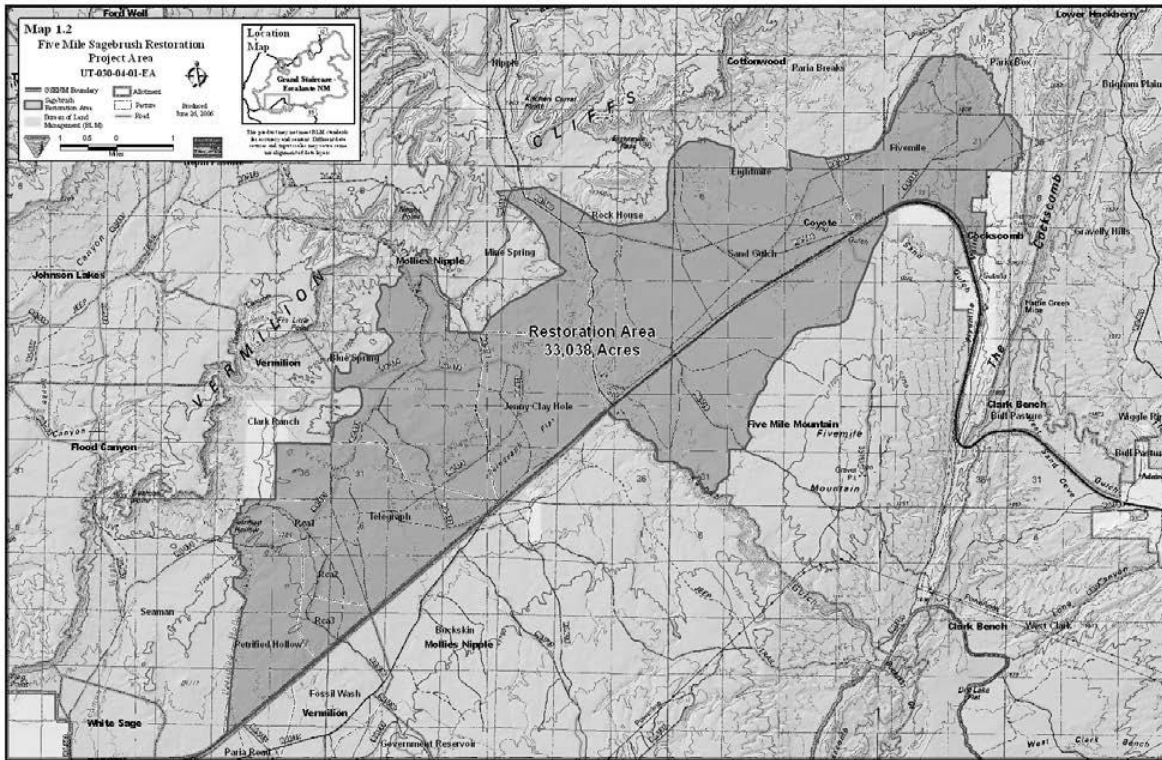
This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the Five Mile Mountain Sagebrush Restoration Project as proposed by the Bureau of Land Management (BLM) for Grand Staircase-Escalante National Monument (GSENM) located in Kane County, Utah. The EA is a site-specific analysis of potential impacts that could result from implementation of the proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of “Finding of No Significant Impact” (FONSI). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record may be signed for the EA approving the selected alternative, whether the proposed action or another alternative. A Decision Record (DR), including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in “significant” environmental impacts (effects) beyond those already addressed in the GSENM Management Plan (MMP) signed November 1999 and effective February 2000.

1.2 Background:

GSENM proposes to restore sagebrush communities on BLM public lands located along U.S. Highway 89 beginning approximately 20 miles east of Kanab, Utah and continuing in an easterly direction for approximately 12 miles. Areas targeted for restoration are located on both the north and south sides of the highway (Maps 1.1 and 1.2). Within the 33,038 acres that this EA addresses (project area), restoration would occur in sites that contain dead and older age class sagebrush and range seedlings that have experienced substantial plant mortalities. These communities will be restored with a variety of mechanical and natural methods depending on individual site conditions and desired results.



Map 1.1: Five Mile Sagebrush Restoration General Location Map



Map 1.2: Five Mile Sagebrush Restoration Project Area

This project proposes to convert sagebrush communities to functioning communities with a diverse species composition and age structure and to reverse erosive processes that threaten overall site stability. This project will be implemented in phases over the next seven to 10 years with several designated treatment sites within the project area initiated at a given time. The analysis in this document is intended to disclose the cumulative impacts of performing landscape level restoration projects. GSENM is committed to restoring plant communities and structure, where appropriate. Results from this project will be incorporated into future restoration efforts.

As part of this project, the restoration areas would be rested from livestock grazing until desired site conditions are met; some fences would be constructed to restrict livestock use in the restoration areas. In order to stabilize erosive soils, some erosion control structures would be installed.

This project is part of a state-wide effort by the BLM and other State and Federal agency cooperators to restore impoverished sagebrush communities. If approved, restoration efforts may begin in late fall of 2006.

1.3 Need for the Proposed Action

The purpose of the proposed project is to restore plant communities to a more natural range of plant associations and increase the health and productivity of degraded sagebrush communities. The primary objective of this project is to create a healthy, resilient plant community composed

of mixed age shrubs and site adapted native grasses and forbs. Specific targets for plant cover and frequency will be established to determine if restoration objectives have been met.

The general objectives of the proposed project are as follows:

- ensure that drought-impacted sagebrush communities are not replaced by invasive annual species such as Cheatgrass (*Bromus tectorum*),
- restore sagebrush habitats to maintain populations of sagebrush obligate species,
- provide winter forage and habitat for mule deer and other wildlife,
- prevent soil loss and restore soil health,
- maintain the quality and quantity of surface waters, and
- conduct the treatment in a way that conforms with the MMP and as consistently as possible with the Kane County, Utah General Plan (1998).

Over 600,000 acres of primarily Wyoming big sagebrush have been severely impacted by a six-year drought in Utah. The extent of the impact varies from sites with <50% sagebrush mortality, to sites with nearly 100% mortality. Understory vegetation in many of these impacted sites has also been severely reduced or eliminated. A major portion of the affected rangelands are considered important seasonal habitats for greater sage-grouse and other sagebrush obligate species, as well as crucial winter ranges for mule deer and other big game.

Large stands of dead sagebrush were identified by GSENM and Utah Division of Wildlife Resources (UDWR) staff during a Fall 2003 field trip which focused on identifying sagebrush die-offs state-wide (Photos 1 and 2). In addition, many range seedings installed in the 1960s and 1970s are in poor condition as a result of sustained drought and grazing pressure. These range seedings were generally located within sagebrush communities. Many of these sagebrush communities may have crossed thresholds that allow them to self heal and require intervention to return to a productive functioning condition. Many sites have lost the ability to support native wildlife populations and are of limited use to livestock. The project area is located within the critical winter range of the Paunsaguant Deer Herd. Many sites within the project area are also experiencing various degrees of erosion as a result of minimal plant cover. The proximity to old fires in the Five Mile Mountain and Buckskin Mountain areas makes weed encroachment from these areas a serious concern. The lack of herbaceous understory plant species and the high percentage of dead sagebrush make these communities highly susceptible to weed invasion and potentially fire prone. Proactive restoration of these sites before they are invaded by weed species will greatly enhance chances of restoration success.



Photo 1: Stand of late seral stage sagebrush with limited understory.



Photo 2: Sagebrush die-off near Five Mile Substation.

1.4 Conformance with BLM Land Use Plan(s):

The Proposed Action and Alternatives described below are in conformance with the MMP. The treatments fulfill restoration and land health requirements outlined in the MMP and provide a framework for implementation. The actions adhere and conform to the following decisions:

- REV-00 The objective of revegetation projects is to stabilize areas that are disturbed, often from overuse by human activities, and to prevent further degradation of a site.
- REV-01 Many factors will be considered when deciding to implement a revegetation or restoration strategy. Each project and area to be treated will be evaluated to determine the appropriate strategy. The following general guidelines can be applied to determine which strategy is the most appropriate and how it will be implemented in order to be consistent with the overall vegetation management objectives.
- 1) Restoration will be the goal whenever possible (i.e., an attempt will be made to return disturbed areas to conditions which promote a natural array of native plant and animal associations).
 - 2) Species used in both restoration and revegetation projects will comply with the non-native plant policy (i.e., native plants will be used as a priority).
 - 3) Revegetation strategies will be used in areas of heavy visitation, where site stabilization is desired.
 - 4) Restoration provisions will be included in all surface disturbing projects including provisions for post restoration monitoring of the area.
 - 5) Priority for restoration or revegetation will be given to projects where GSENM resources are being damaged. These sites will likely be in areas near development and/or heavy visitor use. Although these areas are more likely to be candidates for revegetation projects, careful evaluation of disturbed sites needs to be conducted to include desired future condition of an area. Restoration or revegetation of areas receiving heavy use may include limits on visitor use in order to promote recovery.
- NAT-01 In keeping with the overall vegetation objectives and Presidential EO 11312, native plants will be used as a priority for all projects in GSENM.
- NAT-02 Non-native plants may be used in limited, emergency situations where they may be necessary in order to protect GSENM resources by stabilizing soils and displacing noxious weeds. This use will be allowed to the extent that it complies with the vegetation objectives, Presidential EO 11312, and the Standards for Rangeland Health and Guidelines for Grazing Management for BLM Lands in Utah (1997). In these situations, short-lived species (i.e., nurse crop species) will be used and will be combined with native species to facilitate the ultimate establishment of native species.
- NAT-04 Non-native plants may be used for restoration related research if the use is consistent with and furthers the overall vegetation management objectives, including NAT-02, and after consultation with the GSENM Advisory Committee.

- NAT-05 Non-native plants will not be used to increase forage for livestock and wildlife.
- NAT-06 Monitoring plots will be established in any areas where non-native plants are used in order to document changes in vegetation structure and composition and will be an integral part of the adaptive management framework.
- RM-01 Mechanical methods, including manual pulling and the use of hand tools (e.g., chainsaws, machetes, pruners) may be allowed throughout GSENM.
- RM-02 The use of machinery (e.g., roller chopping, chaining) may be allowed in all zones except the Primitive Zone. Chaining has been used in the past to remove pinyon and juniper prior to reseeded with perennial grasses. Due to the potential for irreversible impacts to other GSENM resources, such as archaeological sites and artifacts, and paleontological resources, this treatment method will not be used to remove pinyon and juniper. It may be allowed to cover rehabilitation seed mixes with soil after wildfires only where:
- noxious weeds and invasive non-native species are presenting a significant threat to GSENM resources or watershed damage could occur if the burned area is not reseeded,
 - it can be demonstrated that GSENM resources will not be detrimentally affected (i.e., completion of full archaeological, paleontological, threatened and endangered species and other resource clearance and consultation),
 - it is determined that seed cover is necessary for the growth of the native species proposed for seeding, and
 - other less surface disturbing measures of covering seed are not available or cannot be applied in a timely manner.
- Visual impacts of chaining will also be minimized near routes and other points of concern by covering the native seed mix with harrows or light chains. GSENM Advisory Committee will be consulted before the use of machinery for treatments is permitted.
- RM-03 Livestock grazing after native seedlings are established will be modified to ensure the survival of the native plants. The livestock exclusion period required to allow full establishment of seeded native species and recovery of surviving native plants after a wildfire may be more than two years. Site evaluation will be required to determine when the native seeding should be grazed again and the effectiveness of the current or new grazing system on the persistence of native plants.
- RM-07 With all of the methods described in Decisions RM-1 through RM-6, vegetation monitoring plots will be established to determine the effectiveness of the treatments in achieving management objectives and to provide baseline data of overall change. This monitoring will include species frequency, density, and distribution data, and will be part of the overall adaptive management framework.

SOIL-01 The BLM will apply procedures to protect soils from accelerated or unnatural erosion in any ground-disturbing activity, including route maintenance and restoration. The effects of these activities such as grazing developments, mineral exploration or development, or water developments will be analyzed through the preparation of project specific NEPA documents. This process will include inventories for affected resources and the identification of mitigation measures.

The Proposed Action and Alternatives would not conflict with other decisions throughout the MMP.

1.5 Relationship to Statutes, Regulations, or other Plans:

The Proposed Action and Alternatives are consistent with Federal and State laws. Utah's Standards for Rangeland Health address upland soils, riparian/wetland, desired and native species and water quality.

The Proposed Action and Alternatives also adhere to the following elements described in the Kane County, Utah General Plan (1998):

- “Conservation efforts will focus on the rehabilitation of the land base in order to improve the functioning of natural systems for the benefit of residents and visitors.”
- “In order to reverse past disturbances, it is vital to participate in efforts to reintroduce grasses and forbs as the dominant vegetation type across the country.”
- “Maintain or improve the primary landscape soil, vegetation, and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability and viability of Kane County and our individual citizens.”
- “Provide for landscape vegetation maintenance and improvement which will support restoration of suspended AUM's, allocation of continuously available temporary non-renewable use as active preference, and will support continued and or increased use of State school endowment trust lands.”
- “Implement rangeland improvement programs, including but not limited to; water developments, rangeland restoration, juniper/shrub control, and weed control to achieve forage and livestock grazing as well as other multiple use resource goals.”

1.6 Identification of Issues:

Critical Elements

1.6.1 *Cultural/Native American Religious Concerns*

- Section 106 cultural resource inventory needs to be carried out and consultation completed.

1.6.2 *Invasive/Non-Native Species*

- New surface disturbance may provide habitat for invasive weeds, especially Cheatgrass. The area would need to be monitored and weeds removed if necessary. Ultimately, project would have a positive impact on weeds.

Other Resources/Concerns

1.6.3 *Fish and Wildlife*

- The area provides critical winter range for mule deer and would be a beneficial impact.
- Migratory birds need to be addressed.

1.6.4 *Livestock Grazing/Rangeland Health Standards and Guidelines*

- There would be a beneficial impact to livestock as additional forage becomes available.
- Allotments and pastures treated would need to be rested for at least two years.

1.6.5 *Soils and Biological Soil Crusts*

- Potential impact to soil due to compaction, displacement, and erosion.
- Surface disturbance would remove biological soil crusts.

1.6.6 *Vegetation Including Special Status Plant Species*

- The project area has potential habitat for several BLM sensitive plants.
- Project would beneficially impact vegetation by restoring functional groups.

1.6.7 *Visual Resource Management*

- Removal or manipulation of large stands of sagebrush, especially in areas of high viewer sensitivity (i.e. along roads and highways and adjacent to camping areas), may attract the attention of casual observers and thus impact visual resources.
- Installation of fencing may attract the attention of casual observers and thus impact visual resources.
- Areas treated with management ignited fire may attract the attention of casual observers and thus impact visual resources.

1.7 *Summary:*

This chapter has presented the purpose and need of the proposed project, as well as the relevant issues, i.e., those elements of the human environment that could be affected by the implementation of the proposed project. In order to meet the purpose and need of the proposed project in a way that resolves the issues, the BLM has developed a range of action alternatives.

These alternatives, as well as a no action alternative, are presented in Chapter 2. Chapter 3 describes the existing environment for the resources that may have a potential environmental impact. The potential environmental impacts or consequences resulting from the implementation of each alternative are then analyzed in Chapter 4 for each of the identified issues.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

This EA includes a No Action alternative and three action alternatives (including the Proposed Action). The Proposed Action is based on input from the GSENM interdisciplinary team for this project and on comments received from the public. The interdisciplinary team checklist is located in Appendix A.

Alternative A - No Action Alternative is considered and analyzed first in order to provide a baseline for comparison of the impacts from implementing the action alternatives. The three action alternatives include:

- Alternative B - Proposed Action which focuses on restoration of sagebrush habitat with an emphasis on research.
- Alternative C - Range Seeding Emphasis which focuses on the restoration of range seedings.
- Alternative D – Intensive Vegetation Management which focuses on more intensive management to achieve restoration.

Table 2.1 summarizes and compares the alternatives.

Table 2.1 Comparison of Alternatives			
<i>Alternative</i>	<i>Experimental Tools</i>	<i>Priority for treatment</i>	<i>Methods used</i>
Alternative A - No Action	None	None	None
Alternative B- Proposed Action	Research regarding methods implemented in early phases. Experimental seed mixes in all phases.	Mix of range seedings and native plant communities throughout phases	Bullhog* Chain* Interseeding* Dixie Harrow Hand thin
Alternative C – Range Seeding Emphasis	None	Range seedings prioritized for first three phases	Dixie Harrow Hand thin
Alternative D – Intensive Vegetation Management	Experimental seed mixes in all phases	Mix of range seedings and native plant communities throughout phases	Bullhog Chain Dixie Harrow Hand thin Interseeding

* Experimental use

2.1 Introduction:

GSENM is proposing to treat up to 24,000 acres within the 33,038 acres that comprise the Five Mile Project Area to restore stability and health to sagebrush-steppe habitat. This project would be implemented in phases beginning in the fall of 2006. Because of the extent of the project area, treatments would be phased over the next seven to 10 years. Start years are given for each phase but phases may be multi-year in length depending on project success and yearly funding. The implementation phases are based on optimal funding support for these projects. If funding is

not available, the timeline may be lengthened. However, the general approach and priority would remain constant unless an emergency situation such as wildfire or insect outbreak shifts priorities or if site conditions improve or decline within the life of this project. Acreage listed in phase tables represents a reasonable percentage of a given pasture that could be treated in each phase. If site conditions deteriorate and funding increases for these projects, increased acreage may be treated but would not exceed 75% of the total acreage in a given pasture. Any changes in phases would be made in cooperation with the permittee. The area left untreated would vary between pastures depending on site conditions observed prior to implementation. Changes in methods may also be adjusted if better techniques become available or research suggests that a method should be discontinued. A variety of mechanical methods would be used to prepare and treat sites. For ease of identification, allotment or pasture boundaries are used to identify treatment areas and locations.

Within the project area, individual treatment sites were evaluated on a site specific basis to determine the most appropriate method of treatment. Factors such as sagebrush stand age, extent of sagebrush mortality, history of use, soil health, presence of weed species, soil series, and extent of biological soil crusts were critical in shaping the treatment and post-treatment management of a given site. Seeding prescriptions are tailored to match site potential and are based on the best available knowledge of the particular site. Seed mixes are presented in Appendix B. Actual seed mixes and precise pounds per acre may vary depending on availability and current market price at the time of seed purchase. If a particular species were to be replaced, it would be with a comparable native species of similar growth form and would be appropriate to site conditions. Sources that were considered when formulating seeding prescriptions included existing range trend data for the site, range site descriptions that match the appropriate soil series, and comparisons with adjacent functioning reference areas with similar site conditions.

Treated restoration areas would be rested from livestock grazing for a minimum of two years. Vegetation success criteria would need to be met prior to a return of grazing on each site. Success criteria would include measures of plant percent cover and frequency and would be based on individual site potential according to reference conditions. Monitoring would be long-term in nature and would include contingency plans for each site to address any problems such as weeds, poor germination, or undesirable changes in species composition over time. While the restoration site is rested, temporary fences may be installed on a limited basis to control livestock access. Monitoring of restoration success may also involve establishment of livestock and wildlife fenced exclosures to document use over time. A more detailed restoration monitoring protocol can be found in Appendix C.

2.2 Alternative A – No Action:

Alternative A - No Action Alternative is considered and analyzed first in order to provide a baseline for comparison of the impacts from implementing the action alternatives.

If no action is taken on the proposed project area, then areas that are presently in non-use for not meeting rangeland health standards would continue in this pattern until site recovery is documented. No active restoration would be conducted on allotments that do not meet standards.

Standard and current procedures would be followed for managing livestock on allotments that do not meet rangeland health standards.

2.3 Alternative B – Proposed Action:

Alternative B - Proposed Action contains a mix of treatment types to match the variety of conditions found within the project area. Areas that would be targeted for treatment include both range seedings and previously untreated sagebrush and pinyon-juniper communities. In range seedings, some introduced species would be used in the seed mix to provide immediate soil stabilization and competition with exotic weed species. Experimental all native seed mixes would be used in range seedings and would occur on 30 acres or less. Several seed mixes would also be tested in previously untreated areas to determine the most effective seed mix for a particular area.

The Proposed Action would contain a research element that allows for testing of lesser used methods and experimental seed mixes over smaller acreage. Research elements would include use of experimental all native seed mixes in areas where introduced species are used in a mix (see description above), interseeding native species into stands of introduced species, and use of mechanical methods that have a limited or nonexistent history of use on GSENM.

Interseeding native species with a rangeland drill would occur in range seedings with stands of introduced species such as Crested wheatgrass on no more than 200 acres at a time. Different approaches to interseeding would help guide GSENM in its efforts to increase species diversity in range seedings that show high cover of single introduced species. Interseeding would only be used with full support of the permittee and in areas agreed upon with the permittee.

Experimental mechanical methods would also include the use of the bullhog and the anchor chain. The anchor chain and the bullhog have been used in other areas by the BLM in the past and continue to be used. The use of these two implement tools for this proposal are being classified experimental because the resource specialists desire to see which tools are the most effective on specific soils, aspects, and existing vegetation conditions within GSENM.

Experimental control of sagebrush and juniper with an herbicide specific to woody species, Tebuthiuron (“Spike”), was selected for areas that do not require soil disturbance or application of seed. These areas contain existing but reduced amounts of understory species that would benefit from reduced competition with woody species. Use of “Spike” is an approved chemical and is authorized for use under the Noxious Weed Control Environmental Assessment (EA) (UT-030-98-006/UT-049-98-006, May 4, 1998). This would occur on 200 acres or less. This method was incorporated as a result of input from the permittee.

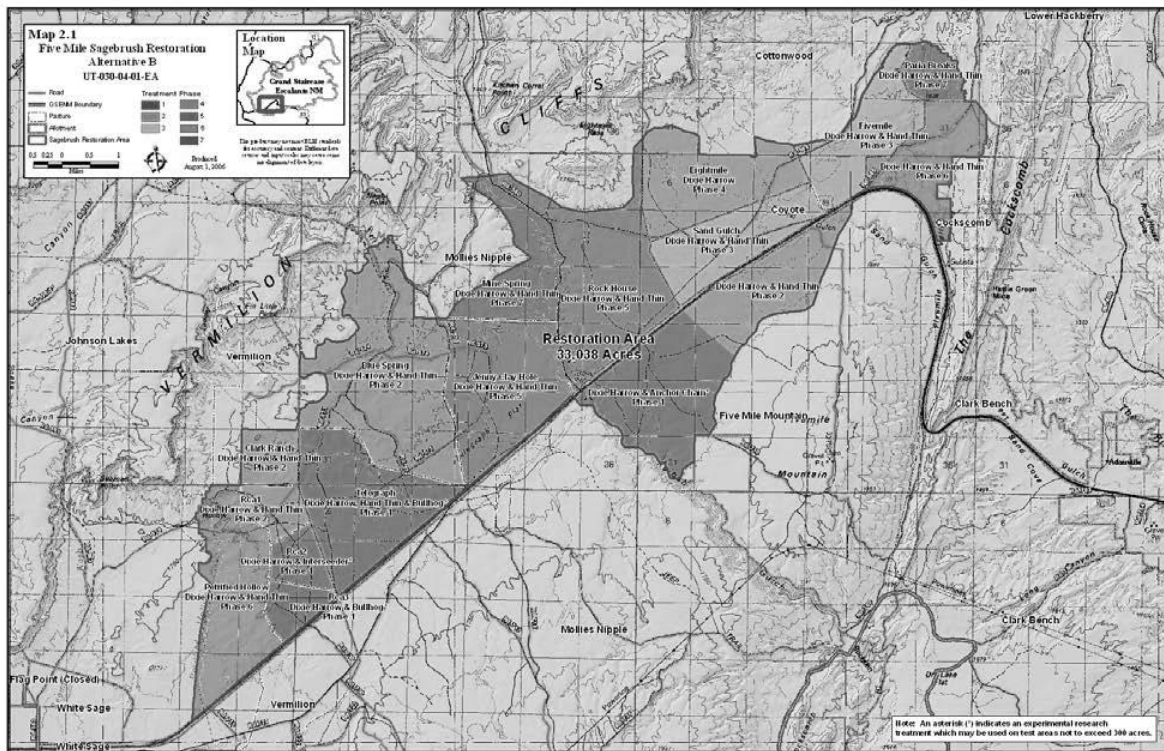
The anchor chain would only be used in sagebrush communities and would not be used to remove pinyon-juniper woodlands. Use of these tools would be limited to 300 acres or less (interseeding at 200 acres or less) and would occur in both range seedings and previously untreated areas. The size limitations were considered because of the cost of transporting the equipment and the importance of establishing a sufficiently large study area to evaluate the treatment affects. Grazing exclosures would also be placed in some treatment areas to determine

the success of the seedings in the absence of grazing. In cases where juniper and pinyon trees are thinned to meet the objectives of the proposed action, handpiling and burning, to remove excess litter and reduce the fire hazard risk, would occur.

Table 2.2 and Map 2.1 show approximate locations of treatments and methods employed. Experimental tools (chain, bullhog, and interseeding) would be used in Phase 1 to evaluate their effectiveness within the project area.

Table 2.2			
Implementation Phases and Methods – Proposed Action			
Phase/Year	Pasture/Allotment	Acres	Method
Phase 1/2006	Five Mile Mountain/Five Mile Mountain	1,000	Dixie Harrow/ Anchor Chain*
	Telegraph/Mollies Nipple	1,000	Dixie Harrow-Hand Thin, Bullhog*
	RCA2&3/Vermilion	500	Interseeder (Drill)* /Dixie Harrow-Hand Thin, Bullhog*
	<i>Phase 1 Total</i>	<i>2,500</i>	
Phase 2/2007	Blue Spring/Mollies Nipple	2,200	Dixie Harrow-Hand Thin
	Five Mile Mountain/Five Mile Mountain	1,000	Dixie Harrow-Hand Thin
	RCA 1 and Clark Ranch/Vermilion	750	Dixie Harrow-Hand Thin
	<i>Phase 2 Total</i>	<i>3,950</i>	
Phase 3/2008	Sand Gulch/Coyote	1,370	Dixie Harrow-Hand Thin
	Fivemile/Coyote	1,320	Dixie Harrow
	<i>Phase 3 Total</i>	<i>2,690</i>	
Phase 4/2009	Eight Mile/Cottonwood	1,700	Dixie Harrow
	<i>Phase 4 Total</i>	<i>1,700</i>	
Phase 5/2010	Jenny Clay Hole/Mollies Nipple	1,800	Dixie Harrow-Hand Thin
	Rock House/Mollies Nipple	1,400	Dixie Harrow-Hand Thin
	<i>Phase 5 Total</i>	<i>3,200</i>	
Phase 6/2011	Petrified Hollow/Vermilion	1,500	Dixie Harrow-Hand Thin
	Cockscomb/Cockscomb	770	Dixie Harrow-Hand Thin
	<i>Phase 6 Total</i>	<i>2,270</i>	
Phase 7/2012	Paria Breaks/Cottonwood	250	Dixie Harrow-Hand Thin
	Mine Spring/Mollies Nipple	1,000	Dixie Harrow-Hand Thin
	<i>Phase 7 Total</i>	<i>1,250</i>	
	<i>Total Acres</i>	<i>17,560</i>	

Note: * indicates a research treatment.



Map 2.1: Alternative B - Proposed Action with Treatment Areas and Phases (see Appendix F)

Each phase listed below describes the existing plant community, issues relative to treatment, treatment prescriptions, seed mixes, and experimental tools (where applicable).

Phase 1

Five Mile Mountain Allotment:

Phase 1 would include treatment of sagebrush grassland in the Five Mile Mountain allotment. Sagebrush grasslands in this area have been impacted by drought and show a high degree of die-off and late seral stage conditions. Herbaceous understory species are limited and in some cases a physical soil crust is present. Biological soil crusts are extensive and diverse in some portions of this pasture. To protect a portion of the crust, the area would be treated in a mosaic pattern, resulting in roughly 75% of the treatable area being treated. Sagebrush patches with understory plants or biological soil crusts would generally be left untreated in the mosaic design. A Dixie Harrow would be used to break up sagebrush plants and deposit the litter and seed on the ground. Seed would be distributed from the back of the tractor and would be worked into the soil by the harrow. Because the treatment would occur after sagebrush seed is produced, there would be an existing supply of seed in this sagebrush stand. Therefore, no sagebrush seed would be included in the mix. The proposed seed mixes are presented in Appendix B.

Experimental Tools:

An anchor chain would be used to treat up to 300 acres of sagebrush grassland in the Five Mile Mountain allotment. Seed would be aerially applied to the treatment area and a chain would be used to cover the seed and remove late seral stage sagebrush. The same seed mixes proposed above would be used for the aerial seeding. Proposed seed mixes are presented in Appendix B.

Experimental treatment of biological soil crusts would focus on two areas, 1) the impact of different treatment types on biological soil crusts and 2) the degree of seed establishment in disturbed and undisturbed crust communities. To accomplish this, sagebrush patches where developed soil crusts are undisturbed would be left untreated. Portions of these islands would be aerially or broadcast seeded and portions would be left unseeded. Seed germination and establishment would be monitored over time. The untreated islands would be delineated and site specific monitoring would be developed.

Telegraph Pasture/Mollies Nipple Allotment:

Range seedings would be targeted for treatment in the Telegraph pasture. This seeding has experienced die-offs of seeded species, accelerated erosion, and soil loss. Because of these reasons, a mix of native and introduced species would be used to treat this pasture. Seed would be applied from the rear of a tractor and worked into the soil with a Dixie Harrow. The seeded area would be treated in a relatively uniform pattern. If areas of desirable species cover are located, they would generally be left untreated. Proposed seed mixes are presented in Appendix B.

Experimental Tools:

The southwest portion of the Telegraph seeding contains high densities of young pinyon-juniper woodland that have invaded the seeding. The bullhog would be used in this area to reduce cover of pinyon-juniper trees and increase diversity and cover of herbaceous understory species. Less than 300 acres of woodland would be treated with this method to evaluate the effectiveness of this tool. An all native seed mix would be applied from a seed box mounted above the tracks of the bullhog and worked into the soil as the bullhog travels over the site. The proposed all native seed mix is presented in Appendix B.

An experimental all native seed mix would be tested on 30 acres or less to evaluate the competitiveness of seeded species with established introduced species. Seed would be applied with a Dixie Harrow in the same manner as described above. The proposed all native seed mix is presented in Appendix B.

RCA 2 & 3 Pastures/Vermilion Allotment:

Range seedings would be targeted for treatment in these pastures because of soil erosion issues and reduced plant cover. Portions of these pastures have high densities of Crested wheatgrass

and other portions have very limited understory species cover. In areas that contain little understory cover and have erosion concerns, seed would be applied from the rear of the tractor and worked into the soil with a Dixie Harrow. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. The seeded area would be treated in a relatively uniform pattern. If areas of desirable species cover are located, they would generally be left untreated. The proposed seed mix is presented in Appendix B.

Experimental Tools:

Portions of the RCA 2 pasture have high densities of Crested wheatgrass with few other native perennial species. In these areas, herbicide would be applied in a mosaic pattern and native species would be seeded to increase diversity within the plant community and test the effectiveness of this technique in interseeding native species into Crested wheatgrass stands. A general BLM-approved herbicide such as Roundup™ would be applied with ATV mounted sprayers. Strips would be approximately 10 feet wide to accommodate the width of a rangeland drill that would follow the application. A proposed all native seed mix for this pasture (Appendix B) would be applied. This method would only be used with the full support of the permittee and would occur in areas agreed upon with the permittee.

A portion of the range seeding in RCA 3 contains high densities of young pinyon-juniper woodland that have invaded the seeding. The bullhog would be used in this area to reduce cover of pinyon-juniper trees and increase diversity and cover of herbaceous understory species. Less than 300 acres of woodland would be treated with this method to evaluate the effectiveness of this tool. An all native seed mix specific would be applied from a seed box mounted above the tracks of the bullhog and worked in as the bullhog travels over the site. The proposed all native seed mix is presented in Appendix B.

Use of Tebuthiuron to reduce woody species competition would occur on 200 acres or less. This would occur in areas that contain sufficient understory cover to benefit from a release from competition. Tebuthiuron would be applied from the rear of an ATV in strips throughout a designated area. These areas would not be seeded initially but may require follow up seeding with a rangeland drill or Dixie harrow if understory response does not occur.

Experimental all native seed mixes would be tested on 30 acres or less and compared with the mix of native and introduced species. Seed would be applied with a Dixie Harrow in the same manner as described above. Proposed all native seed mixes are presented in Appendix B.

Phase 2

Blue Spring Pasture/Mollies Nipple Allotment:

Range seedings would be targeted for treatment in the Blue Spring pasture. This seeding has experienced die-offs of seeded species, accelerated erosion, and soil loss. Because of these reasons, a mix of native and introduced species would be used to treat this pasture. Seed would be applied from the rear of a tractor and worked into the soil with a Dixie Harrow. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. The seeded area would be treated in a relatively uniform pattern. If areas of

desirable species cover are located, they would generally be left untreated. Proposed seed mixes are presented in Appendix B.

Experimental Tools:

An all native seed mix would be tested on 30 acres or less to evaluate the competitiveness of seeded species with established introduced species. Seed would be applied in the same manner as described above. The proposed all native seed mix is presented in Appendix B.

Five Mile Mountain Allotment:

Phase 2 would include treatment of additional sagebrush grassland in the Five Mile Mountain allotment. Sagebrush grasslands in this area have been impacted by drought and show a high degree of die-off and late seral stage conditions. Herbaceous understory species are very limited and in some cases a physical soil crust is present. Biological soil crusts are extensive and diverse in some portions of this pasture. To protect a portion of the crust, the area would be treated in a mosaic pattern, resulting in roughly 75% of the treatable area being treated. Sagebrush patches with understory plants or biological soil crusts would generally be left untreated in the mosaic design. A Dixie Harrow would be used to break up sagebrush plants and deposit the litter and seed on the ground. Seed would be distributed from the back of the tractor and would be worked into the soil by the harrow. Because the treatment would occur after sagebrush seed is produced, there would be an existing supply of seed in this sagebrush stand. Therefore, no sagebrush seed would be included in the mix. The proposed seed mixes are presented in Appendix B.

Experimental Tools:

In order to evaluate the competitive role of native and introduced species in seedings, an all introduced seed mix would be paired with a native/introduced mix and an all native mix. Seeding would occur on five acres or less and the site would be fenced to track changes over time. Baseline soil chemistry would be measured and tracked over time to evaluate the role of these species in altering soil properties. Vegetation cover and frequency would also be monitored. The proposed seed mixes for this project are listed in Appendix B.

RCA 1 Pasture and Clark Ranch/Vermilion Allotment:

The RCA 1 pasture was converted to a range seeding and is presently dominated by Big sagebrush, Utah Juniper and Crested wheatgrass. A Dixie Harrow would be used to treat the seeding in a relatively uniform manner. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. Areas with desirable species would generally be avoided during treatment. Because of problems associated with erosion, low plant cover, and establishment of exotic weeds, a seed mix comprised of both introduced and native species would be used over most of the area. Proposed seed mixes are presented in Appendix B.

The Clark Ranch pasture contains areas of untreated sagebrush grassland that has late seral sagebrush stands with limited understory species. A Dixie Harrow would be used to treat the area in a mosaic pattern. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. The seed would be applied from the rear of the tractor that pulls the harrow. The seed mix would be the same as the all native mix prescribed for RCA 3 pasture.

Experimental Tools:

An all native seed mix would be tested on 30 acres or less to evaluate the ability of the mix to establish and compete with the exotic species. The all native mix would be applied in the same manner described above. The proposed all native seed mix is presented in Appendix B.

Phase 3

Sand Gulch and Five Mile Pastures/Coyote Allotment:

These pastures are comprised of range seedings that have experienced overall low vegetative cover, low cover of perennial plants, decreases in cool season grasses, increases in invasive species cover, and increased soil erosion. The Coyote allotment is at a lower elevation than range seedings in other allotments and receives less precipitation. Seed mixes would be matched to this precipitation regime. Shrub cover is high enough that seeding of shrub species is not warranted. Seed would be distributed from the rear of the tractor and worked into the soil by a Dixie Harrow. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. Because of the presence of invasive plants and the erosion concerns in this pasture, a mix of native and introduced species would be the main seed mix used in the area. The proposed seed mix is listed in Appendix B.

Experimental Tools:

An all native seed mix would be tested on 30 acres or less and compared to the mix described above to determine the effectiveness of seeding with all natives in the adverse conditions present. The all native mix would be applied in the same manner described above. The proposed all native seed mix is presented in Appendix B.

Phase 4

Eight Mile Pasture/Cottonwood Allotment:

The Eight Mile pasture is comprised of range seedings that have experienced soil erosion, decreased vigor of seeded species, and pedestalling of perennial plants. The Dixie Harrow would be used to treat this area in a relatively uniform pattern. Seed would be distributed from the rear of the tractor and the harrow would incorporate the seed into the soil, while removing larger or late seral species. Areas that contain desirable species would generally be avoided, leaving islands within the treatment area. Because of concerns with soil erosion and the presence of invasive weeds such as Cheatgrass, a mix of introduced and native species would be used to

treat this site. Shrub cover is high enough that seeding shrub species is not necessary. The proposed seed mix is presented in Appendix B.

Experimental Tools:

An all native seed mix would be tested on 30 acres or less in smaller test plots to evaluate the effectiveness of the differing seed mixes. The all native mix would be applied in the same manner as described above. The proposed all native seed mix is presented in Appendix B.

Phase 5

Jenny Clay Hole Pasture/Mollies Nipple Allotment:

Range seedings in this pasture contain high cover of exotic weed species and eroding soils are a concern. The Dixie Harrow would be used to break up soil compaction, remove some weed species and create a seedbed for seed that would be distributed from the tractor. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. The treatment in the seedings would be relatively uniform. However, if patches of desirable species are located they would generally be avoided during treatment. The sagebrush grassland sites would be treated with an all native mix in a mosaic pattern. The proposed seed mixes are presented in Appendix B.

Experimental Tools:

An all native seed mix would be tested on 30 acres or less. The all native mix would be applied in the same manner as described above. The proposed all native seed mix is presented in Appendix B.

Rockhouse Pasture/Mollies Nipple Allotment:

The treatment area for the Rockhouse pasture consists of sagebrush grassland that is deteriorating due to accelerated soil erosion, decreases in perennial grass cover, and increases in weedy annuals. Much of the sagebrush cover in this pasture is in late seral condition with patches of sagebrush die-off. A Dixie Harrow would be the primary tool for treating this pasture. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. Because this area has not been previously treated, seeding would mimic a natural array of shrub age classes. A mosaic pattern would be used with areas containing understory species left generally untreated. Two different all native seed mixes would be used in this pasture. Proposed seed mixes are listed in Appendix B.

Phase 6

Cockscomb Pasture/Cockscomb Allotment:

The Cockscomb pasture is comprised of a mix of sagebrush grassland, blackbrush, and pinyon-juniper woodland. The blackbrush community would not be treated under this project. Both the pinyon-juniper woodland and sagebrush grassland community types have minimal understory vegetation and are susceptible to soil loss. Sagebrush grasslands would be treated using a Dixie Harrow with seed applied from the rear of the tractor. Because this area has not been previously treated and invasive species cover is relatively low, an all native species mix (Appendix B) would be used and the area would be treated in a mosaic pattern to best emulate natural conditions.

Trees that cannot be removed with the Dixie Harrow, and pinyon-juniper woodlands, would be hand thinned using chainsaws. Select areas would be identified for thinning within the woodland with no more than one third of the woodland receiving treatment. Only areas that are considered suitable in terms of understory species, soils, and landscape position would be selected for treatment. Seed would be aerially applied and would consist of a proposed all native mix (Appendix B).

Petrified Hollow Pasture/Vermilion Allotment:

Areas targeted for treatment in the Petrified Hollow pasture include range seedings and sagebrush grassland interspersed with pinyon-juniper woodland. The range seedings occupy a small portion of the pasture and would be treated in a uniform manner with a mix of native and introduced species. Seedings are targeted for treatment because of accelerated erosion, a high amount of bare ground cover, and increased cover of exotic annual species. The sagebrush grassland communities have similar issues as the seedings with gully formation, pedestalling of plants, and reduced cover of perennial grasses. Seed would be applied from the rear of the tractor and worked into the soil with a Dixie Harrow. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. Proposed seed mixes are presented in Appendix B.

Experimental Tools:

An all native seed mix would be used on 30 acres or less to test the effectiveness of the mix in competing with exotic species. The all native mix would be applied in the same manner as described above. The proposed all native seed mix is presented in Appendix B.

Phase 7

Paria Breaks/Cottonwood:

The Paria Breaks pasture is composed of pinyon-juniper woodland and sagebrush grassland communities. Both of these communities have experienced a loss of understory herbaceous species and die-off of sagebrush plants. Sagebrush grassland would be treated with a Dixie Harrow with seed applied from the rear of the tractor. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. Areas with desirable species cover would generally not be treated and the treatment area would resemble a mosaic of treated and untreated areas. Hand thinning would be used in areas where larger trees have become established in the sagebrush grassland communities and in a portion of late seral stage pinyon-

juniper woodlands. A proposed all native species mix would be applied to this area (Appendix B).

Mine Spring Pasture/Mollies Nipple Allotment:

The Mine Spring pasture is comprised of a mix of sagebrush grassland interspersed with pinyon-juniper woodland. The sagebrush grassland cover type would be targeted in this pasture because of issues related to low species diversity, low grass cover, and increases in the amount of weedy annual species. Because this area has not been previously treated, the treatment would be applied in a mosaic pattern to best mimic natural conditions. Areas with desirable species cover would generally not be treated. Seed would be distributed from the rear of the tractor and worked into the soil by a Dixie Harrow. Larger juniper trees that cannot be treated with the Dixie Harrow would be hand thinned using chainsaws. A proposed all native species mix would be applied to this area (Appendix B).

2.4 Alternative C – Range Seeding Emphasis:

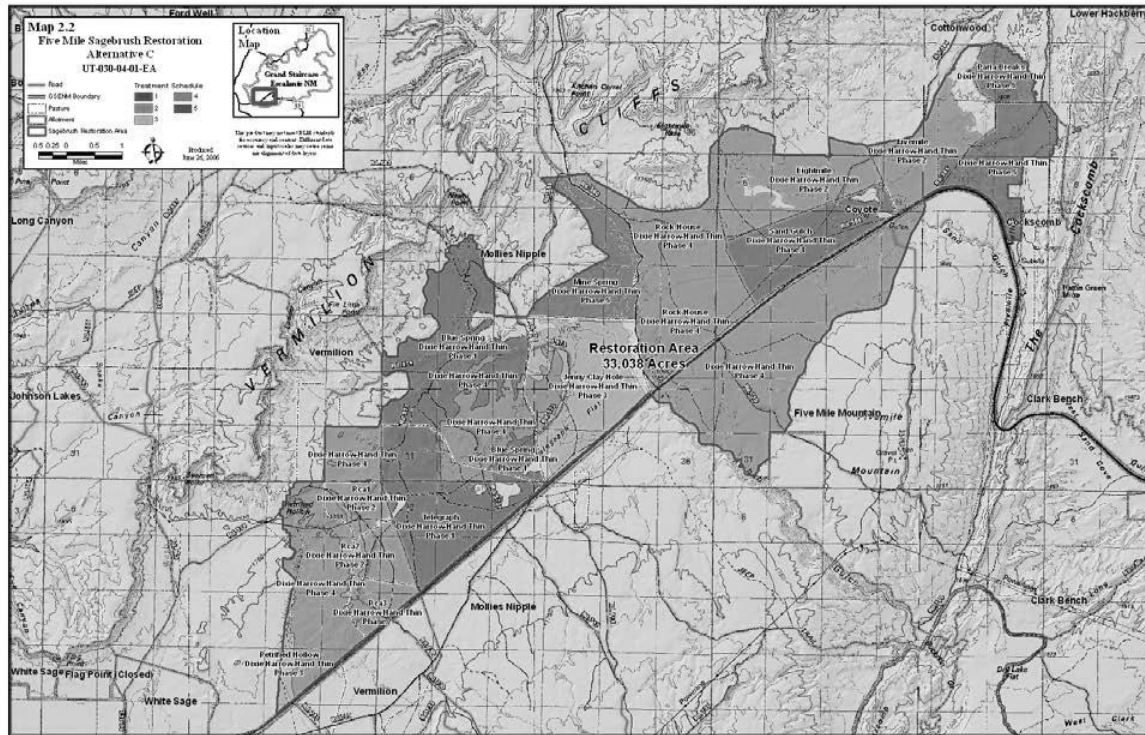
The focus of restoration activities under Alternative C would be areas that were previously converted to range seedings. The range seedings under consideration in this document experienced die-offs in seeded species during drought years, particularly during 2001-2003. These areas have not recovered and have become dominated by woody or exotic weed species. Soil erosion is also a concern in many areas. Alternative C would focus on rehabilitating these sites first then moving into areas that were not converted to range seedings. Areas not converted to range seedings have issues relating to limited understory species and late seral stage sagebrush. Soil erosion is also a concern in some of these communities. If funding continues for this effort, the areas not converted to range seedings would be restored during Phase 4. Table 2.3 and Map 2.2 show approximate locations of treatments and methods employed.

Experimental studies to test the effectiveness of the chain, interseeding, and the bullhog would not be included in this alternative. Experimental use of all native seed mixes would not be incorporated into this alternative. Seed mixes for the seedings would be the same as the “native/introduced” mixes presented in the Proposed Action (Appendix B). Seed mixes for the sagebrush grassland sites would remain the same as the Proposed Action.

Table 2.3			
Implementation Phases and Methods – Alternative C			
Phase/Year	Pasture/Allotment	Acres	Method
Phase 1/2006 <i>Range Seedings</i>	Telegraph/Mollies Nipple	900	Dixie Harrow-Hand Thin
	Sand Gulch/Coyote	1,370	Dixie Harrow-Hand Thin
	Blue Spring/Mollies Nipple	1,600	Dixie Harrow-Hand Thin
	<i>Phase 1 Total</i>	<i>3,870</i>	
Phase 2/2007 Range	RCA 1, 2, and 3/Vermillion	900	Dixie Harrow-Hand Thin

Seedings	Eightmile/Cottonwood	1,700	Dixie Harrow-Hand Thin
	Five Mile/Coyote	1,320	Dixie Harrow-Hand Thin
	<i>Phase 2 Total</i>	<i>3,920</i>	
Phase 3/2008 <i>Range Seedings</i>	Petrified Hollow/Vermilion	200	Dixie Harrow-Hand Thin
	Jenny Clay Hole/Mollies Nipple	1,600	Dixie Harrow-Hand Thin
	<i>Phase 3 Total</i>	<i>1,800</i>	
Phase 4/2009 <i>Sagebrush Communities</i>	Five Mile Mountain/Five Mile Mountain	2,000	Dixie Harrow-Hand Thin
	Petrified Hollow/Vermilion	1,300	Dixie Harrow-Hand Thin
	Telegraph-Blue Spring-Jenny Clay Hole/Mollies Nipple	900	Dixie Harrow-Hand Thin
	Clark Ranch/Vermilion	350	Dixie Harrow-Hand Thin
	Rock House/Mollies Nipple	1,400	Dixie Harrow-Hand Thin
	<i>Phase 4 Total</i>	<i>5,950</i>	
Phase 5/2010 <i>Sagebrush Communities</i>	Cockscomb/Cockscomb	770	Dixie Harrow-Hand Thin
	Paria Breaks/Cottonwood	250	Dixie Harrow-Hand Thin
	Mine Spring/Mollies Nipple	1,000	Dixie Harrow-Hand Thin
	<i>Phase 5 Total</i>	<i>2,020</i>	
	<i>Total Acres</i>	<i>17,560</i>	

Map 2.2: Alternative C Range Seeding Emphasis with Treatment Areas and Phases (see Appendix F)



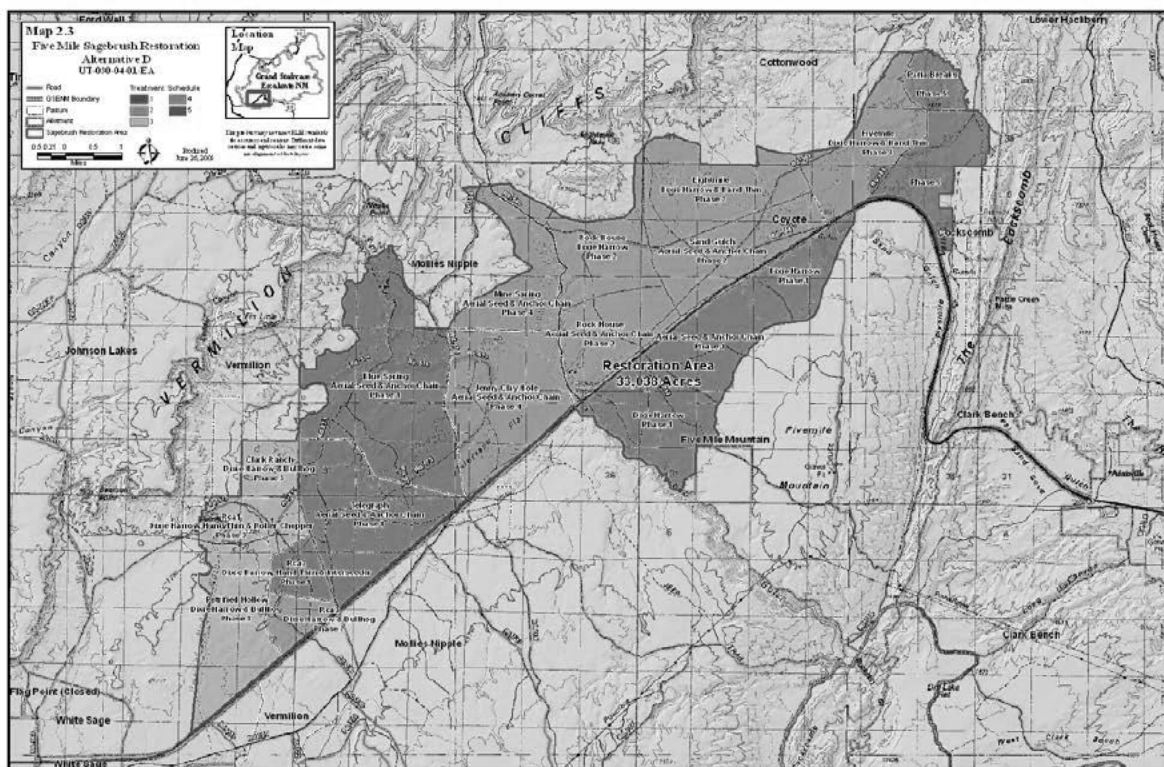
2.5 Alternative D – Intensive Vegetation Management:

Intensive vegetation management techniques that were used in a limited experimental approach in the Proposed Action would be used in a more widespread manner in Alternative D. Mechanical methods would include the chain, interseeding, and the bullhog. The chain would only be used to remove late seral stage sagebrush, not pinyon-juniper woodland. Prior to using the chain, seed would be aerially applied to the site and the chain would be used to cover the seed while removing late seral sagebrush. The bullhog would be used in dense stands of juniper of varying ages.

Treatment phases would differ from the proposed action and the acres treated with the intensive management tools would increase (Table 2.4). Areas where these management tools would be used are presented in Map 2.3. Seed mixes would remain the same, including testing of all native complements, where introduced species are used.

Table 2.4			
Implementation Phases and Methods – Alternative D			
Phase/Year	Pasture/Allotment	Acres	Method
Phase 1/2006	Five Mile Mountain/Five Mile Mountain	1000	Dixie Harrow
	Five Mile Mountain/Five Mile Mountain	1000	Aerial Seed/Anchor Chain
	Telegraph-Blue Spring/Mollies Nipple	3,200	Aerial Seed/Anchor Chain
	RCA2/Vermilion	250	Dixie Harrow-Hand Thin/Interseeder
	<i>Phase 1 Total</i>	<i>5,450</i>	
Phase 2/2007	Sand Gulch/Coyote	1,370	Aerial Seed/Anchor Chain
	Eightmile/Cottonwood	1,700	Dixie Harrow-Hand Thin
	RCA 3/Vermilion	250	Dixie Harrow-Hand Thin
	Rock House/Mollies Nipple	1,400	Dixie Harrow
	<i>Phase 2 Total</i>	<i>4,720</i>	
Phase 3/2008	Petrified Hollow & Clark Ranch/Vermilion	1,750	Dixie Harrow & Bullhog
	RCA 1/Vermilion	500	Dixie Harrow-Hand Thin/Roller Chopper
	<i>Phase 3 Total</i>	<i>2,250</i>	
Phase 4/2009	Fivemile/Coyote	1,320	Dixie Harrow-Hand thin
	Jenny Clay Hole/Mollies Nipple	1,800	Aerial Seed/Anchor Chain
	Mine Spring/Mollies Nipple	1,000	Aerial Seed/Anchor Chain

	<i>Phase 4 Total</i>	<i>4,120</i>	
Phase 5/2010	Paria Breaks/Cottonwood	250	Dixie Harrow-Hand Thin/Bullhog-Aerial Seed
	Cockscomb/Cockscomb	770	Dixie Harrow-Hand Thin/ Bullhog-Aerial Seed
	<i>Phase 5 Total</i>	<i>1,020</i>	
	<i>Total Acres</i>	<i>17,560</i>	



Map 2.3: Alternative D – Intensive Vegetation Management with Treatment Areas and Phases (see Appendix F)

2.6 Alternatives Considered, but Eliminated from Further Analysis:

Other alternatives considered but eliminated from further analysis in this document include the use of prescribed fire. Because of the lack of fuels to ignite and carry fire, and the presence of Cheatgrass in the project area, use of prescribed fire was considered impractical for meeting the objectives of the project. Previous wildfires in the project vicinity have resulted in high cover of Cheatgrass with poor cover of desirable native plant species even after seeding efforts. Because of the latter risk related to reseeding success and management concerns with Cheatgrass, prescribed fire will not be considered in this project area.

2.7 Mitigation Measures Common to All Alternatives:

2.7.1 General:

All work on the project would be performed during daylight hours. No night work or artificial lighting would be used.

2.7.2 Cultural Resources:

Prior to implementation of the project, the treatment areas will be inventoried for cultural resources. All properties eligible for inclusion in the National Register of Historic Places will be flagged and avoided by mechanized ground disturbing activities.

On some sites, treatment with hand tools may be recommended to protect cultural resources.

2.7.3 Herbicide Application:

Herbicide treatment would occur according to the BLM Integrated Pest Management requirements and MMP. Treatments would meet or exceed individual States' label standards. Chemicals may be applied by backpack sprayers, ATV Sprayers, and/or sprayer attached to a tractor.

Herbicide applications are scheduled and designed to minimize potential impacts on non-target plants and animals, while remaining consistent with the objectives of the vegetation treatment program. The rates of application depend on the target species, presence and condition of non-target vegetation, soil type, depth to water table, presence of other water sources, and the requirements of the label.

2.7.4 Hydrology:

No mechanical treatments would occur within the active floodplain of stream channels or within 30 feet of intermittent stream channels. Perennial streams are those that flow year-round; intermittent streams are those that flow throughout the wet season and are typically sustained by groundwater flow between precipitation events. Ephemeral streams are those that flow only in direct response to precipitation.

Equipment crossing of intermittent or perennial streams would only be allowed when no other practical alternative exists and would only occur at designated locations.

Equipment crossing of ephemeral channels would be minimized. Areas with flat slopes would be the preferred locations for equipment crossings. No equipment crossing would be allowed at locations where the streambank angle exceeds 35%, or where bank height exceeds two feet (measured from the bottom of the channel to the top of the bank).

Post-treatment site rehabilitation may be required at stream crossings. Site rehabilitation techniques may include placing of organic materials (juniper boles and/or branches or woody material from shrubs) and installing water bars, where needed.

The following restrictions would apply to mechanical site preparation and planting treatments within 330 feet of intermittent streams:

- At any given location, no more than two equipment passes would be allowed; and,
- Equipment passes would follow the contour of the terrain (in general, this would parallel the stream channel)

2.7.5 Mechanical Methods:

2.7.5.1 Anchor Chain

In areas that contain late seral stage sagebrush stands, the chain would be used. The chain consists of a ship anchor that is pulled in a “U” or “J” shape between two crawler tractors. This technique is used to remove woody vegetation while leaving understory species and small shrubs intact. This method is also used to incorporate seed into the soil following aerial seeding. The chain would not be used to remove pinyon-juniper woodland.

2.7.5.2 Bullhog

When densities of pinyon and juniper are too high to hand thin in a cost effective manner, the Bullhog would be used. The Bullhog is a mechanical mulching tool that shreds live trees of varying sizes into a mulch layer. The shredder operates with a rotating horizontal blade attached to a vertical shaft. The blade is mounted on a boom that can reach up and shred trees from the top. The resulting mulch layer provides soil stabilization through reduced runoff and facilitates seed germination through soil moisture retention and development of microsites. Use of this tool would be limited to portions of the project area that contain dense pinyon-juniper woodland.

2.7.5.3 Dixie Harrow

When late seral stage sagebrush communities are present with little understory species cover, a Dixie Harrow would be used to thin sagebrush, prepare a seed bed, and distribute seed. The Dixie Harrow consists of a series of metal pipes with prongs that remove sagebrush and prepare a seed bed. Seed is distributed from the tractor in front of the harrow. Depending on the number of passes, sagebrush mortality with these treatments is approximately 60 – 90%. The harrow does not remove all the sagebrush which would leave some residual species to create a multiple aged sagebrush stand. Young and seedling sagebrush would often be unaffected by these treatments. A large portion of the project area is suitable for treatment with the Dixie Harrow. This tool is effective in both late seral sagebrush stands and range seedings with varying amounts of woody plant cover, including small juniper trees.

2.7.5.4 Hand Thinning

If tree densities are relatively low, cultural sites cannot be avoided, or surface disturbance is unwarranted for any other reasons, then hand removal of trees with chainsaws would be used. Hand thinning may also be used in combination with a Dixie Harrow to remove larger trees that the harrow is not able to remove.

2.7.5.5 Interseeding

Where existing stands of vegetation are present and complete seedbed preparation is not necessary or desired because of desirable residual plant species, interseeding would be used. Sites where some sagebrush or other desirable component is still present would be interseeded to prevent erosion and to augment existing species composition. Interseeding would also be used to diversify areas dominated by single species, such as Crested wheatgrass, with a range of native species. In areas where plant density is high or species are highly competitive, a general herbicide such as Roundup™ would be used to reduce competition prior to seeding other species into the plant community. Typically, this would be applied in strips in a mosaic pattern to best mimic natural variation. When these types of areas have gentle, non-rocky terrain and sandy or silty soils, the rangeland drill would be used to distribute seed.

2.7.5.6 Rangeland Drill

When woody plant cover is low and soils are not compacted, a rangeland drill would be used to distribute seed. When slopes are not steep and soils are not too rocky, the drill would be the preferred method of seeding. Failed range seedings with low shrub cover and presence of non-native and undesirable species are the most likely candidates for this type of treatment. Following hand pile and burning or chaining, a rangeland drill may be used to apply seed.

2.7.6 Monitoring:

All project phases would be monitored to determine project effectiveness and to evaluate when livestock grazing could resume. A baseline survey would be conducted for each area prior to treatment for comparison purposes with post treatment monitoring. Monitoring of treated areas would occur one growing season following treatment. Monitoring will continue every year after for the first five years and then in five year increments thereafter.

Once baseline vegetation surveys are completed and seed mixes finalized, specific monitoring plans for each treatment area will be developed. The following approach will be applied. Vegetation cover and frequency data would be collected. The reproductive stages of seeded species would be evaluated. Ground cover data such as biological soil crusts, rock, litter, and bare ground would be collected. Soil aggregate stability and basal and canopy gaps would be measured to evaluate the impacts of the different treatments on soils. Mobile rain gauges would be installed in treated areas to evaluate precipitation and its effects on seeding success. Utilization studies would occur to document use of wildlife during seeding re-establishment. Detailed methods are described in Appendix C of the EA.

Reference sites would be established prior to treatment. The monitoring plan would define and describe specific reference conditions for each of the treatment areas. Reference conditions/sites would be determined differently for range seedings and sagebrush grassland communities. Range site descriptions will be used to create reference conditions for sagebrush grasslands. Because range site descriptions are not available for range seedings, descriptions of the Desired Future Condition, along with consultation with the permittee regarding their knowledge of the range, will be used to create reference conditions for range seedings.

The following project success criteria must be met before grazing would permanently resume in a treated pasture. The criteria are based on averages across the sampling locations.

- Total cover (including, but not limited to, plant canopy, litter, biological soil crust, and rock/gravel) of at least 80% of reference site conditions for the site
- Minimum of 55% of desired species at reproductive stage.

After each monitoring period, the monitoring data will be summarized and the permittee will be contacted to discuss the results and the degree of progress toward the above criteria. If monitoring data show that the criteria are met at the end of the second growing season, the pasture would be available for grazing in the next authorized season of use. Monitoring would typically occur at the end of the monsoon season. For permittees who would be authorized for fall use, they would be notified that their pasture would be ready for use by September 15th. For all other seasons of use, the permittee would be notified by November 1st if their pasture has met success criteria.

If project success criteria are not met at the end of two years, the permittee would be consulted and an interdisciplinary team would begin an evaluation of site conditions and development of a site specific contingency plan. The site would be compared to other treatment sites in the project area with similar conditions to evaluate the cause and appropriate future actions. Depending on the likely cause of the seeding failure, alternative actions may include different treatment methods, different seed mixes, or timing of implementation. Plans for implementing these actions would be developed and funding avenues pursued. Contingency plans could begin to be implemented as funding allows and the BLM and cooperators agree.

If success criteria are not met after the third growing season, livestock grazing may resume during the dormant season if it is determined by the permittee and GSENM staff that grazing would not adversely affect the treatment or further establishment of seeded species. This determination would be based on an evaluation of the amount of forage available for grazing and the length of time that it could be grazed. If grazing is resumed, GSENM staff would monitor the effects and livestock would be removed if it is determined that it is causing an adverse effect on the seeding.

2.7.7 Seed Selection:

Native plant species would be used for all sites not previously disturbed in range seedings. Non-native plant species would be part of the seed mix in range seedings that have been converted to a dominance of non-native species. Where an introduced and native species mixture would be used because of erosion or competition with weeds, at least one full native seed mix would also

be tested in the same area. Use of several seed mixes in disturbed areas would help identify the most effective way to stabilize soils and compete with weeds. Introduced plant species may also be used in a seed mix in a research context to determine the role of competition with native plants in GSENM restoration projects and to guide future restoration efforts. Use of introduced species in the above contexts would be limited to areas that have been converted to range seedings.

When developed strains of species are used in seedings, an effort would be made to include a variety of locally adapted cultivars. Use of a range of cultivars would allow the cultivars to match the range of microsite conditions and diversify the genetic stock of the seeding.

2.7.8 Soils and Biological Soil Crusts:

When hand thinning occurs in an area, the cut material would be placed in nearby deep gullies or areas of excessive water erosion to reduce deepening of headcuts.

Ground disturbing equipment would contour to the slope when operating. Erosion control structures that are damaged during implementation would be repaired.

Mechanical equipment would not be used on slopes > 20% and mechanical operations would be suspended when soil moisture exceeds the plastic limit (water content where soil changes from a plastic state to a semi-solid - derived from the NRCS soil survey).

Areas of desirable vegetation and/or well developed biological soil crust would be incorporated into untreated leave islands where possible. Well developed soil crust communities are defined as containing a diversity of species and morphological groups with lichens and mosses present.

2.7.9 Vegetation:

In areas where the plant community has not been previously seeded (not a range seeding), a mosaic pattern would be used for treatment. This mosaic pattern would be used to mimic a natural appearance and would allow for multiple aged shrub stands and thermal cover for wildlife. When areas have been previously seeded, such as the range seedings, a more uniform approach would be adopted to rehabilitate as much area as possible.

To prevent mechanical damage to rare plants, surveys would be done before treatment to locate and avoid these populations.

2.7.10 Weeds:

If any listed noxious weed species are found at a project site, treatment of those species would occur prior to commencing work to prevent further spread.

To minimize exotic weed invasion, efforts would be made to plant seed during advantageous climatic conditions and to control exotics quickly if the seedings fail and exotics invade. Areas

that are properly functioning with adequate functional groups, good soil condition, and high cover of biological soil crust would generally not be disturbed. These areas are less at risk of exotic invasion than they would be if they were disturbed by restoration activity.

For all phases of the proposed action, equipment would be cleaned with a pressure washer prior to delivery and work to avoid spreading of noxious or invasive weeds.

2.7.11 Wildlife:

Treatments would occur in late fall or winter. This would allow animal species to complete brood raising and allow time for the young to become mobile enough to avoid project activities better. The timing would also alleviate some animal mortality by having some species hibernating underground.

If condors are found feeding on carrion within the project area boundaries, any project related activities near the feeding area would be avoided until the birds are finished feeding and have moved on.

If burrowing owls are found and there are indications of nesting within the project area boundaries, a buffer zone would be established around the nesting area to protect the owls and their nesting habitat.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction:

This chapter presents the potentially affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the impact area as identified in the Interdisciplinary Team Analysis Record Checklist found in Appendix A and presented in Chapter 1 of this assessment. This chapter provides the baseline for comparison of impacts/consequences described in Chapter 4.

3.2 General Setting:

The proposed project area is located in the southwest section of GSENM, in a corridor along Highway 89 (Maps 1.1 and 1.2 in Chapter 1). It lies in the Colorado Plateau physiographic region described as follows:

Encompassing 150,000 square miles of Utah, Arizona, New Mexico and Colorado the Colorado Plateau is home to one million people, one quarter of them Native American. Fifty five % of the Plateau is federal land, including twenty-seven units of the National Park Service, seventeen National Forests and twenty-six

wilderness areas. The name Colorado Plateau came into use around 1860, likely coined by members of Lt. Joseph Ives's Expedition to the area in 1857 and 1858. Characterized by plateaus and tablelands that lie at an elevation above 5,000 feet, this diverse land is punctuated by volcanic peaks and igneous-cored mountains that rise as high as 14,000 feet above the deeply inscribed plateau country. Mapmakers draw the margins of the Colorado Plateau on the south at the Mogollon Rim, on the west along major faults of the Basin and Range province, and to the east at the western edge of the Rocky Mountains of Colorado. The northern limits are drawn east of the Wasatch Mountains and south of the Uinta Mountains (Plateau Journal, 1997).

The elevation of the project area is approximately 5400 feet above sea level. The mean annual precipitation is eight to 10 inches. The mean annual temperature is 49 to 53 degrees Fahrenheit. Most of the precipitation falls during the winter/spring months or as monsoonal events usually occurring in July and August. These monsoonal events are the northern extension of the Mexican Monsoon which brings heavy, localized thunderstorm activity to the area (National Oceanic and Atmospheric Administration, 2003).

The dominant vegetation types in the area are Crested wheatgrass seedings, sagebrush shrubland types, and scattered pinyon-juniper woodland. The terrain is rolling to flat throughout much of the project area with a wide range of soil types. Primary land uses are livestock grazing and hunting. The area has been impacted previously by grazing and recreational activities such as hunting and off-road vehicle use.

Resources that were not identified in the IDT checklist as having potential impacts, conflicts, or issues from the Proposed Action or alternatives will not be discussed further in this Environmental Assessment.

3.3 Critical Elements of the Human Environment and Other Resources Brought Forward for Analysis:

Specific resources that could potentially be affected by the Proposed Action or the alternatives are:

- Cultural/Native American Religious Concerns
- Invasive/Non-Native Species
- Fish and Wildlife
- Livestock Grazing/Rangeland Health Standards and Guidelines
- Soils and Biological Soil Crusts
- Vegetation Including Special Status Plant Species
- Visual Resource Management

3.3.1 Cultural/Native American Religious Concerns

Prehistoric archeological resources in the proposed treatment areas range in time from the Archaic Period (6,000 BC – 100 BC) through the Historic Period. Site types present in the area

can be expected to correspond with the period represented. Early sites tend to be limited activity areas and camps represented by scattered artifacts, concentrations of lithic debris and fragile features such as fire hearths. Sites that date to the Puebloan period (100 BC – AD 1200) display a variety of site types ranging from limited activity areas to substantial pit house villages and masonry pueblos.

The distribution of sites and their density is also affected by the local setting i.e. agricultural sites occur near arable land, sites focused on seed gathering occur where cool season grasses were abundant and hunting camps where game was plentiful.

Although relatively little archeological inventory has been conducted on the treatment areas themselves, the occurrence of Puebloan agricultural sites in nearby areas with better agricultural potential is well documented. Assuming that the treatment area was prehistorically a grassland, it is expected that the area was used primarily for hunting and gathering throughout the prehistoric era. Site types are expected to be relatively small limited activity areas occurring in low to moderate densities.

Prior to implementation of the project, the treatment areas will be inventoried for cultural resources. All properties eligible for inclusion on the National Register of Historic Places will be flagged and avoided by mechanized ground disturbing activities. On some sites, treatment with hand tools may be recommended.

3.3.2 Invasive/Non-Native Species:

Several thousand acres of sagebrush on deep, loamy soils have been converted to Crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Elymus junceus*) seedlings. Due to recent drought and grazing, many of these seedlings have been converted to Cheatgrass, Russian thistle (*Salsola iberica*), or annual sunflower (*Helianthus annuus*) communities, which now dominate thousands of acres in the project area. Peppergrass (*Lepidium* sp.), flaxweed (*Descurainia sophia*), and musk mustard (*Chorispora tenella*) are also present to some degree throughout the range seedlings in the project area.

3.3.3 Fish and Wildlife and Special Status Animals:

Sagebrush communities are utilized by many wildlife species during some part of the year or during some of their lifetime. Some species are dependant upon sagebrush communities to complete their life cycles. Sagebrush obligates include the sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), sage grouse, pygmy rabbit (*Brachylagus idahoensis*), sagebrush vole (*Lemmyscus curtatus*), sagebrush lizard (*Sceloporus graciosus*), and pronghorn (*Antilocapra americana*) (Paige and Ritter 1999). Pygmy rabbits are not known to occur within the boundaries or adjacent to GSENM near the project area. Many birds nest and feed in these communities.

Pronghorn have been released recently in the Big Water and Church Wells area and have been sighted along the Paria River. The population of this herd is unknown but regular sightings indicate some reproductive success and survival. Pronghorn should be expected to move into the project area in the future. Pronghorn diets consist of less than 10% grass during spring and summer. They rely heavily upon forbs during the spring and summers and during winter they switch to shrubs for the majority of their diet. The proposed project area is located within the Paunsaugant mule deer herd wintering area. Large numbers of mule deer rely on a variety of plants in this area to survive.

Sage grouse are found associated with both tall and short species of sagebrush in foothills, sagebrush shrublands, and mountain slopes. Sage grouse also occur in mosaics of sagebrush, grasslands, and aspen, but not in pinyon-juniper woodlands or in shadscale shrublands (Paige and Ritter 1999). Home ranges are from one to 577 square miles (Connelly and Markham 1983). Sage grouse benefit from restoration of native forb and perennial bunchgrass communities and from maintenance of patches of tall and dense big sagebrush. Sagebrush stands should have multiple cover and size classes.

Sage grouse have not been recorded in the proposed project area although the proposed project area is recognized as historic habitat. Sage grouse are known to occur north and west of the proposed project area near the town of Alton. Colonization of sage grouse in the project area would require birds to move from that population down Johnson Canyon and then east to the project area. Migration into the project area from other directions could occur but would require the birds to move through thick pinyon-juniper communities or across sandy sites with low populations of sagebrush. Lack of suitable habitat, along with a currently small number of sage grouse in that population, would reduce the likelihood of this occurring in the near future.

Utah Partners in Flight Avian Strategy lists priority species dependant on sagebrush communities as greater sage grouse, sage sparrow, Brewer's sparrow, and sage thrasher. Neotropical migratory birds most affected by sagebrush alteration activities are sage sparrow, Brewer's sparrow, and sage thrasher. The sage thrasher, Brewer's sparrow, sage sparrow, and sage grouse most frequently nest in or beneath sagebrush. The sage thrasher and Brewer's sparrow summer in Utah and migrate south in the winter while the sage sparrow could be a year round resident. Sage thrashers are almost always associated with big sagebrush communities. Sage sparrows and Brewer's sparrows are sometimes found in other plant communities other than sagebrush. Sage sparrows show high site fidelity but move out of areas where sagebrush has died out or been removed. Sage sparrows eat a variety of invertebrates and seeds. During brood raising periods they feed almost entirely on invertebrates and switch their diet to more seeds during winter. Brewer's sparrows also decline in areas where sagebrush has died out or been removed.

Resident raptors in the project area include the golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), cooper's hawk (*Accipiter cooperii*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrinus*), sharp-shinned hawk (*Accipiter striatus*), northern harrier (*Circus cyaneus*), turkey vulture (*Cathartes aura*), and condor. Owls that would likely use this area are great-horned (*Bubo virginianus*), western screech (*Otus kennicottii*), northern pygmy (*Glaucidium gnoma*), long-eared (*Asio otus*), short-eared (*Asio flammeus*), and burrowing (*Athene cunicularia*).

Burrowing owls have been recorded north of the project area on Mollies Nipple Allotment and historic sightings just east of the Cockscomb and north of the highway (UDWR database 2004). Other raptors most likely pass through the area during migration or seasonally spend time foraging there. Prey species associated with the project area would be affected by implementation of the project. Project activities would be performed during a time of the year that does not interfere with nesting and brood raising of wildlife species.

Twenty-one species of amphibians and reptiles were recorded in or near the project area during surveys conducted between 1999 and 2002 (Oliver 2003). The sagebrush lizard was the second most abundant and widespread lizard recorded in this study. None of these reptile and amphibian species are listed by federal or state agencies as sensitive, endangered, or threatened.

There are no fish species or habitat for fish within the project area boundaries.

3.3.4 Livestock Grazing/ Rangeland Health Standards and Guidelines

General Description

There are six allotments within the project area: Cockscomb (65 AUMs), Coyote (2,044), Cottonwood (3,117 AUMs), Five Mile Mountain (385 AUMs), Mollies Nipple (3,868 AUMs), and Vermilion (2,852 AUMs). Table 3.1 shows the allotments, number of acres each allotment has in the proposed project, season of use, average number of days and AUMS for each pastures or allotments.

The Cockscomb Allotment has one pasture in the proposed project area.

The Coyote Allotment has two pastures (Five Mile and Sand Gulch) in the proposed project area. The other pastures that are not in the project are the South Coyote, White Sands and Wahweap pastures.

The Cottonwood Allotment has two pastures (Eight Mile and Paria Breaks) in the proposed project area. The other pastures that are outside of the project area are the Blue Trails, Brigham Plains, Butler Valley, Cottonwood Wash, Gravelly Hills, Jack Riggs Bench, North Coyote, Paria Box, Paria Breaks, Paria River, and Wiggle Rim pastures.

The Five Mile Mountain Allotment has one pasture in the proposed project area.

The Mollies Nipple Allotment has five pastures (Jenny Clay Hole, Telegraph, Blue Spring, Rock House, and Mine Spring) in the proposed project area. The other pastures that are outside of the project area are Buckskin and Nipple pastures.

The Vermilion Allotment has five pastures (RCA 1, RCA 2, RCA 3, Petrified Hollow, and Clark Ranch) in the proposed project area. The other pastures that are outside the project area are Nephi Pasture, Government Reservoir, Fossil Wash, Old Paria, and Seaman Wash pastures.

<p align="center">Table 3.1</p> <p>Allotments, Pastures, Acres, Season of Use, Average Number of days that a pasture has</p>
--

been grazed and the average number of AUMs for the pastures that are proposed to be treated.					
Allotment	Pastures in the Project Area	Acres in the Project Area	Season of Use	Average # of days that each pasture was grazed during the authorized grazing season	Average # of AUMs determined from five years of actual use reports or grazing bills
Cockscomb	Cockscomb	1,524	3/01-5/31	92	21
Coyote	Five Mile	1,761	11/01-5/31	23	293
	Sand Gulch	1,822	11/01-5/31	22	293
Cottonwood	Eight Mile	2,279	11/01-5/31	61	299
	Paria Breaks	572	11/01-5/31	61	299
Five Mile Mountain	Five Mile Mountain	4,612	11/01-4/30	181	178
Mollies Nipple	Jenny Clay Hole	2,955	3/01-2/28	31	245
	Telegraph	2,900	3/01-2/28	31	282
	Blue Spring	4,542	3/01-2/28	37	270
	Rock House	3,432	3/01-2/28	34	137
	Mine Spring	1,519	3/01-2/28	10	112
Vermilion	RCA 1	563	2/16-5/15 6/01-9/15 10/01-01/15	14	53
	RCA 2	565	2/16-5/15 6/01-9/15 10/01-01/15	25	118
	RCA 3	532	2/16-5/15 6/01-9/15 10/01-01/15	20	72
	Petrified Hollow	2,530	2/16-5/15 6/01-9/15 10/01-01/15	27	161
	Clark Ranch	644	2/16-5/15 6/01-9/15 10/01-01/15	14	53

The average number of days and AUMs were determined from five years of actual use reports that each of the livestock operators have submitted or paid grazing bills.

Seedings

A total of 15,295 acres of seedings have occurred within the project area. Table 3.2 shows the five seedings that were completed in the 1960's. In 2002, these seedings received less than three inches of precipitation. The result of receiving such a low amount of precipitation was that approximately 80% of the Crested wheatgrass plants died in these seedings. In the RCA pastures in the Vermilion Allotment and the Clay Hole seedings in the Mollies's Nipple Allotment, the juniper trees have reestablished themselves in a portion of the seeded areas. The juniper trees have crowded out the seeded and native grasses. Also in the north portion of the Clay Hole seeding, the juniper trees have crowded out the browse species.

At about the same time, the sagebrush areas in the Five Mile Mountain, Mollies Nipple, and Vermilion Allotments started to show a sagebrush die-off of the older sagebrush plants. There is very little under story of herbaceous species in these sagebrush communities.

Table 3.2 Seeding names, year seeding completed, allotment, type of treatment, seed mixture and acres in the project area.					
Name of Seeding	Year	Allotment	Type of Treatment	Seed Mixture	Acres
Jenny Clay Hole	1963	Mollies Nipple	Plowed/Drilled	Crested wheat	1,845
Jenny Clay Hole	1963	Mollies Nipple	Double Chained	Crested wheat	6,052
RCA 1&2	1963	Vermilion	Plowed/Chained	Crested wheat	1,494
Petrified Hollow	1982	Vermilion	Plowed	Crested wheat Pubescent wheatgrass	242
Kimball Valley	1965	Cottonwood/Coyote	Plowed/Chained	Crested wheat	5,662

The current long term trend on each of the pastures and allotments, where data is available, is described in the following tables (3.3-3.7).

Table 3.3 Cockscomb Allotment trend*		
Pasture	Study number	Trend
Cockscomb	CC-1	Trend is downward with a decrease in the number of galleta grass (<i>Hilaria jamesii</i>) plants and it is also down for Indian ricegrass (<i>Stipa hymenoides</i>) and big sagebrush (<i>Artemisia tridentata</i>).

* This trend study was last recorded in 2003.

Table 3.4. Cottonwood Allotment trend*		
Pasture	Study number	Trend

Table 3.4. Cottonwood Allotment trend*		
Pasture	Study number	Trend
Eight Mile	2-20	Trend on Crested wheatgrass is upward with an increase in the number of plants. Galleta grass trend is static. Needleandthread grass (<i>Stipa comata</i>) trend is downward with no plants recorded in 1996 and five plants recorded in 1987. Sand dropseed (<i>Sporobolus crytandrus</i>) trend is downward.
Eight Mile	2-21	Trend on Crested wheatgrass is upward with an increase in the number of plants. Trend is upward on galleta grass and downward on sand dropseed.

*These studies were last recorded in 1996.

Table 3.5. Coyote Allotment trend*		
Pasture	Study number	Trend
Sand Gulch	2-24	Overall the trend is downward with a decrease in the number of Crested wheatgrass plants and percent cover.
Sand Gulch	2-25	Overall the trend is downward with a decrease in the number of Crested wheatgrass plants and percent cover
Five Mile	2-22	Overall the trend is downward with a decrease in the number of Crested wheatgrass plants and percent cover.
Five Mile	2-23	Overall the trend is downward with a decrease in the number of Crested wheatgrass plants and percent cover.
Five Mile	2-26	Overall the trend is static, with Crested wheatgrass showing an upward trend and big sagebrush and Indian ricegrass showing a static trend and galleta grass showing a downward trend.

*Studies number 2-22, 2-23, 2-24, and 2-25 were last recorded in 2004. Study number 2-26 was last recorded in 2000.

Five Mile Mountain Allotment

There are no monitoring studies located on the Five-Mile Mountain Allotment.

Table 3.6. Mollies Nipple Allotment trend*		
Pasture	Study number	Trend
Telegraph	1-16	The data shows that there has been a loss of Crested wheatgrass plants between 1997 and 2003. There were a total of 13 Crested wheatgrass plants recorded in 1997 and none in 2003.
Blue Spring	1-17	The data shows that there has been a loss of Crested wheatgrass plants between 1997 and 2003. There were a total of 16 Crested wheatgrass plants recorded in 1997 and none in 2003.

Table 3.6.
Mollies Nipple Allotment trend*

Pasture	Study number	Trend
Jenny Clay	1-18	The data shows that there has been a loss of Crested wheatgrass plants between 1997 and 2003. There were a total of 14 Crested wheatgrass plants recorded in 1997 and none in 2003.
Telegraph	Telegraph-1	The data shows that there has been a loss of Crested wheatgrass plants between 1997 and 2003. In telegraph #1 and # 2 there were a total of 31 Crested wheatgrass plants recorded in 1997 and one in 2003.
Kimball	1-62	Downward with a decrease of grass species in the trend study.

*These studies were last recorded in 2003.

Table 3.7.
Vermilion Allotment trend*

Pasture	Study number	Trend
RCA 3	1-14	Trend on Crested wheatgrass is downward. In 2000 there were 2 plants and in 2004 there were none. Trend for Indian ricegrass is downward. Trend is static on needleandthread grass. Galetta grass shows an upward trend with an increase in the number of plants and percent cover.
RCA 1	1-15	Trend on Crested wheatgrass is downward with a loss of Crested wheatgrass plants and decrease in percent cover. Trend on galetta grass is static with the same number of plants and percent cover.
Petrified Hollow	1-73	Trend for Indian ricegrass is upward. The trend for western wheatgrass is downward and it is static for galleta grass.

*The trend studies in the RCA pasture were last recorded in 2004, and the Petrified Hollow study was last recorded in 1992.

3.3.5 Soils and Biological Soil Crusts

Most soils in the project area are derived from either weathering products (“residuum”) of the Chinle and Moenkopi formations, fine-textured water-deposited alluvium, or wind-deposited (“eolian”) fine sands. The distribution of soil types is a result of geologic controls on parent materials and by patterns of water and wind erosion, and deposition.

A soil survey map (Map 3.2) and survey details for the project area are located in Appendix E. Residuum-derived soils are relatively shallow, with depths typically ranging from less than five inches to 25 inches. These soils occupy approximately 44% of the project area and occur on shallowly dipping structural benches and the slopes of knolls and rock outcrops. These soils are prone to runoff as a result of steep slopes, shallow depths, fine surface textures, and/or naturally sparse vegetation. There is a relatively high risk of erosion via runoff, and rills are common on

slopes.¹ Textural characteristics and shallow depths result in low or very low available water capacity (AWC) in the plant rooting zone (Table 3.8). Characteristic vegetation communities associated with these soils include Utah juniper-pinyon, Mormon tea, and where inclusions of eolian- or alluvial-derived soils occur, Wyoming big sagebrush.² Of the nine Rangeland Health Assessments (RHAs) conducted in these soils, four (44%) exhibited unsatisfactory soil and hydrologic conditions.

Table 3.8 Soil Map Units and Corresponding Ecological Sites				
Map Unit ID	Acres (% of Project Area)	Available Water Capacity (inches)	Typical Ecological Sites	Occurrence in Project Area
Alluvial Flats				
5037	6355 (19.1%)	Moderate	- Semidesert Loam (Wyoming Big Sagebrush) - Semidesert Shallow Loam (Utah Juniper- Pinyon)	Alluvial flats occupying broad valley floors throughout the project area (e.g., Telegraph Flats), including portions of all affected pastures. Range seedings are located in many of these areas.
5167	512 (1.5%)	Low		
		V. Low		
5172	6363 (19.1%)	High		
		Moderate		
Chinle and Upper Moenkopi Residuum				
5164	392 (1.2%)	-	- Semidesert Shallow Loam (Utah Juniper- Pinyon) - Semidesert Shallow Gypsum (Mormon Tea) - Semidesert Shallow Shale (Utah Juniper- Pinyon) - Semidesert Loam (Wyoming Big Sagebrush)	Chinle badlands and knolls and slopes of Moenkopi bedrock and residuum, distributed across the project area, primarily on the west side of Hwy 89. Scattered drapes of eolian-derived material overlay residuum, primarily near the Cockscomb and along Hwy 89.
5166	2690 (8.1%)	V. Low		
		V. Low		
5170	4899 (14.7%)	V. Low		
		V. Low		
		Low		
5171	6641 (19.9%)	V. Low		
		V. Low		
		Low		
Recent and Remnant Alluvial Terraces and Eolian Deposits				

¹ The soil erodibility factor (Kw) and (Kf) is an index of soil detachment by runoff. These erodibility factors are indexes used to predict the long term average soil loss, from sheet and rill erosion under crop systems and conservation techniques. (NRCS Manual 618.55)

² Following ecological site inventory convention, vegetation communities are described in terms of the dominant tree or shrub species.

Table 3.8 Soil Map Units and Corresponding Ecological Sites				
Map Unit ID	Acres (% of Project Area)	Available Water Capacity (inches)	Typical Ecological Sites	Occurrence in Project Area
5112	414 (1.2%)	High	- Loamy Bottom (Basin Big Sagebrush) - Alkali Bottom (Greasewood) - Semidesert Stony Loam (Utah Juniper-Pinyon) - Semidesert Loam (Wyoming Big Sagebrush) - Semidesert Sand (Fourwing Saltbush)	Recent and pre-historic terraces adjacent to Sand Wash, Kitchen Corral Wash, and Clay Hole Wash. Alluvial fans. Eolian dunes occur on structural benches near the base of the Vermillion Cliffs.
		Moderate		
		Moderate		
5122	445 (1.3%)	Low		
		Moderate		
5141	1010 (3.0%)	Moderate		
		High		
		Low		
5163	687 (2.1%)	V. Low		
5174	1143 (3.4%)	Low		
		Low		
Limestone Residuum (Kaibab Limestone and Timpoweap Member of Moenkopi Formation)				
5159	1359 (4.1%)	V. Low	- Semidesert Shallow Loam (Black Sagebrush) - Semidesert Loam (Wyoming Big Sagebrush)	Gently dipping slopes underlain by limestone, primarily east of Hwy 89.
		V. Low		

Soils developed on alluvial flats occupy approximately 40% of the project area and have the greatest potential rangeland productivity. These soils are relatively deep (typical depths range from 26 inches to more than 60 inches), and have moderate surface textures. These soils are less prone to runoff than residuum-derived soils, and the risk of erosion from runoff is lower. Compared to residuum-derived soils, the greater depths and slight coarser textures that characterize these soils provide for increased AWC. As a result, Wyoming big sagebrush is the dominant ecological type, with Utah juniper-pinyon occurring on inclusions of shallow soils. Of the 19 RHAs conducted in these soils, both soil and hydrologic conditions were unsatisfactory at 11 (58%) of the sites (including four that showed a moderate to extreme departure from reference conditions), and hydrologic or soils conditions were unsatisfactory at two additional sites.

Recent and remnant alluvial terraces and recent and reworked eolian deposits comprise the parent material for approximately 11% of the soils within the project area. Characteristics of these soils vary widely; this is a reflection of different parent materials and the length of time since deposition. In general, these soils are relatively deep and have moderate surface textures. The eolian and recent alluvial soils tend to have low slopes, low rates of runoff, and lower risks of erosion via runoff. The eolian soils are vulnerable to wind erosion. Soils derived from remnant alluvial terraces and fans exhibit a wide range of depths. Although they tend to occur on steeper slopes, and are therefore prone to runoff, such soils are only moderately at risk to erosion from runoff. Vegetation communities associated with these soils include basin big sagebrush,

greasewood, Utah juniper-pinyon, Wyoming big sagebrush, and fourwing saltbush. Relatively few RHAs are available for these soils; soil and hydrologic conditions at one of the three sites were unsatisfactory.

Soils derived from limestone residuum comprise approximately four percent of the project area. Shallow depths, steep slopes, and sparse vegetation create conditions favorable for runoff generation. However, coarse surface textures reduce the risk of erosion via runoff or wind. Characteristic plant communities include black sagebrush and Wyoming big sagebrush. The sole RHA for this soil type exhibited a high degree of similarity with reference conditions.

Soils and soil processes in the project area have been affected by past land management. Livestock grazing has caused moderate to severe compaction in many of the finer textured soil areas, especially in seedings and other areas that receive disproportionate use. Field observations indicate that water erosion rates have been increased in areas that lack adequate litter, woody debris, and/or stabilizing root masses, such as heavily used and/or compacted areas, failed seedings, and at-risk sagebrush stands that lack perennial grasses. This erosion is evident as sheet erosion, rills, gullies, and pedestalling. Rates of wind erosion, which may be the dominant erosion process in the project area (Breshears, et al., 2003), have probably increased as well. Wind erosion rates are likely highest in failed seedings and decadent sagebrush stands; conversely, woodland establishment may have depressed wind erosion rates on loamy and sandy soils.

Of the soils in the project area, the soils on alluvial flats have been most affected by climate, wildlife improvements, range improvements and grazing. Additionally, high rates of runoff generation from upslope areas of residuum-derived soils and the lack of shallow bedrock under these soils have created conditions favorable for gully erosion and migration (and associated soil loss). In some areas, improperly drained roads are contributing to headcutting and gully erosion.

There are some residual beneficial effects of past range improvements. Downed woody debris in chainings and pushes have a tendency to trap and hold erosional sediment. Earthen erosion control structures, though in many cases no longer functional, slowed the rate of headcut movement and caused deposition of soils.

Biological soil crusts occur throughout the project area and are an assortment of cyanobacteria (blue-green algae), green algae, lichens, fungi, or mosses that occur together on the soil surface, forming layers that can range from one to 10 centimeters thick. They are common in arid and semi-arid areas worldwide. Crusts on fine-textured soils often appear dark, rough, and pinnacled. Those on sand usually do not develop pinnacles and instead appear as a dark, two-dimensional layer on the surface. Biological soil crusts on the range seedings are comprised mainly of early successional groups such filamentous cyanobacteria and green algae. Sagebrush grasslands typically contain more complex biological soil crust communities comprised of cyanobacteria, gelatinous lichens, squamulose lichens, crustose lichens, and mosses. Areas that contain pockets of gypsum rich soils support a much higher diversity of biological soil crusts than other soil types.

3.3.6 Vegetation Including Special Status Plant Species

3.3.6.1 Special Status Plants

Five BLM sensitive plants occur in the project area, and two more are found just outside its boundary. Moenkopi derived soils throughout the area provide habitat for several populations of Meager camissonia (*Camissonia exilis*), Atwood's pretty phacelia (*Phacelia pulchella* var. *atwoodii*), gumbo milkvetch (*Astragalus ampullarius*), and Kane breadroot (*Pediomelum epipsilum*), all of which occur along the Highway 89 corridor, along the Paria movie set road, or in the Paria Breaks. Several Chinle endemics also occur in or near the project area. Populations of chia (*Salvia columbariae* var. *argillacea*) are found along the Kitchen Corral Road and the Paria Breaks. Murdock's evening primrose (*Oenothera murdockii*) and Kanab thelypody (*Thelypodopsis ambigua* var. *erecta*) are just outside the project boundary in Kitchen Corral Wash and probably occur in the project area.

In addition, the area contains two regional endemics without Federal protection. Pipe Springs cactus (*Opuntia erinacea* var. *aurea*) occurs on Moenkopi soils just outside the boundary of the Cockscomb Allotment, and GSENM's only known population of the Chinle endemic Chinle phacelia (*Phacelia cephalotes*) is found in the Five Mile Allotment.

These species and their habitats are potentially vulnerable to loss of habitat from chaining, burning, drilling, brush beating, and other surface disturbances. Competition from exotic species is another potential threat, particularly with Cheatgrass (*Bromus tectorum*), musk-mustard (*Chorispora tenella*), Russian thistle (*Salsola iberica*), and bur buttercup (*Ranunculus testiculatus*).

3.3.6.2 Vegetation

Most of the project area is characterized by sagebrush flats, pinyon/juniper woodlands, or Crested wheatgrass seedings (See Vegetation Map 3.1 in Appendix D). The slopes and summit of the Vermilion Cliffs are dominated by Utah juniper (*Juniperus osteosperma*) Big sagebrush woodlands intermixed with Gambel oak (*Quercus gambelii*) Utah serviceberry (*Amelanchier utahensis*) woods, montane shrublands of Utah serviceberry, Greenleaf manzanita (*Arctostaphylos patula*), and Mountain mahogany (*Cercocarpus* sp.), or outcrops of barren sandstone. Scattered areas of deep sand support sand sagebrush (*Artemisia filifolia*) or big sagebrush grasslands. Flats below the Vermilion Cliffs contain extensive Big sagebrush grasslands with scattered inclusions of Utah juniper-sagebrush vegetation. Several thousand acres of sagebrush on deep, loamy soils have been converted to Crested wheatgrass and Russian wildrye seedings. Rocky sites on Buckskin and Fivemile mountains are dominated by pinyon-juniper forests or thickets of Gambel oak and Cliffrose (*Purshia mexicana*). Open, rocky sites derived from thin, limestone-rich soils are dominated by Black sagebrush (*Artemisia nova*). Areas with deeper loam soils surrounding the stony core of Buckskin Mountain are dominated by Big sagebrush. Desert shrub communities are present throughout the area, but their highest concentration is on the east side of the project area on well-drained, non-alkaline clay soils frequently dominated by Shadscale (*Atriplex confertifolia*).

3.3.7 Visual Resource Management

Visual Resource Management Classes and Objectives

The BLM uses a Visual Resource Management (VRM) system to inventory and manage visual resources on public lands. The primary objective of VRM is to minimize visual impacts on BLM administered public lands. The VRM system uses four classes to describe the different degrees of modification allowed to the landscape. Visual Resource Management classes are based upon a landscape's visual quality, viewer sensitivity to that landscape, and comprehensive management objectives. Once an area has been assigned a VRM class, the classification is used to analyze the visual impacts of proposed projects and activities on BLM lands. The basic philosophy underlying the VRM system is that the degree to which a proposed project or activity affects the visual quality of a landscape depends on the visual contrast created between the proposal and the existing landscape. The VRM system's assessment process provides a means for determining visual impacts and for identifying measures to mitigate those impacts.

The entire project area lies within VRM Class III. The objective for VRM Class III is to partially retain the existing character of the landscape; the level of change to the characteristic landscape should be moderate; management activities may attract attention but should not dominate the view of the casual observer.

Characteristic Landscape

The project area consists primarily of flat expanses of open, low-lying terrain on either side of HWY 89 which form a panoramic view. The consistent mat of vegetation (sagebrush and grasses), with only random openings, contributes to the foreground view. To the north of the highway, the landform changes to slightly rounded hills in the mid-ground and vertical cliff-edged plateaus (the Vermilion Cliffs formation of the Grand Staircase) in the background. On the south side of the highway, the flat expanses gently elevate upward to form Buckskin Mountain. In the mid-ground and background, swathes of pinyon/juniper occur along the tops of the plateau and on the hills, whereas spotty stands occur at the interface with the sagebrush and on the face of the cliffs.

The lines in the landscape are strongly horizontal in nature in the foreground. They are formed by the landform edges and the subtle differences in concentrations of the vegetation. The lines in the mid-ground and background are predominantly horizontal but with some rounded and diagonal lines along cliff and plateau edges and hills as well as where vegetation composition changes.

The predominant colors of this landscape are greens and reds. The greens run the spectrum of sage to dark green because of the vegetation. The reds are primarily vermilion with some lighter and darker variations depending on the soil types and rock layers.

The texture of the landforms is smooth in the foreground and medium in the mid-ground and background. The texture of the vegetation is primarily smooth, with small areas of medium texture where the vegetation changes from sagebrush to pinyon/juniper.

There are no visible structures within this landscape other than HWY 89.

The typical casual observers for this project area primarily include:

- Travelers along HWY 89 (i.e. local commuters, tourists and recreationists, and commercial vehicle drivers) who could express varying levels of sensitivity to changes in the landscape character.
- Cattle permittees maintaining allotments in and near project area and hunters who could likely view this type project as a positive undertaking and be minimally sensitive to changes in landscape character.
- Visitors to the Paria Movie Set and Old Town Site area who could likely be somewhat sensitive to landscape character changes.
- OHV/ATV recreationists utilizing the dirt roads throughout the project area who could express varying levels of sensitivity to changes in the landscape character.

This project is proposed in a classic sagebrush and red cliffs landscape in Southern Utah which creates a feeling of vastness and open space similar to many areas within the Colorado Plateau region.

Key Observation Points (KOPs)

Two key observations points (KOPs) that are representative of the project area were chosen to determine the impacts to visual resources. These points are in locations where the casual observer is most likely to see the proposed project. KOP #1 is located along HWY 89 looking north, and KOP #2 is located along the Paria Town Site Road (#565).

4.0 ENVIRONMENTAL IMPACTS

4.1 Introduction:

This chapter analyzes the impacts of implementing the No Action Alternative as well as three action alternatives (including the Proposed Action) to those resources described in Chapter 3. Key issues that are analyzed include the role of introduced and weed species associated with treatments, short term negative effects to soils/biological soil crusts and wildlife habitat, and the effects of non-use to the livestock operator while the treatment areas are rested. Management of livestock during and after restoration efforts within a traditionally grazed landscape will also be addressed. Cessation of grazing is not analyzed here because language in the MMP states that grazing will continue on the GSENM in the foreseeable future. Only a temporary rest from grazing is analyzed in these alternatives.

4.2 Direct/Indirect Impacts:

4.2.1 Alternative A – No Action:

4.2.1.1 Cultural/Native American Religious Concerns:

Under this alternative, there would be no potential for ground disturbing activities, and no potential for additional disturbance to cultural resource sites. However, there would be no cultural resource surveys of the study area, and cultural resource sites within the area would not be identified, documented, and described.

4.2.1.2 Invasive/Non-native Species:

This alternative would do nothing to control the spread of invasive, non-native species, which would continue to invade the understory of these communities, disrupt ecosystem function, and create fire hazards.

4.2.1.3 Fish and Wildlife and Special Status Animals:

Reduced forage production in wildlife habitat would continue. The lack of competition by sagebrush and other native plants, such as grasses and forbs, may provide for the increase of non-native annuals, especially Cheatgrass. Increased wildfire activity due to invasive annuals could further modify the plant communities that dominate the area. The limited understory of native grasses and forbs in the sagebrush stands would persist or worsen. Ungulates and other species that use sagebrush would have to continue to adjust to the loss of sagebrush. While the loss of sagebrush would be detrimental to sagebrush obligate species such as sage sparrows, sage thrashers, sage grouse, and brewers sparrows, a reduction of sagebrush would better suit birds of open areas such as horned larks and vesper sparrows.

4.2.1.4 Livestock Grazing/Rangeland Health Standards and Guidelines

The proposed project area would be managed under the current Allotment Management Plans. Further declines in plant cover and species diversity paired with possible increases in soil erosion

may result in additional reductions in livestock grazing. Areas that are presently in non-use for livestock grazing would continue in this pattern until site recovery is observed.

In this alternative, there would continue to be a decrease in the amount of herbaceous forage available for livestock within the proposed treatment areas. The trend studies located within the pastures and allotments would continue to be downward with a decrease in perennial grasses and forbs. The trend studies, especially in the seedings, would show an increase in weedy species such as Cheatgrass and Russian thistle.

The livestock operators would not have to rest the pastures and allotments for two or more grazing seasons from livestock. The length of the season of use within the project area would need to be shortened because there would be less forage available for livestock.

4.2.1.5 Soils and Biological Soil Crusts

Under this alternative, treatments intended to restore and/or maintain soil health and decrease erosion rates would not be implemented. Although there would be no risk for short-term adverse direct or indirect impacts associated with active vegetation manipulation, conditions in degraded seedings would continue to decline, and adverse trends in at-risk sagebrush stands would not be reversed.

Accelerated erosion of alluvium- and residuum-derived soils would continue, and may worsen as surface soil horizons, organic matter, and nutrients are lost. Wind and sheet erosion would continue, and the number and size of rills and gullies would increase in some portions of the project area. In compacted areas, root growth would not be sufficient for natural rehabilitation.

Degraded vegetation communities would not provide adequate litter or root mass to maintain or restore soil fertility, organic matter, aggregate stability, surface roughness, infiltration, or desirable micro-organism populations.

4.2.1.6 Vegetation Including Special Status Plant Species

Special Status Plants:

Since there would be no surface disturbance associated with treatments, there would be no potential impact to special status plants from direct mechanical damage or removal.

Vegetation:

Taking no action would negatively impact vegetation. The functional groups that are now missing would not be restored and the understory forbs and grasses would continue to be underrepresented in much of the project area, while shrubs and trees would be overrepresented relative to the range site description. Threats from fire, soil erosion, Cheatgrass and invasion by non-native species due to the lack of understory and the large percentage of dead or decadent shrubs would increase.

However, there would be no new surface disturbance associated with treatments and therefore no new sites that might be susceptible to exotic invasion and soil erosion.

4.2.1.7 Visual Resource Management

Under this alternative, the existing visual resources would not be affected. Thus, this alternative meets the objectives of VRM Class III. However, the potential for replacing the decadent stands of sagebrush with healthy vegetation and potentially improving the natural aesthetics of the project location, which could enhance the visual resources, would not exist.

4.2.2 Alternative B – Proposed Action:

4.2.2.1 Cultural/Native American Religious Concerns:

Cultural resource surveys would be required prior to project implementation to identify all cultural resource sites within the proposed project area. These sites, once identified, would be evaluated and all sites deemed eligible for submission to the National Register of Historic Places would be flagged and avoided during project implementation. Under this alternative, cultural resource sites would be identified, documented, and described in an area that has not yet seen archaeological inventory, thus increasing the data base and knowledge concerning the prehistory of the Five Mile Mountain area.

4.2.2.2 Invasive/Non-native Species:

Seed Mixes:

Introduced/Native Seed Mix

Seed mixes containing both native and introduced species would be used in range seedings where invasive species and soil erosion are concerns. The introduced species typically establish more reliably and would provide competition with invasive species and stabilize soils while the native species become established. Using both native and introduced species in the range seedings would increase species diversity and overall site stability. However, if germination and establishment are low for introduced and native species, then the treatment areas could convert to a monoculture of invasive species. In this situation, reseeding and chemical and/or mechanical treatments of the invasive species may be necessary to establish the introduced and native species.

Native Seed Mix

All native seed mixes would be used in portions of the range seedings to evaluate the ability of natives in competing with invasive species and stabilizing soils. If the all native mixes are successful in the range seedings, this would allow the range seedings to more closely mimic site potential. Further, using all native mixes in the range seedings would help guide species selection in subsequent phases of this project and in future restoration projects across GSENM. This experimental approach would allow for adaptive management that may increase effectiveness in future projects.

All native seed mixes would be used in areas that have not been treated in the past, such as sagebrush grassland communities. If these treatments are successful, site stability and species diversity would increase. Plant growth forms such as grasses, young shrubs, and forbs that were absent before treatment would be present. Treatment areas would more closely mimic site potential.

If treatments are unsuccessful, the newly disturbed area may become a niche for invasive species to establish. If the native mix proves unsuccessful, reseeding and chemical and/or mechanical treatments may be necessary to establish this seed mix.

Methods:

Anchor Chain

The anchor chain would be applied experimentally to sagebrush grassland communities that have not been treated previously. The anchor chain would be a lighter treatment than the Dixie Harrow and would result in fewer plants removed and less soil scarification. The resulting plant community would be comprised of some existing plant species in addition to seeded species. Seed establishment may be lower than the Dixie Harrow because of the more limited soil disturbance. Young and flexible sagebrush and understory grasses and forbs would most likely remain after treatment with a chain. Where suitable competition is removed, seeded species would most likely become established. The plant community would resemble a mosaic with untreated and treated patches representing a range of plant species depending on existing vegetation.

The anchor chain, like the Dixie Harrow, disturbs the soil and creates a seed bed for invasive species to establish.

Bullhog

The bullhog would be used on an experimental basis in areas of dense pinyon-juniper woodland. The bullhog would convert standing trees to mulch that would be left on the surface. The mulch layer would increase the soil moisture retention and decrease soil heating which would facilitate seed germination and establishment. The mulch layer may also slow overland flow and soil erosion after rainfall events. This would keep seed on the site and enhance chances for establishing understory plants. The bullhog would result in a more evenly distributed plant community if mulch and seed is applied somewhat uniformly throughout the treatment area.

The bullhog would not disturb the soil in such a way as to create a seed bed for invasive species. The mulch that it creates would suppress germination of invasive seeds and depending on the thickness of the mulch, it may prevent asexual roots from sprouting.

Dixie Harrow-Hand Thin

Under the Proposed Action, use of the Dixie Harrow would result in plant communities that retain some of the original species composition and some of the seeded species. Smaller sagebrush and some grasses and forbs would not be removed during this treatment. In sagebrush grassland communities, this would result in a range of age classes for sagebrush plants. In range seedings, this would result in some shrubs and some of the originally seeded Crested wheatgrass plants remaining intact. These residual plant communities would be augmented with the seeded species which would result in a more diverse plant community. Slash from the hand thinning of juniper trees and vegetation removed by the Dixie Harrow would provide coarse mulch to assist with germination of seeded species and soil moisture retention.

If invasive weed seed, and/or asexual root material is in the soil, further spread could occur. Hand thinning with chainsaws is not likely to disturb the soil so there is less likelihood of spreading seeds.

Herbicide

Herbicide would be used to control Crested wheatgrass in areas where interseeding would occur. Herbicide would typically kill invasive species and possibly non-target species. There would be very little soil disturbance and therefore less probability of creating a seed bed for invasives to establish. If the area is planted within a six month time period, invasive species would likely not occupy the area.

Interseeding (with Rangeland Drill)

The use of herbicide and the rangeland drill to allow interseeding of native species would be tested in the range seedings. Because the treatment would involve applying herbicide in 10 foot wide strips within a matrix of low diversity plant cover and interseeding native species, the result would be a mix of existing and newly seeded species. The overall result would most likely be increased species diversity and soil stability. The treatment area would have greater resilience to disturbance and drought.

If there is invasive weed seed in the soil, a drill could create a niche for these species to germinate. The drill disks are capable of spreading asexual root material as well, if it is present.

In general, soil disturbance provides the potential for invasive species to establish in newly opened areas as seed from previous years remains in the soil. There may be, in the first few years, an increase in annual invasive species but, as native and introduced perennials establish, there would be a decrease in annual invasive species over the course of the following years. The project has the potential to help control the spread of invasive species by restoring the proper functional groups associated with each range site type. If the vegetation treatments fail, invasive species may colonize the new disturbance.

4.2.2.3 Fish and Wildlife and Special Status Animals:

Long term affects of this project would benefit wildlife species by improving cover and forage for wildlife species and their prey. The implementation of all action alternatives would create a diverse plant community, if the seedings are successful, and improve forage for herbivorous wildlife species. Forage for insects and other prey species would also increase. The already dead stands of sagebrush contain a low amount of forage and a small amount of cover for wildlife. During the site preparation treatments requiring heavy machinery, some mortality of slow moving animals such as lizards, snakes, insects, and small mammals may occur. Some plant mortality would be expected and forage may be reduced for wildlife species between site preparation treatments and production of seeded plant species. The affects should be short term with other forage available in untreated areas. A large portion of sagebrush communities near the proposed project area would remain unaffected throughout the life of the project and provide forage and cover for wildlife. The temporary removal of cattle grazing from treatment areas would make more forage available to wildlife species while seedings become established. Installation of study plots could provide information to improve wildlife habitat in future treatments.

Wildlife species of special concern that occur in the area and would be affected by the proposed vegetation treatments are wintering mule deer from the Paunsaugunt herd, pronghorn from recent reintroductions, and the sage sparrow, a Partners in Flight priority species for the Colorado Plateau.

Seed Mixes:

Introduced/Native Seed Mix

The existing plant community in the project area has lost much of its forb and grass component in the sagebrush understory. Opening of the sagebrush communities and the introduction of forbs and grasses would benefit wildlife species of concern. The introduced plant species that would be used in the treatments have been around for several years and animals in that area have been living adjacent to or within habitats containing several of the species listed. The presence of wildlife species of concern in this area indicates they have adapted, to some degree, to the introduced plant species and coexist with them. Crested wheatgrass is common to all introduced seed mixes and is proposed in the project area.

Browse comprises the majority of mule deer winter diet (Kufeld et. al 1973), but grass is often an important component (Leach 1956). The availability of green Crested wheatgrass significantly contributes to the overwinter nutrition of deer (Urness et. al 1983). The seed mixes proposed contain grasses and forbs that would be beneficial to deer and pronghorn. Increasing the diversity of species in sage brush communities would also create a more diverse invertebrate prey base for sage sparrows and have beneficial impacts especially during brood raising periods.

Native Seed Mix

Native seed mixes would also increase diversity and restore understory in the sagebrush communities and would have the same beneficial affects as those in the introduced/native seed mix discussed above.

*Methods:**Anchor Chain*

The affects of anchor chaining would be the same as those discussed in the Dixie Harrow-Hand Thin section below.

Bullhog

Bullhog projects would remove the pinyon and juniper components of sagebrush communities. Encroachment of pinyon and juniper into sagebrush communities has a negative affect by crowding out sagebrush and other related plant species. Pinyon and juniper also provide perches for hunting raptors. Bullhog projects would remove observation perches for raptors in the area. This could negatively affect raptor species that hunt from a perch. However, removal of pinyon and juniper would reduce the amount of predation from raptors on sagebrush obligate species, especially sage grouse if they move into this historical habitat. Removal of pinyon and juniper would also provide increased sight for pronghorn to keep away from predators. The encroachment of pinyon and juniper inhibit their ability to spot and avoid predators and they seek out more open areas. The affects of noise and human related activity during implementation of the project would be similar to those discussed in the next section.

Dixie Harrow-Hand Thin

Treatments would be implemented during the late fall and winter. The increased noise and activity would affect some movements of migrating mule deer. Deer would need to go around the treatment areas or move through during the evening or night. Mule deer are more active in the early morning, evenings, and throughout the night. The small size of the project, or treatment area, relative to the remaining untreated area should enable mule deer to travel around the project area or travel through the project area after working hours to reach areas of suitable winter habitat. However, because mule deer may be reluctant to enter areas with noise related to implementation of the project, some may have to travel more than they would if treatments were not occurring in the project area. This would have negative affects if added stresses such as deep snow were in the area. Snow depths in that area have not been sufficient in recent years to add additional stress or slow migration movements. Further, deep snow would likely prohibit implementation of the Dixie Harrow-Hand Thin and other proposed treatments. Overall, the affects of treatments may be negative for a short duration when human activity is taking place.

Pronghorn are very mobile and would be able to move to suitable habitat in areas not being treated.

Sage sparrows are a migratory species with northern populations going south to overwinter. The project area is located close to the northern limits of wintering areas for sage sparrows. If sage sparrows are present in the area during winter months, they would all be adults and capable of avoiding harm from working machinery and other associated activities. Some nesting and brood rearing habitat would be removed from the area until the return of mature sage brush. Sage sparrows would have to move to sagebrush habitat that remains in the treatment area, or outside of the treatment area, to nest.

Overall, the long term affects of opening up closed sagebrush stands and creating openings and edge habitat, along with the recruitment of forbs and grasses, would be beneficial to wildlife of concern.

Interseeding (with Rangeland Drill)

Interseeding would leave cover for species of concern while increasing plant diversity. The need for sage sparrows to move out of areas to find nesting and brood rearing habitat would be reduced in comparison to other methods. Deer and pronghorn would not be affected after human activities subsided. The affects of human related activity would be similar to those discussed in the Dixie Harrow-Hand Thin section above.

4.2.2.4 Livestock Grazing/Rangeland Health Standards and Guidelines

The immediate impact of the proposed action to livestock operators would be from modifying the pasture rotations because the treated pastures would need to be rested from livestock grazing for two to five growing seasons once proposed treatment has been completed.

Table 3.1 shows the number of pastures that are in each of the allotments and also the number of pastures within the proposed action.

Each of the pastures and allotments that are proposed for treatment would be rested between two to five growing seasons. Resting these pastures up to five growing seasons would have the greatest impact to the livestock operators. For this reason, the analysis evaluates resting treated pastures for five growing seasons. The rested pasture(s) would be available to be grazed after the fifth growing season or until success criteria are met. The exception to this would be the Cockscomb allotment where the authorized season of use occurs during the growing season. In this case livestock would be allowed during the next authorized season of use. The impacts to livestock operators would be less if particular pastures are ready to be grazed in less than five growing seasons.

Cockscomb Allotment

If a temporary fence is not constructed, the entire Cockscomb Allotment would be excluded from livestock grazing between 2012 through 2016. The AUMs would be temporarily reduced by an average of 21 AUMs per year for a total reduction of 32% of the current authorized AUMs per year. This may impact how the private land owner would be able to graze cattle on the piece of unfenced private land located within the boundary of the allotment.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 12 AUMs between the years of 2012 through 2016.

The season of use may need to be adjusted, but this would be determined after 2016.

Coyote Allotment

In 2009 through 2012, the pasture rotation would be modified to exclude the Five Mile and Sand Gulch pastures. The season of use would be shortened by an average of 45 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 586 AUMs per year for a total reduction of 28% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2012.

Cottonwood Allotment

In 2010 through 2012, the pasture rotation would be modified to exclude the Eight Mile pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

In 2013, the pasture rotation would be modified to exclude the Eight Mile and Paria Breaks pastures. The season of use would be shortened by an average of 122 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 598 AUMs per year for a total reduction of 19% of the current authorized AUMs per year.

In 2014 through 2016, the pasture rotation would be modified to exclude the Paria Breaks pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2016

Five Mile Mountain Allotment

If a temporary fence is not constructed, the entire Five Mile Mountain Allotment would be excluded from livestock grazing between 2007 through 2010. The AUMs would be temporarily reduced by an average of 178 AUMs per year for a total reduction of 46% of the current authorized AUMs per year.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 44 AUMs between the years of 2007 through 2011.

The season of use may need to be adjusted, but this would be determined after 2011.

Mollies Nipple Allotment

In 2007, the pasture rotation would be modified to exclude the Telegraph pasture. The season of use would be shortened by an average of 31 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 282 AUMs per year for a total reduction of 7% of the current authorized AUMs per year.

In 2008 through 2010, the pasture rotation would be modified to exclude the Telegraph and Blue Spring pastures. The season of use would be shortened by an average of 68 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 552 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the Blue Spring, Rock House, and Jenny Clay Hole pastures. The season of use would be shortened by an average of 102 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 652 AUMs per year for a total reduction of 17% of the current authorized AUMs per year. If the Blue Spring pasture does not come back into production, treatment of one of the other two pastures would be delayed.

In 2012, the pasture rotation would be modified to exclude the Rock House and Jenny Clay Hole pastures. The season of use would be shortened by an average of 65 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 382 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

In 2013 and 2014, the pasture rotation would be modified to exclude the Rock House, Jenny Clay Hole, and Mine Spring pastures. The season of use would be shortened by an average of 75 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 494 AUMs per year for a total reduction of 13% of the current authorized AUMs per year. The treatment of the Mine Spring pasture may be delayed until cattle would be authorized to graze in either the Rock House or Jenny Clay Hole pastures

In 2015 and 2016, the pasture rotation would be modified to exclude the Mine Spring pasture. The season of use would be shortened by an average of 10 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 112 AUMs per year for a total reduction of 3% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2016.

Vermillion Allotment

In 2007, the pasture rotation would be modified to exclude the RCA 2 and 3 pastures. The season of use would be shortened by an average of 45 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 125 AUMs per year for a total reduction of 4% of the current authorized AUMs per year.

In 2008 through 2010, the pasture rotation would be modified to exclude the RCA 1, 2, 3 and Clark Ranch pastures. The season of use would be shortened by an average of 73 days during

the authorized season of use. The AUMs would be temporarily reduced by an average of 296 AUMs per year for a total reduction of 10% of the current authorized AUMs per year. The treatment of RCA 1 and Clark Ranch may be delayed until cattle are authorized to graze in either RCA 2 or 3.

In 2011, the pasture rotation would be modified to exclude the RCA 1 and Clark Ranch pastures. The season of use would be shortened by an average of 28 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 106 AUMs per year for a total reduction of 4% of the current authorized AUMs per year.

In 2012 through 2015, the pasture rotation would be modified to exclude the Petrified Hollow pasture. The season of use would be shortened by an average of 27 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 161 AUMs per year for a total reduction of 4% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2015.

The proposal to spray herbicide in the RCA 2 pasture would impact the amount of forage for livestock. The actual number of acres that would be treated would be determined in cooperation with the livestock operator and the interdisciplinary team for GSENM. Spraying herbicides on strips of Crested wheatgrass could temporarily reduce the total amount of forage available in the pasture.

Trend

The proposed action would increase the amount of herbaceous species available for livestock over what is currently available in each of the pastures and allotments by approximately fifty % or greater if the seedings are successful. This increase in the amount of available forage for livestock would be less than what was available in these pastures prior to the die-off of Crested wheatgrass plants.

The number of AUMs on the allotments may be less after the proposed treatment is implemented because there may be less forage available for livestock. This is because the native and introduced seed mixture could produce less forage than areas seeded with Crested wheatgrass seed. The stocking rate would be determined from production studies that would be completed once the seeded areas become established.

While native seed mixtures may not produce the amount of forage that the crested wheat grass plants do in the treatment areas, the native seed mixes may increase the diversity of perennial grasses within the allotment. Increased diversity could result in pastures being grazed for a longer period of time and may provide forage for livestock and wildlife if the Crested wheatgrass plants die due to drought conditions or other factors.

Once the plant species are successfully established, the trend on all of the pastures should improve in comparison to what is described in Chapter 3. Should plant species not establish as

anticipated, invasive species could increase and the trend could decline from what is currently described.

4.2.2.5 Soils and Biological Soil Crusts

For each alternative, there are several ways in which the proposed actions could adversely and beneficially affect soils. The following several paragraphs discuss general impacts associated with all action alternatives. The severity and duration of short-term increases in erosion vulnerability, as well as the potential beneficial impacts of attaining desired vegetation conditions, will be discussed in more detail for each alternative.

The primary objective of the proposed treatments is to rehabilitate rangeland ecosystems which have been degraded and maintain those which are functioning. Long-term beneficial impacts of vegetation restoration include increased infiltration, reduced rates of runoff and water and wind erosion, rehabilitation of compacted soils, and restoration/maintenance of soil health. Although use of introduced grass species gives greater confidence that soil stabilization would occur in a timely manner at highly degraded sites, use of seed mixes containing large components of native grasses and forbs would facilitate recovery of long-term site stability throughout the project area.

Adverse impacts may be either direct (caused during implementation) or indirect (caused as a result of implementation); recovery from impacts may occur in the short-term (i.e., a few years) or may require several years ('long-term'). Following is a summary of the types of impacts that may occur:

- Use of mechanical equipment could cause surface disturbance, especially on coarse-textured soils and steeper slopes, and in areas where woody root masses are upturned. Disturbance may increase the rate of runoff generation and increase erosion. Disturbance of biological crusts would reduce surface roughness, potentially reducing infiltration rates and increasing runoff. In general, the affects of surface disturbance are ameliorated in the short-term by local soil redistribution and vegetation establishment. Surface disturbance would be minimized via operating restrictions and equipment selection.
- Use of mechanical equipment could cause compaction. Compaction is most likely to occur in finer-textured soils, although operating restrictions based on soil moisture would be implemented to limit compaction. Compacted soil layers have lower infiltration rates and increased rates of runoff, and severely compacted soils may inhibit root growth. Compaction is ameliorated by freeze-thaw processes, root growth, and bioturbation. Recovery from severe compaction can take several years.
- Increases in erosion vulnerability represent indirect effects of project implementation, and are caused by altered vegetation cover and composition, surface disturbance, and/or compaction. The extent of surface disturbance and compaction would be minimized through project design. Because treatment units would primarily encompass degraded seedings or poorly-functioning sagebrush

sites, short-term increases in erosion rates may be relatively minor compared to current accelerated erosion rates caused by inadequate herbaceous plant cover. Further, increases in surface roughness created by following contours during implementation of mechanical methods would reduce the connectivity of surface flow paths and reduce runoff rates. If desired vegetation conditions are not attained, long-term post-treatment erosion rates in degraded seedings would be similar to pre-treatment erosion rates, while erosion rates from at-risk sites may be similar to conditions which could develop if poor range conditions are not addressed.

The success of the proposed treatments would depend on many factors, including intrinsic soil characteristics (texture and AWC) and weather conditions during seed germination windows. Seed mixes, treatment prescriptions, and mitigation measures have been selected to maximize the potential for achieving desired responses and minimize surface disturbance and compaction.

There would be a time lag of one or more years between implementation and development of desired conditions and, as such, project implementation could cause short-term adverse impacts. Further, if desired conditions cannot be attained, the proposed action may cause long-term adverse impacts. The relative risk of potential short-term adverse impacts is greatest in areas that currently retain some soils and hydrologic functionality and is lowest in degraded sites.

Specific impacts of the Proposed Action are discussed below. Proposed treatments encompass large areas of soils occurring on alluvial flats, as well as areas derived from residuum. In the long term, assuming treatment objectives are achieved, rates of water and wind erosion would be decreased by increased vegetation cover and increased litter and woody debris from improved plant species composition. The expression of these beneficial impacts would be greatest in currently degraded seedings. In all units, increased root mass density would increase soil stability and litter and woody debris would trap sediment and impede the flow of water, thereby increasing on-site retention of nutrients. Improved plant species composition with high root production and a mix of species with different rooting depths would increase soil fertility, organic matter, surface litter, aggregate stability, infiltration, desirable micro-organism populations, and resilience to compaction.

Residuum-derived soils have intrinsically high erosion rates and low or very low AWCs and, as such, treatments in these areas have the highest likelihood for short- and long-term adverse impacts. Conversely, given current degraded and at-risk rangeland conditions, treatments on these soils could potentially result in beneficial long-term impacts.

The risk of soil displacement is greatest in degraded sagebrush stands, as slopes are generally greater and some roots may be upturned. Conversely, short-term post-treatment increases in runoff and erosion rates would likely be higher in degraded seedings than in at-risk sagebrush stands, as larger amounts of runoff-detaining organic matter would be introduced to the soil surface in the sagebrush stands, and sagebrush treatments would be spatially discontinuous. Functional plant/soil communities would generally remain untreated and would absorb some of the runoff and sediment generated from upslope areas.

Surface runoff may be reduced in portions of the RCA 2 pasture where juniper would be cut, as woody material would detain runoff (Gifford, 1975). Susceptibility to wind erosion may increase in the short-term, especially in sites where contiguous areas of coarse-textured soil are exposed or where woodlands are removed.

The experimental bullhog treatment proposed for the RCA 3 pasture would distribute mulched organic material across large areas of the soil surface, thereby greatly reducing short-term water and wind erosion risks.

4.2.2.6 Vegetation Including Special Status Plant Species

Special Status Plants

Special status plant species would be surveyed for and avoided during project implementation.

Vegetation

The project would ultimately have a positive impact on vegetation by restoring the functional groups that are now missing. Currently, understory forbs, perennial grasses, and biological soil crust are underrepresented in much of the project area, while shrubs and trees are overrepresented relative to the range site descriptions. In addition, the project area is susceptible to fire, soil erosion, and invasion by non-native species due to the lack of understory and the large percentage of dead or decadent shrubs. Restoration would minimize these threats.

Use of experimental mechanical methods and seed mixes in the proposed action would allow a better understanding of how to restore plant communities on the GSENM. This approach would also position the GSENM to host researchers interested in studying various aspects of the proposed treatments.

For more information regarding potential impacts to vegetation, see the **Invasive/Non-Native Species** section.

4.2.2.7 Visual Resource Management

Under this alternative, large areas of vegetation would be cleared or manipulated in phases over the span of seven to 10 years or more using mechanized equipment, hand-thinning, and herbicides. The treatment areas, temporary fencing, and erosion control structures (e.g. vegetative debris piled in gullies) could be visible during and after implementation. The machinery (heavy equipment, tractors, and ATVs) used during implementation could also attract the attention of the casual observer during implementation.

Large, irregularly shaped swathes would be cut in a mosaic pattern into late-seral sagebrush stands. These treatment areas would be noticeable because of the contrast in color and texture when comparing the existing vegetation with the uprooted and dried vegetative debris post-treatment. Edges would also be created at the contact between treated and untreated areas until the edges between treated and untreated areas have naturally blurred. Additionally, there would

be textural and color contrasts between the treated and untreated areas once new vegetation of a more varied composition is reestablished. The treatment areas would likely be noticeable for several years.

The equipment to be used during implementation would be visible only temporarily. The visual contrasts created by the various mechanical methods would be fairly similar.

The erosion control structures would be visible in the foreground view for the short term. After soil stabilization and revegetation, these structures would not be noticeable.

The temporary fencing would be noticeable for the short-term within the foreground view if it is located adjacent to well-traveled routes.

Under this alternative, the elements of the proposal that potentially impact visual resources are of short-term concern. The level of change to the characteristic landscape would be low to moderate in the short-term, and though the activities associated with this proposed project may attract the attention of the casual observer, they would not dominate the view. Changes to the landscape associated with this proposed project would repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape. Thus, this alternative meets the objectives of VRM Class III.

Additionally, the long term effects of this proposed project could improve the visual aesthetics of the project area by replacing the decadent stands of sagebrush and denuded rangeland seedings with healthy vegetation.

Compared to Alternatives C and D, the Proposed Action would spread the treatment areas across the proposed project area in a more fragmented and less uniform manner over several years which could lead to fewer visual impacts, especially during the first years of implementation.

4.2.3 Alternative C – Range Seeding Emphasis:

4.2.3.1 Cultural/Native American Religious Concerns:

Impacts caused by this alternative would be the same as those described in the Proposed Action.

4.2.3.2 Invasive/Non-native Species:

Impacts caused by this alternative would generally be the same as those described in the Proposed Action. However, experimental all native seed mixes would not be tested with seed mixes that contain introduced species in the range seedings. Therefore, information would not be gained about the ability of all native seed mixes to establish in the seedings.

4.2.3.3 Fish and Wildlife and Special Status Animals:

Species of concern would experience some short term negative impacts during implementation of the proposed project. Long term impacts would benefit wildlife species of concern. The impacts for this alternative are similar to those discussed under the proposed alternative.

4.2.3.4 Livestock Grazing/Rangeland Health Standards and Guidelines

The immediate impact of Alternative C to the livestock operators would be from modifying the pasture rotations because the treated pastures would need to be rested from livestock grazing for two to five growing seasons once proposed treatment has been completed.

Table 3.1 shows the number of pastures that are in each of the allotments and also the number of pastures within Alternative C.

Each of the pastures and allotments that are proposed for treatment would be rested between two to five growing seasons. Resting these pastures up to five growing seasons would have the greatest impact to the livestock operators. For this reason, the analysis evaluates resting treated pastures for five growing seasons. The rested pastures would be available to be grazed after the fifth growing season, unless the authorized season of use occurs during the fifth growing season. The impacts to livestock operators would be less if particular pastures are ready to be grazed in less than five growing seasons.

Cockscomb Allotment

If a temporary fence is not constructed, the entire Cockscomb allotment would be excluded from livestock grazing between 2011 through 2015. The AUMs would be temporarily reduced by an average of 21 AUMs per year for a total reduction of 32% of the current authorized AUMs per year. This may impact how the private land owner would be able to graze cattle on the piece of unfenced private land located within the boundary of the allotment.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 12 AUMs between the years of 2011 through 2015 for a total reduction of 18% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2015.

Coyote Allotment

In 2007, the pasture rotation would be modified to exclude the Sand Gulch pasture. The season of use would be shortened by an average of 22 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 293 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2008 through 2010, the pasture rotation would be modified to exclude the Five Mile and Sand Gulch pastures. The season of use would be shortened by an average of 45 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 586 AUMs per year for a total reduction of 29% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the Five Mile pasture. The season of use would be shortened by an average of 23 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 293 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2011.

Cottonwood Allotment

In 2008 through 2010, the pasture rotation would be modified to exclude the Eight Mile pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the Eight Mile and Paria Breaks pastures. The season of use would be shortened by an average of 122 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 598 AUMs per year for a total reduction of 19% of the current authorized AUMs per year.

In 2012 through 2014, the pasture rotation would be modified to exclude the Paria Breaks pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2014.

Five Mile Mountain Allotment

If a temporary fence is not constructed, the entire Five Mile Mountain Allotment would be excluded from livestock grazing between 2010 through 2014. The AUMs would be temporarily reduced by an average of 178 AUMs per year for a total reduction of 49% of the current authorized AUMs per year.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 44 AUMs between the years of 2010 through 2014 for a total reduction of 12% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2014.

Mollies Nipple Allotment

In 2007 and 2008, the pasture rotation would be modified to exclude the Blue Spring and Telegraph pastures. The season of use would be shortened by an average of 68 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 552 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2009, the pasture rotation would be modified to exclude the Blue Spring, Telegraph, and Jenny Clay Hole pastures. The season of use would be shortened by an average of 99 days

during the authorized season of use. The AUMs would be temporarily reduced by an average of 797 AUMs per year for a total reduction of 20% of the current authorized AUMs per year.

In 2010, the pasture rotation would be modified to exclude the Blue Spring, Telegraph, Jenny Clay Hole, and Rock House pastures. The season of use would be shortened by an average of 133 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 934 AUMs per year for a total reduction of 24% of the current authorized AUMs per year.

In 2011 through 2013, the pasture rotation would be modified to exclude the Jenny Clay Hole, Rock House, and Mine Spring pastures. The season of use would be shortened by an average of 112 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 764 AUMs per year for a total reduction of 20% of the current authorized AUMs per year.

In 2014, the pasture rotation would be modified to exclude the Mine Spring pasture. The season of use would be shortened by an average of 10 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 112 AUMs per year for a total reduction of 3% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2014.

Vermillion Allotment

In 2008, the pasture rotation would be modified to exclude the RCA 1, 2, and 3 pastures. The season of use would be shortened by an average of 59 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 296 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

In 2009, the pasture rotation would be modified to exclude the RCA 1, 2, 3 and Petrified Hollow pastures. The season of use would be shortened by an average of 86 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 404 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2010 and 2011, the pasture rotation would be modified to exclude the RCA 1, 2, 3, Petrified Hollow and Clark Ranch pastures. The season of use would be shortened by an average of 100 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 457 AUMs per year for a total reduction of 16% of the current authorized AUMs per year.

In 2012 and 2013, the pasture rotation would be modified to exclude the Petrified Hollow and Clark Ranch pastures. The season of use would be shortened by an average of 41 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 214 AUMs per year for a total reduction of 8% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2013.

Trend

Alternative C would increase the amount of herbaceous species available for livestock over what is currently available in each of the pastures and allotments by approximately fifty percent or greater if the seedings are successful. This increase in the amount of available forage for livestock would be less than what was available in these pastures prior to the die-off of Crested wheatgrass plants.

The number of AUMs on the allotments may be less after the proposed treatment is implemented because there may be less forage available for livestock. This is because the native and introduced seed mixture could produce less forage than areas seeded with Crested wheatgrass seed. The stocking rate would be determined from production studies that would be completed once the seeded areas become established.

Once the plant species are successfully established, the trend on all of the pastures should improve in comparison to what is described in Chapter 3. Should plant species not establish as anticipated, invasive species could increase and the trend could decline from what is currently described.

4.2.3.5 Soils and Biological Soil Crusts

General impacts of Dixie Harrow use, hand thinning, and vegetation restoration listed in the Proposed Action also apply to this alternative. No experimental mechanical treatments would be used, and associated beneficial or detrimental impacts would not occur.

Range seedings, which are prioritized under this alternative, have more issues related to soil health and erosion than at-risk sagebrush grassland sites. Therefore, critically-needed restoration of soil conditions would occur over larger acres in the first several years rather than in smaller parcels throughout the life of the project. Risk of treatment failure may be lower, as a result of higher AWC in alluvial flat soils.

Treatment of at-risk sagebrush stands on more erosive soils would be deferred to later phases. In some cases, where stands are currently undergoing undesirable changes, there is some risk that this delay would allow ecological thresholds related to runoff, soil erosion, and annual plant establishment to be crossed, thereby making eventual restoration more difficult.

4.2.3.6 Vegetation Including Special Status Plant Species**Special Status Plants:**

Special status plant species would be surveyed for and avoided during project implementation.

Vegetation:

The project would ultimately have a positive impact on vegetation by restoring the functional groups that are now missing. Currently, understory forbs, perennial grasses, and biological soil crust are underrepresented in much of the project area, while shrubs and trees are

overrepresented relative to the range site descriptions. In addition, the project area is susceptible to fire, soil erosion, and invasion by nonnative species due to the lack of understory and the large percentage of dead or decadent shrubs. Restoration would minimize these threats.

Under this alternative, benefits associated with restoration would be observed first in the range seedings. The range seedings typically have more invasive weed concerns and these would be controlled early to prevent spread to other communities. However, sagebrush grassland and pinyon-juniper woodlands that may be at a threshold for restoration with all native species may cross that threshold if left untreated until later phases. This would make restoration of these communities more difficult and costly and may result in a plant community that does not resemble site potential.

4.2.3.7 Visual Resource Management

Impacts caused by this alternative would generally be the same as those described in the Proposed Action. However, compared to the Proposed Action and Alternative D, Alternative C would treat areas in a more uniform fashion, and larger swathes of landscape would be covered at a given time and thus be more noticeable initially.

4.2.4 Alternative D – Intensive Vegetation Management:

4.2.4.1 Cultural/Native American Religious Concerns:

Impacts caused by this alternative would generally be the same as those described in the Proposed Action.

4.2.4.2 Invasive/Non-native Species:

Impacts caused by this alternative would generally be the same as those described in the Proposed Action. However, the experimental treatments would be used over a larger acreage. If treatments are unsuccessful then a larger area would be susceptible to weed invasion. Re-treatment would be made more difficult because of the presence of weeds.

4.2.4.3 Fish and Wildlife and Special Status Animals:

Species of concern would experience some short term negative impacts during implementation of the proposed project. Long term impacts would benefit wildlife species of concern. The impacts for this alternative are similar to those discussed under the proposed alternative.

4.2.4.4 Livestock Grazing/Rangeland Health Standards and Guidelines

The immediate impact of Alternative D to the livestock operators would be from modifying the pasture rotations because the treated pastures would need to be rested from livestock grazing for two to five growing seasons once proposed treatment has been completed.

Table 3.1 shows the number of pastures that are in each of the allotments and also the number of pastures within Alternative D.

Each of the pastures and allotments that are proposed for treatment would be rested between two to five growing seasons. Resting these pastures up to five growing seasons would have the greatest impact to the livestock operators. For this reason, the analysis evaluates resting treated pastures for five growing seasons. The rested pasture would be available to be grazed after the fifth growing season, unless the authorized season of use occurs during the fifth growing season. The impacts to livestock operators would be less if particular pastures are ready to be grazed in less than five growing seasons.

Cockscomb Allotment

If a temporary fence is not constructed, the entire Cockscomb Allotment would be excluded from livestock grazing between 2011 through 2015. The AUMs would be temporarily reduced by an average of 21 AUMs per year for a total reduction of 32% of the current authorized AUMs per year.

This may impact how the private land owner would be able to graze livestock on the piece of unfenced private land located within the boundary of the allotment.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 12 AUMs between the years of 2011 through 2015 for a total reduction of 18% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2015.

Coyote Allotment

In 2008 and 2009, the pasture rotation would be modified to exclude the Sand Gulch pasture. The season of use would be shortened by an average of 22 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 293 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2010 and 2011, the pasture rotation would be modified to exclude the Sand Gulch and Five Mile pastures. The season of use would be shortened by an average of 45 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 586 AUMs per year for a total reduction of 29% of the current authorized AUMs per year.

In 2012 and 2013, the pasture rotation would be modified to exclude the Five Mile pasture. The season of use would be shortened by an average of 23 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 293 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2013.

Cottonwood Allotment

In 2008 through 2010, the pasture rotation would be modified to exclude the Eight Mile pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the Eight Mile and Paria Breaks pastures. The season of use would be shortened by an average of 122 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 598 AUMs per year for a total reduction of 18% of the current authorized AUMs per year.

In 2012 through 2014, the pasture rotation would be modified to exclude the Paria Breaks pasture. The season of use would be shortened by an average of 61 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 299 AUMs per year for a total reduction of 10% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2014.

Five Mile Mountain Allotment

If a temporary fence is not constructed, the entire Five Mile Mountain Allotment would be excluded from livestock grazing between 2007 through 2010. The AUMs would be temporarily reduced by an average of 178 AUMs per year for a total reduction of 46% of the current authorized AUMs per year.

If a temporary fence is constructed, the AUMs would be temporarily reduced by an average of 44 AUMs between the years of 2007 through 2010 for a total reduction of 11% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2010.

Mollies Nipple Allotment

In 2007, the pasture rotation would be modified to exclude the Blue Spring and Telegraph pastures. The season of use would be shortened by an average of 68 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 552 AUMs per year for a total reduction of 14% of the current authorized AUMs per year.

In 2008 and 2009, the pasture rotation would be modified to exclude the Blue Spring, Telegraph, and Rock House pastures. The season of use would be shortened by an average of 102 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 689 AUMs per year for a total reduction of 18% of the current authorized AUMs per year.

In 2010, the pasture rotation would be modified to exclude the Blue Spring, Telegraph, Rock House, and Jenny Clay Hole pastures. The season of use would be shortened by an average of 143 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 1,046 AUMs per year for a total reduction of 27% of the current authorized AUMs per year for a total reduction of 27% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the Rock House, Jenny Clay Hole, and Mine Spring pastures. The season of use would be shortened by an average of 75 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 494 AUMs per year for a total reduction of 13% of the current authorized AUMs per year.

In 2012 and 2013, the pasture rotation would be modified to exclude the, Jenny Clay Hole and Mine Spring pastures. The season of use would be shortened by an average of 41 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 357 AUMs per year for a total reduction of 9% of the current authorized AUMs per year.

In 2014 the pasture rotation would be modified to exclude the Mine Spring pasture. The season of use would be shortened by an average of 10 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 112 AUMs for a total reduction of 3% of the current authorized AUMs per year

The season of use may need to be adjusted, but this would be determined after 2014

Vermillion Allotment

In 2007, the pasture rotation would be modified to exclude the RCA 2 pasture. The season of use would be shortened by an average of approximately 25 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 118 AUMs per year for a total reduction of 4% of the current authorized AUMs per year.

In 2008, the pasture rotation would be modified to exclude the RCA 2 and 3 pastures. The season of use would be shortened by an average of 45 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 190 AUMs per year for a total reduction of 7% of the current authorized AUMs per year.

In 2009 and 2010, the pasture rotation would be modified to exclude the RCA 1, 2, 3, Petrified Hollow and Clark Ranch pastures. The season of use would be shortened by an average of 100 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 457 AUMs per year for a total reduction of 16% of the current authorized AUMs per year.

In 2011, the pasture rotation would be modified to exclude the RCA 1, 3, Petrified Hollow and Clark Ranch pastures. The season of use would be shortened by an average of 75 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 339 AUMs per year for a total reduction of 12% of the current authorized AUMs per year.

In 2012, the pasture rotation would be modified to exclude the RCA 1, Petrified Hollow and Clark Ranch pastures. The season of use would be shortened by an average of 55 days during the authorized season of use. The AUMs would be temporarily reduced by an average of 267 AUMs per year for a total reduction of 9% of the current authorized AUMs per year.

The season of use may need to be adjusted, but this would be determined after 2012.

Trend

Trend would generally be the same as described in the Proposed Action.

4.2.4.5 Soils and Biological Soil Crusts

Long-term impacts caused by this alternative would generally be similar to those associated with the Proposed Action and include decreased soil erosion, decreased compaction, and improved soil health. The timing, extent, and relative severity of certain impacts would change as a result of altered treatment sequences and equipment choices.

Increased use of the interseeder in certain range seedings would result in less surface disturbance (compared to Alternatives B and C) and would therefore reduce the risk of increases in short-term water and wind erosion. Increased use of the bullhog would cause immediate increases in surface water detention and organic litter cover, respectively, thereby mitigating impacts of disturbance and vegetation removal on short-term runoff and erosion rates. Increased use of the anchor chain would result in lower overall surface disturbance but more intense local disturbance, thereby reducing overall runoff but possibly increasing erosion from highly disturbed patches.

4.2.4.6 Vegetation Including Special Status Plant Species

Special Status Plants

Special status plant species would be surveyed for and avoided during proposed project implementation.

Vegetation

The proposed project would ultimately have a positive impact on vegetation by restoring the functional groups that are now missing. Currently, understory forbs, perennial grasses, and biological soil crust are underrepresented in much of the proposed project area, while shrubs and trees are overrepresented relative to the range site descriptions. In addition, the proposed project area is susceptible to fire, soil erosion, and invasion by nonnative species due to the lack of understory and the large percentage of dead or decadent shrubs. Restoration would minimize these threats.

Widespread use of experimental methods and seed mixes in this alternative would allow for a large scale application of different methods across a range of soil types and plant communities. While this would give a wider range of response to the treatments, it could result in larger areas that would require additional treatment if the approach is not successful. This could result in increased weed occurrence and an overall lower restoration success potential in additional treatments.

4.2.4.7 Visual Resource Management

Impacts caused by this alternative would generally be the same as those described in the Proposed Action.

4.3 Cumulative Impacts Analysis:

“Cumulative impacts” are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions. Cumulative impacts consider the combined effects of past, present, reasonably foreseeable future, and proposed management actions.

4.3.1 Past and Present Actions:

Past actions in most of the frequently used areas have resulted in a reduction in litter causing sheet, rill, and gully erosion resulting in loss of top soil, soil nutrients, and plant pedestalling. Detrimental compaction has occurred in many of the areas with finer textured soils; particularly in the seedings. Improperly drained roads are contributing to head cutting and gully formation.

Presently, to some degree, the impacts caused by the past actions are ongoing due to lack of mitigation.

4.3.2 Reasonably Foreseeable Action Scenario (RFAS)

The proposed management actions in the reasonably foreseeable future should reduce compaction and establish desirable plant species. This would result in increased litter, soil organic matter, plant nutrients, water infiltration, aggregate stability, micro-organism populations, stabilizing root masses, and decreased bare ground, erosion, and plant pedestalling. The proposed action would initially cause soil disturbance; but the effects should be short term.

Other foreseeable actions include noxious weed control, road maintenance, administrative road use, livestock grazing, and public recreation use. These activities involve the use of vehicles on existing road surfaces. Based on the types and extent of these uses in the study area, no detrimental soil disturbance is anticipated except for livestock grazing. Soil impacts that would continue due to livestock use include localized areas where livestock congregate such as near water sources and salt block locations or where the soils are wet.

The following reasonably foreseeable action scenario identifies the cumulative actions that would cumulatively affect the same resources in the cumulative impact area as the proposed action and alternatives.

The Buckskin Mountain habitat improvement project is currently undergoing NEPA analysis and would likely be occurring concurrently with this proposed project. Although the habitat improvement projects slated for the Buckskin Mountain area are primarily in pinyon and juniper habitat, some restoration of sagebrush habitats is planned. The Buckskin Mountain project borders this project to the west and encompasses approximately 41,000 acres.

Permittee Norris Brown is planning vegetation treatments on his private parcel, adjacent to the western edge of the project area. This private parcel is located south of Telegraph Wash near Petrified Hollow. Vegetation treatments planned for the private property include treating woody vegetation, particularly shrubs, with the herbicide Tebuthiuron. Baseline study plots were established in the summer of 2003 on the private parcel and across the fence on GSENM property to document changes in vegetation over time. It is unclear when the treatments would be conducted.

5.0 CONSULTATION AND COORDINATION:

5.1 Introduction:

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

5.2 Persons, Groups, and Agencies Consulted:

Table 5.1. List of Persons, Groups, and Agencies Consulted		
Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
U.S. Fish & Wildlife Service (FWS)	Information Consultation, under Section 7 of the Endangered Species Act (16 USC 1531)	No threatened or endangered species are known to occur in the study area.
Utah State Historic Preservation Office (SHPO)	Consultation for undertakings, as required by the National Historic Preservation Act (NHPA) (16 USC 470)	The BLM and the SHPO have a National Cultural Programmatic Agreement (2001) that would apply to this project. Once project specific boundaries are delineated, cultural surveys would be completed. This would occur before any project work is initiated. The cultural survey reports would be sent to the SHPO for review.
Kaibab Band of Paiute Indians	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 1531)	A letter was sent and phone calls made on April 27, 2004. The Tribe has not responded identifying any concerns. Lack of response is interpreted by BLM to indicate that the Tribe has no concerns relative to the proposed action.
Hopi Tribe	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 1531)	A letter was sent and phone calls made on July 14, 2004. The Tribe has not responded identifying any concerns. Lack of response is interpreted by BLM to indicate that the Tribe has no concerns relative to the proposed action.

Table 5.1. List of Persons, Groups, and Agencies Consulted		
Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
Dr. Steven Monson	Dr. Monson has experience with techniques and land management issues addressed in this document.	Suggestions were incorporated into the document.
Utah Division of Wildlife Resources	Project involves restoration activities in which UDWR has expertise.	UDWR provided advice on suitable restoration methods and seed mixes that was incorporated into the document.

5.3 Summary of Public Participation:

Public scoping for this project was initiated with an Electronic Notification Bulletin Board (ENBB) posting on April 26, 2004. Scoping letters were sent to the interested public on April 27, 2004. A 30-day public comment period began April 27, 2004 and continued until May 27, 2004. No public meetings were held for this project.

5.3.1 List of Commenter's:

Written comments were received from the following parties:

Boulder Regional Group
 Escalante Wilderness Project
 Southern Utah Wilderness Alliance
 Five County Association of Governments
 State of Utah
 U.S. Fish and Wildlife Service

5.3.2 Response to Public Comment:

On April 27, 2004, GSENM sent out a "scoping" letter regarding this proposed project. Comments, concerns and questions were requested by the BLM. Written comments from the above parties, and the BLM responses, are addressed in the following text.

Boulder Regional Group

C: "We would like to see a wide range of alternatives in the prepared EA with an environmental or natural conservation alternative based on our comments..."

R: The BLM has developed three action alternatives, including a proposed action, for public review and comment. All three action alternatives meet the purpose and need, to varying degrees, described in Chapter 1 of this document.

C: “We are concerned that there may be little or no real information or criteria compiled by GSENM to measure effectiveness of the project in order to accomplish monitoring of the restoration. What basis is there to expect that this project will be successful, especially when others have failed?”

R: Other like projects across the state were evaluated and “lessons learned” are incorporated into the document (see chapter 4) as are specific monitoring steps (see chapter 2) to measure the effectiveness of the project.

C: “We request that no further use of non-native seed be made in GSENM because of the problems they present in competition with the natural plant communities.”

R: Varying levels of non-native seed are evaluated in the action alternatives. The 2000 GSENM Management Plan does allow for some use of non-native seed materials, as appropriate, for experimental purposes or to meet resource management objectives (see chapter 2).

C: “We are concerned about the use of mechanical manipulation in un-roaded, roadless, and potential wilderness areas. Will such manipulation preclude wilderness designation and exactly what parts of the project area include BLM or citizen wilderness proposed areas?”

R: This proposed project occurs in lands designated as frontcountry and outback zones in the 2000 GSENM Management Plan. Within these designations, the proposed actions are appropriate and allowed. With respect to roads, the BLM has developed a transportation management plan for GSENM. The agency does not recognize the terms “un-roaded” or “roadless.” Regarding designated wilderness study areas, there are no wilderness study areas in the proposed project area.

C: “EWP and BRG request that GSENM consider the immediate removal of all livestock grazing from the project area indefinitely...”

R: Livestock grazing is a recognized, legal use under the Federal Land Policy and Management Act of 1976 and the 1996 Presidential Proclamation for GSENM. The BLM anticipates releasing a draft management plan for livestock grazing in GSENM within the year which will propose various action alternatives for management of livestock grazing.

C: “We request the size of the area be decreased to specific watershed areas and particular plant communities where BLM can take a {hard look} at the cumulative effects of any further manipulation of the environment.”

R: The current proposed area was identified based on a specific need to restore sagebrush-steppe communities to healthy ecosystems. The area was identified by a BLM interdisciplinary team, and the Utah Partners for Conservation and Development, after extensive on-the-ground

monitoring and discussions occurred. It is anticipated that additional sites in GSENM will require similar restoration in the near future.

C: “Do you have data indicating what percentage of the range resource is being utilized by domestic ungulates versus wild ungulates?”

R: Range utilization data is available for domestic ungulates only.

C: “Please provide analysis and alternatives that propose various reduced levels of domestic grazing.”

R: The purpose of the proposed project is to restore sagebrush-steppe communities. Where necessary, cattle will be removed from the public rangelands while reseeding and re-growth occurs. In some cases, cattle could be removed for at least two, and possibly more years. In addition, the draft management plan for livestock grazing will propose additional actions for management of livestock grazing.

C: “Sagebrush die-off that is due to drought is of special concern to our groups since we believe there is solid evidence of present day climate change. This would be an important consideration with restoration since precipitation might be a very limiting factor in determining what seeds can be planted successfully. GSENM needs to find or develop scientific models using data from the past 100 years and project many years into the future to determine the long-term effects of the drought.”

R: While there is some evidence that we could be entering a multi-decadal period of drought, individual precipitation on an annual basis is difficult to predict. Monitoring, as described in chapter 2, addresses follow-up actions to be taken if re-growth and success rates are not met. Escalante Wilderness Project

C: “...the EA should consider a No Grazing Alternative.”

R: As stated above, livestock grazing is an appropriate use of public lands as determined by federal law and Presidential Proclamation. A “no grazing alternative” would not meet current laws and regulations by which the BLM must abide. A management plan for livestock grazing will evaluate varying options for livestock grazing on public lands within the monument.

C: “We wouldn’t be able to support removal of the older sagebrush that dominates the landscape, because the Monument has entered a drought that is predicted to last several decades....If BLM rips them (sagebrush) out during time of drought, when it is unlikely that new seedlings would prosper, the “restoration” project could turn into a disaster, creating a moon-like landscape scarred by severe erosion.”

R: Again, monitoring, as described in chapter 2, addresses success rates, and appropriate follow-up actions, as needed, based upon findings after initial implementation.

Southern Utah Wilderness Alliance

C: “Any cutting of plants should be done by hand using primitive tools, not by machines.”

R: This proposal does not meet the purpose and need of the proposed project.

C: “Is non-native vegetation invading the area? If so, it should be manually removed.”

R: As described in chapter 3, non-native vegetation is invading the proposed project area. In fact, in the past, Crested wheatgrass was planted in the area to provide additional forage for both wildlife and livestock. While the current action alternatives propose removal of non-native species as one step toward restoring healthy ecosystems, manual (hand) removal of non-native vegetation is not economically or biologically viable.

C: “Natural processes should be encouraged to continue. Since natural processes like drought, fire, plant die-off, erosion, and weed invasion have occurred throughout time, isn’t this project interfering with natural processes?”

R: The purpose and need of this proposed project is to restore stands of dead and decadent sagebrush and range seedings to healthy, stable plant communities thereby, assisting natural processes in restoring ecosystems. The proposed action is meant to drive the discussion regarding how much, where, and how man’s intervention in assisting natural processes is appropriate not whether or not man should intervene in natural processes.

C: “What data exists about the history of ecological change in these plant communities?....And if such data doesn’t exist, are assumptions and speculations playing a part in the decision process?”

R: Research on sagebrush and pinyon-juniper communities indicate that many of the trends in vegetation change occurring in the west and southwest are also occurring in the project area. While much is known about the history of change, there is also active research in this field and we are continually learning how these communities respond to stressors. State and transition models for these vegetation communities show changes in community structure over time and in relation to disturbance. These models and references are available upon request.

C and R: Other comments, concerns, and issues raised by the Escalante Wilderness Project (or Southern Utah Wilderness Alliance), such as determination of the desired future condition, analysis of the cumulative and long-term impacts of implementing the proposed action to the health of the landscape, actual plant generation expectations, road development and heavy equipment access issues, types of plant species to be strewn, protection of riparian areas and management of off-road vehicles are addressed in chapters 2, 3 and 4 of this document.

Five County Association of Governments

C: “The EA should address how the restoration efforts will succeed in the face of continuing drought conditions.”

R: Restoration success criteria are established in chapter 2. In the event that drought conditions prevent seeded species from meeting these success criteria, contingency measures would be developed. Contingency measures would be based on the results of monitoring.

C: “The restoration projects should not be used as a means to reduce or eliminate grazing.”

R: None of the proposed action alternatives include a proposal to reduce or eliminate livestock grazing. However, livestock will be removed from restoration units, for a minimum of two years, while the area recovers. Where possible, fencing will be used to better distribute livestock and alternative grazing locations will be identified and obtained to benefit permittees.

State of Utah

C: “...This area was selected as a priority region for habitat improvement as part of the UDWR’s Habitat Initiative...”

R: The BLM agrees the five mile restoration area is a priority for restoring habitat.

C: Interest in improving habitat within “dense, decadent stand(s) of even-aged sagebrush that competitively excludes grasses and forbs” was expressed. Recognition of “current drought conditions (which) have exacerbated this crowding and sagebrush decadence, increased the loss of forbs and grasses in these communities, and severely limited natural seed production of grasses and forbs” was described. “Vegetation in the area exhibits severe stress.”

R: The BLM agrees with the state’s description of the area and shares concerns regarding the current poor quality of the habitat.

U.S. Fish and Wildlife Service

C: “We appreciate that the BLM is proposing to convert stands of dead and decadent sagebrush and range seedlings to stable, healthy plant communities with a diverse species composition and age structure.”

R: No response is needed.

C: “The project activities will include some surface disturbance and will therefore include some increased risk for weed spread.”

R: The BLM recognizes that, if not properly managed, increased surface disturbance can cause invasive species spread. The monitoring section in chapter 2 addresses these concerns.

C and R: The agency requested the BLM take measures, to the extent possible, and in accordance with federal laws and guidelines, to protect endemic flora and fauna, migratory bird habitat, raptors, and other wildlife species.

5.4 List of Preparers:

List of Preparers (BLM)

BLM staff specialists who determined the affected resources for this document are listed in Appendix A. Those who contributed further analysis in the body of this EA are listed below.

Table 5.2. List of Preparers		
Name	Title	Responsible for the Following Section(s) of this Document
Holly Beck	Team Leader	Technical Coordination & Quality Control.
Allysia Angus	Landscape Architect	Impact analysis for visual resources.
Allan Bate	Range Conservationist	Impact analysis for grazing resources.
Kelly Buckner	Environmental Protection Specialist	General document editing and NEPA compliance.
Laura Fertig Holly Beck	Botanist	Impact analysis for vegetation related sections.
Susan Goheen Michael Turaski	Soil Scientist	Impact analysis for soil resources and floodplains/watersheds.
Terry Tolbert	Wildlife Biologist	Impact analysis for wildlife resources and threatened, endangered, and candidate species.
Michael Turaski	Hydrologist	Impact analysis for watershed and hydrology sections.
Doug McFadden Matthew Zweifel	Archeologist	Impact analysis for cultural resources and Native American religious concerns.

6.0 REFERENCES AND ACRONYMS

6.1 References Cited:

Breshears, D.D., J.J. Whicker, M.P. Johansen, and J.E. Pinder, 2003. Wind and water erosion and transport in semi-arid shrubland, grassland and forest ecosystems: quantifying dominance of horizontal wind-driven transport. *Earth Surface Processes and Landforms*, 28: 1189-1209.

Connelly, J. W., and O. D. Markham. 1983. Movements and radionuclide concentrations of sage grouse in southeastern Idaho. *Journal of Wildlife Management* 47:169-177.

Department of the Interior. 1996. Federal Register Vol. 61, No. 201 Wednesday, October 16, 1996., 50 CFR Part 17, Endangered and Threatened Wildlife and Plants: Establishment of a Nonessential Experimental Population of California Condors in Northern Arizona. Final Rule.

Dunne, T. and L.B. Leopold, 1978. *Water in Environmental Planning*. W.H. Freeman and Company, New York. 818 pages.

Gifford, G.F., 1975. Beneficial and detrimental effects of range improvement practices on runoff and erosion, pages 216-248 *in* Symposium on Watershed Management, Utah State University, Logan, Utah.

Idaho Sage Grouse Task Force. 1997. Idaho sage grouse management plan-1997. Idaho Department of Fish and Game, Boise ID. 34pp.

Oliver, George V. 2003. Amphibians and Reptiles of the Grand Staircase-Escalante National Monument, Distribution, Abundance, and Taxonomy, final report. 26 February 2003.

Paige, Christine and Sharon A Ritter. 1999. Birds in a Sagebrush Sea, Managing Sagebrush Habitats for Bird Communities, Partners in Flight, Western Working Group 1999. 32pp.

Reid, K.D., B.P. Wilcox, D.D. Breshears, and L.MacDonald, 1999. Runoff and erosion in a pinon-juniper woodland: influence of vegetation patches. *Soil Science Society of America Journal*, 63: 1869-1879.

Utah Division of Wildlife Resources. 2002. Strategic Management Plan for Sage-Grouse.

Kane County, Utah. 1998. Kane County, Utah General Plan for the Physical Development of the Unincorporated Area.

6.2 List of Acronyms Used in this EA:

Acronym	Definition
AUM	Animal Unit Month
BLM	Bureau of Land Management
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENBB	Electronic Notification Bulletin Board
EO	Executive Order
FONSI	Finding of No Significant Impact
GSENM	Grand Staircase Escalante National Monument
KOP	Key Observation Point
NEPA	National Environmental Policy Act
PSI	Pounds per Square Inch
RFAS	Reasonably Foreseeable Action Scenario
TES	Threatened Endangered and Sensitive Species
UDWR	Utah Division of Wildlife Resources

APPENDIX A

INTERDISCIPLINARY TEAM ANALYSIS RECORD CHECKLIST

Project Title: Five Mile Sagebrush Restoration

NEPA Log Number: UT 030 04 010 EA

File/Serial Number:

Project Leader: Holly H. Beck

Date Proposal Received: 02/23/04

Plan Decision/Objective:

Date of Public Notification: 04/26/04

FOR EAs: NP: not present; NI: resource/use present but not impacted; PI: potentially impacted

FOR DNAs only: NC: no change (anticipated resource impacts not changed from those analyzed in the NEPA document on which the DNA is based)

STAFF REVIEW OF PROPOSAL:

NP/NI/ PI NC	Resource	Date Reviewed	Signature	Review Comments (required for all NIs and PIs. PIs require further analysis.)
CRITICAL ELEMENTS				
NI	Air Quality	03/06/04	/S/ Joni Vanderbilt	No issues.
NP	Areas of Critical Environmental Concern	07/11/06	/S/ Kelly Buckner	ACEC 1 of the Monument Management Plan states: "No Areas of Critical Environmental Concern (ACECs) are designated in the Monument Management Plan. After careful evaluation of the resources recognized in ACEC nominations, it was determined that their protection will be substantially equivalent under either Monument authority or ACEC designation."
PI	Cultural Resources	02/23/04	/S/ Doug McFadden	Section 106 cultural resource inventory needs to be carried out.
NP	Environmental Justice	02/23/04	/S/ David Wolf	According to the EPA Region VIII, State of Utah, Environmental Justice Map, the region has been categorized as a minority population area of 0 10% and a poverty population area of 10 20%. No minority or economically disadvantaged communities or populations are present which could be affected by the proposed action or alternatives. (http://www.epa.gov/enviro/ej , 03/12/06).
NP	Farmlands (Prime or Unique)	02/23/04	/S/ David Wolf	No Prime or Unique Farmlands exist within the project area. (see http://www.ut.nrcs.usda.gov/technical/nri/1997results/land .)
NI	Floodplains	01/26/05	/S/ Sue Goheen	Floodplain areas would not be impacted with the project.
PI	Invasive, Non native Species	02/25/04	/S/ Laura Fertig	New surface disturbance may provide habitat for invasives, especially <u>Cheatgrass</u> . Would need to monitor and remove if necessary. Ultimately, project would have a positive impact on weeds.
PI	Native American Religious Concerns	02/23/04	/S/ Doug McFadden	Dependent on inventory results and consultation.
NI	Threatened, Endangered or Candidate Animal Species	02/26/04	/S/ Melissa Siders	Historic range for sage grouse beneficial impact in improved habitat. No Threatened or Endangered species.

NP/NI/ PI NC	Resource	Date Reviewed	Signature	Review Comments (required for all NIs and PIs. PIs require further analysis.)
NI	Threatened, Endangered or Candidate Plant Species	02/26/04	/S/ Laura Fertig	No Threatened or Endangered plant species. Site visit required.
NI	Wastes (hazardous or solid)	03/18/04	/S/ Doug Powell	Impacts relating to hazardous or solid wastes are not anticipated. Weed control may be addressed in the future.
NI	Water Quality (drinking/ground)	03/12/04	/S/ James Holland	Project would have no adverse affect on drinking or groundwater quality.
	Wetlands/Riparian Zones			
NP	Wild and Scenic Rivers	02/23/04	/S/ Barbara Sharrow	There are no wild and scenic river segments in this project area.
NP	Wilderness	03/20/04	/S/ Holly Beck for Craig Sorensen	Per telephone conversation with Craig Sorensen. No wilderness present.
OTHER RESOURCES / CONCERNS*				
PI	Fish and Wildlife including Special Status Species other than FWS candidate or listed species eg. Migratory birds	02/26/04	/S/ Melissa Siders	Critical winter range for mule deer beneficial impact. Need to address migratory birds.
NI	Fuels / Fire Management	02/23/04	/S/ Harry Barber	The project would reduce decadent sage and decrease chance of wildfire in the area.
NI	Geology / Mineral Resources	03/18/04	/S/ Doug Powell	Restoration project would not impact geology, mineral or energy resources.
NI	Lands / Access	03/16/04	/S/ Naomi Hatch	No issues.
NI	Law enforcement	03/18/04	/S/ Jeffrey Long	No foreseeable law enforcement impact.
PI	Livestock Grazing/ Rangeland Health Standards and Guidelines	02/24/04	/S/ Allan Bate	Beneficial impact to livestock, additional forage would become available. Two allotments and portions of four others would need to be rested for 2+ years.
NI	Paleontology	03/12/04	/S/ Alan Titus	Outcrops of Moenkopi are sparse and have low paleontological potential.
NI	Recreation	02/23/04	/S/ Barbara Sharrow	Hunting is the only recreational activity that occurs in this area. This project should benefit that activity in the long term.
NI	Socio economics	02/23/04	/S/ David Wolf	See grazing may require closure of allotments/pastures.
PI	Soils and Biological Soil Crusts	02/23/04 02/25/04	/S/ Sue Goheen /S/ Laura Fertig	Potential impact to soil compaction, displacement, erosion need more information and field visit. Surface disturbance would remove crusts. Recommend salvage.
PI	Vegetation Including Special Status Species other than FWS candidate or listed species	02/26/04	/S/ Laura Fertig	No Threatened or Endangered plant species exist in the project area. The project would beneficially impact vegetation by restoring functional groups. The project area is potential habitat for several BLM sensitive plants. Site visit required.
PI	Visual Resources	03/01/04	/S/ Allysia Angus	The project area is rated as VRM Class III. All action alternatives meet the objectives of this classification.
NP	Water Rights	03/12/04	/S/ James Holland	Project would have no impact on water rights.
NP	Woodland / Forestry	02/27/04	/S/ Mary Lou Zimmerman	The project area is not located within a woodland ecosystem.

FINAL REVIEW:

Reviewer Title	Date	Signature	Comments
Environmental Coordinator			
Manager Review			

APPENDIX B

Proposed Seed Lists

Proposed Seed Lists

I = Introduced Species

N = Native Species

Phase 1

Five Mile Mountain Sagebrush Grassland. Native Seed Mix A		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Winterfat (N)	<i>Eurotia lanata</i>	0.25
<i>Grasses</i>		
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	7.75

Five Mile Mountain Sagebrush Grassland. Native Seed Mix B		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Galleta grass (N)	<i>Hilaria jamesii</i>	1
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Needle and thread grass (N)	<i>Stipa comata</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Rocky Mountain bee plant (N)	<i>Cleome serrulata</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Telegraph Range Seedings. Native/Introduced Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian wheatgrass (I)	<i>Agropyron sibericum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	1
Galleta grass (N)	<i>Hilaria jamesii</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
Blue flax (I)	<i>Linum perenne</i>	1
	Total	9.25

Telegraph Range Seedings. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	1
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.25

RCA 2 Range Seedings. Native/Introduced Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Agropyron junceus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Blue flax (I)	<i>Linum perenne</i>	1
	Total	9.25

RCA 2 Range Seedings. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Galletta grass (N)	<i>Hilaria jamesii</i>	2
Needle and threadgrass (N)	<i>Stipa comata</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Yellow beeplant (N)	<i>Cleome lutea</i>	0.25
	Total	9.50

RCA 3 Range Seeding. Introduced/Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	1
Russian wildrye (I)	<i>Elymus junceus</i>	2
Basin wildrye (N)	<i>Elymus cinereus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Blue flax (I)	<i>Linum perenne</i>	1

	Total	9.25
--	-------	------

RCA 3 Range Seeding. Experimental Native Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Basin wildrye (N)	<i>Elymus cinereus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	1
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

RCA 3 Woodland. Native Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Basin wildrye (N)	<i>Elymus cinereus</i>	1
Needle and thread grass (N)	<i>Stipa comata</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

Phase 2

Blue Spring Range Seedings. Native/Introduced Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian wheatgrass (I)	<i>Agropyron sibericum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	1
Galleta grass (N)	<i>Hilaria jamesii</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
Blue flax (I)	<i>Linum perenne</i>	1
	Total	9.25

Blue Spring Range Seedings. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	1
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.25

Five Mile Mountain Sagebrush Grassland. Native Seed Mix A		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Winterfat (N)	<i>Eurotia lanata</i>	0.25
<i>Grasses</i>		
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	7.75

Five Mile Mountain Sagebrush Grassland. Native Seed Mix B		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Galleta grass (N)	<i>Hilaria jamesii</i>	1
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Needle and thread grass (N)	<i>Stipa comata</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Rocky Mountain bee plant (N)	<i>Cleome serrulata</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Five Mile Mountain Sagebrush Grassland. Native-Introduced Experimental Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian crested wheatgrass	<i>Agropyron sibericum</i>	2
Russian wildrye	<i>Elymus junceus</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Yellow sweet clover (I)	<i>Melilotus officinale</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Five Mile Mountain Sagebrush Grassland. All Introduced Experimental Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian crested wheatgrass	<i>Agropyron sibericum</i>	3
Russian wildrye	<i>Elymus junceus</i>	3
Pubescent wheatgrass	<i>Agropyron intermedium</i>	3
<i>Forbs</i>		
Yellow sweet clover (I)	<i>Melilotus officinale</i>	0.25
Alfalfa (I)	<i>Medicago sativa</i>	0.25
	Total	9.50

RCA 1 Range Seeding. Introduced/Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (I)	<i>Sanguisorba minor</i>	1
	Total	9.25

RCA 1 Range Seeding - Experimental Native Seed Mix and Clark Ranch Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and threadgrass (N)	<i>Stipa comata</i>	2
galleta grass (N)	<i>Hilaria jamesii</i>	3
Blue grama (N)	<i>Bouteloua gracilis</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Phase 3

Sand Gulch Range Seeding. Introduced/Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (I)	<i>Sanguisorba minor</i>	1
	Total	9.25

Sand Gulch Range Seeding. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thick spike wheatgrass (N)	<i>Elymus lanceolatus</i>	3
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Five Mile Range Seeding. Introduced/Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (N)	<i>Sanguisorba minor</i>	1
	Total	9.25

Five Mile Range Seeding. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thick spike wheatgrass (N)	<i>Elymus lanceolatus</i>	3
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Phase 4

Table 2.10 Seed Mix for Eight Mile Seeding – Introduced/Native Mix

Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (I)	<i>Sanguisorba minor</i>	1
	Total	9.25

Eight Mile Range Seeding. Experimental Native Mix

Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and threadgrass (N)	<i>Stipa comata</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Blue grama (N)	<i>Bouteloua gracilis</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Phase 5

Jenny Clay Hole Range Seeding. Introduced/Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Winterfat (N)	<i>Eurotia lanata</i>	0.25
<i>Grasses</i>		
Siberian Crested wheatgrass (I)	<i>Agropyron sibiricum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	3
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (I)	<i>Sanguisorba minor</i>	1
	Total	9.50

Jenny Clay Hole Range Seeding. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Winterfat (N)	<i>Eurotia lanata</i>	0.25
<i>Grasses</i>		
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Blue grama (N)	<i>Bouteloua gracilis</i>	3
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	10.0

Jenny Clay Hole Sagebrush Grassland Sites. Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Winterfat (N)	<i>Eurotia lanata</i>	0.25
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	7.75

Rockhouse Sagebrush Grassland. – Native Mix A		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Blue grama (N)	<i>Bouteloua gracilis</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass(N)	<i>Agropyron smithii</i>	1
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

Rockhouse Sagebrush Grassland. Native Seed Mix B		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Phase 6

Petrified Hollow Range Seeding. Native/Introduced Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Siberian wheatgrass (I)	<i>Agropyron sibericum</i>	2
Russian wildrye (I)	<i>Elymus junceus</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Small burnet (N)	<i>Sanguisorba minor</i>	1
	Total	9.25

Petrified Hollow Range Seeding. Experimental Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Petrified Hollow Sagebrush Grassland. Native Seed Mix A		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Bottlebrush squirreltail (N)	<i>Elymus elymoides</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Palmer penstemon (N)	<i>Penstemon palmeri</i>	0.25
	Total	9.50

Petrified Hollow Sagebrush Grassland. Native Seed Mix B		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

Cockscomb Sagebrush Grassland. Native Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

Cockscomb Woodland. Native Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Shrubs</i>		
Big Sagebrush	<i>Artemisia tridentata</i>	0.50
Cliffrose	<i>Cowania mexicana</i>	2
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	4
Galleta grass (N)	<i>Hilaria jamesii</i>	4
Western wheatgrass (N)	<i>Agropyron smithii</i>	2
Indian ricegrass (N)	<i>Stipa hymenoides</i>	4
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	4
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.50
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.50
	Total	21.50

Phase 7

Paria Breaks Sagebrush Grassland. Native Seed Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Western wheatgrass (N)	<i>Agropyron smithii</i>	3
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

Mine Spring Sagebrush Grassland. Native Mix		
Common Name	Scientific Name	Approximate Pounds per Acre
<i>Grasses</i>		
Needle and thread grass (N)	<i>Stipa comata</i>	2
Galleta grass (N)	<i>Hilaria jamesii</i>	2
Sand dropseed (N)	<i>Sporobolus cryptandrus</i>	1
Indian ricegrass (N)	<i>Stipa hymenoides</i>	2
Thickspike wheatgrass (N)	<i>Elymus lanceolatus</i>	2
<i>Forbs</i>		
Globemallow (N)	<i>Sphaeralcea grossulariaefolia</i>	0.25
Firecracker penstemon (N)	<i>Penstemon eatonii</i>	0.25
	Total	9.50

APPENDIX C

Detailed Monitoring Plan

DETAILED MONITORING PROTOCOL

UDWR RANGE TREND STUDY METHODS

VEGETATIVE COMPOSITION

Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 foot baseline transects in the area of interest. This 500 foot line is the baseline and one, 100 foot belt is placed perpendicular to each 100 foot section of the baseline at random foot marks and centered on the 50 foot mark. The beginning of each belt is marked by a rebar stake to ensure a more precise alignment of the originally sampled belt. A 1/4 m² quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. Cover is determined using an ocular cover estimation procedure using 7 cover classes (Bailey and Poulton, 1968, Daubenmire 1969). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site. Total canopy cover of shrubs or trees is estimated using the lineintercept method. The distance along each belt covered by a particular species of tree or shrub is divided by the total length of the line to give percent canopy cover.

Nested frequency values for the quadrat range from 1-5 according to which area or sub-quadrat the plant species or cover type is rooted in. The notation for each sub-quadrat is as follows: 5 = 1% of the area, 4 = 5% of the area, 3 = 25% of the area, 2 = 50% of the area, and 1 = the remainder of the quadrat. Each time a particular plant species or cover type occurs within the quadrat, it is scored relative to which of the smallest nested quadrats it is rooted in (in the case of vegetation) or where it first occurs (for all other cover types). The highest possible score is 5 for each quadrat occurrence and 100 per belt, for a possible score of 500 for each species or cover type at a given site. Higher nested frequency scores represent a higher abundance for that plant species or cover type. These summed values are used to help determine changes in trend and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Smith et al. 1987, Smith et al. 1986, Mosley et al. 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled. Therefore, plant cover and density values can be misleading if used by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species. Nested frequency and average percent cover data for individual grass and forb species are

summarized in the “Herbaceous Trends” table. Nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground are summarized in the “Basic Cover” table.

TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency and cover data. A variety of parameters are used to help determine trend for key species through time. These include:

- 1) changes in density or number of plants/acre
- 2) proportion of decadent plants, and the percentage of decadent plants that are classified as dying
- 3) biotic potential or proportion of seedlings to the population
- 4) proportion of young plants in population
- 5) proportion of individuals moderately or heavily browsed
- 6) proportion of plants in poor vigor
- 7) changes in height and crown diameter measurements for mature age class
- 8) changes in browse species composition
- 9) strip frequency values
- 10) proportion of cover contributed by key species

Trends in herbaceous plants as a group or as a single “key” species can be determined by comparing the sum of nested frequency values between readings. Attention is also given to changes in species composition of grasses and forbs through time. A non-parametric statistical test (Friedman test which is analogous to analysis of variance) (Conover 1980) is conducted on nested frequencies of each species to determine significant changes at $\alpha = .10$. Ground cover parameters are analyzed and compared in the discussions of the reread studies. Trends for soil are determined by comparing basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. A ratio of the nested frequency values of protective cover types (vegetation, litter, and cryptogams) to bare soil can also be used to help determine changes in soil trend. Beginning in 2002, an erosion condition class assessment adapted from the Bureau of Land Management is also completed on each study site to provide additional qualitative information on soil condition. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons. Soil aggregate stability is a key indicator of soil quality and rangeland health. This parameter would be measured according to methods described in Herrick et al. (2001).

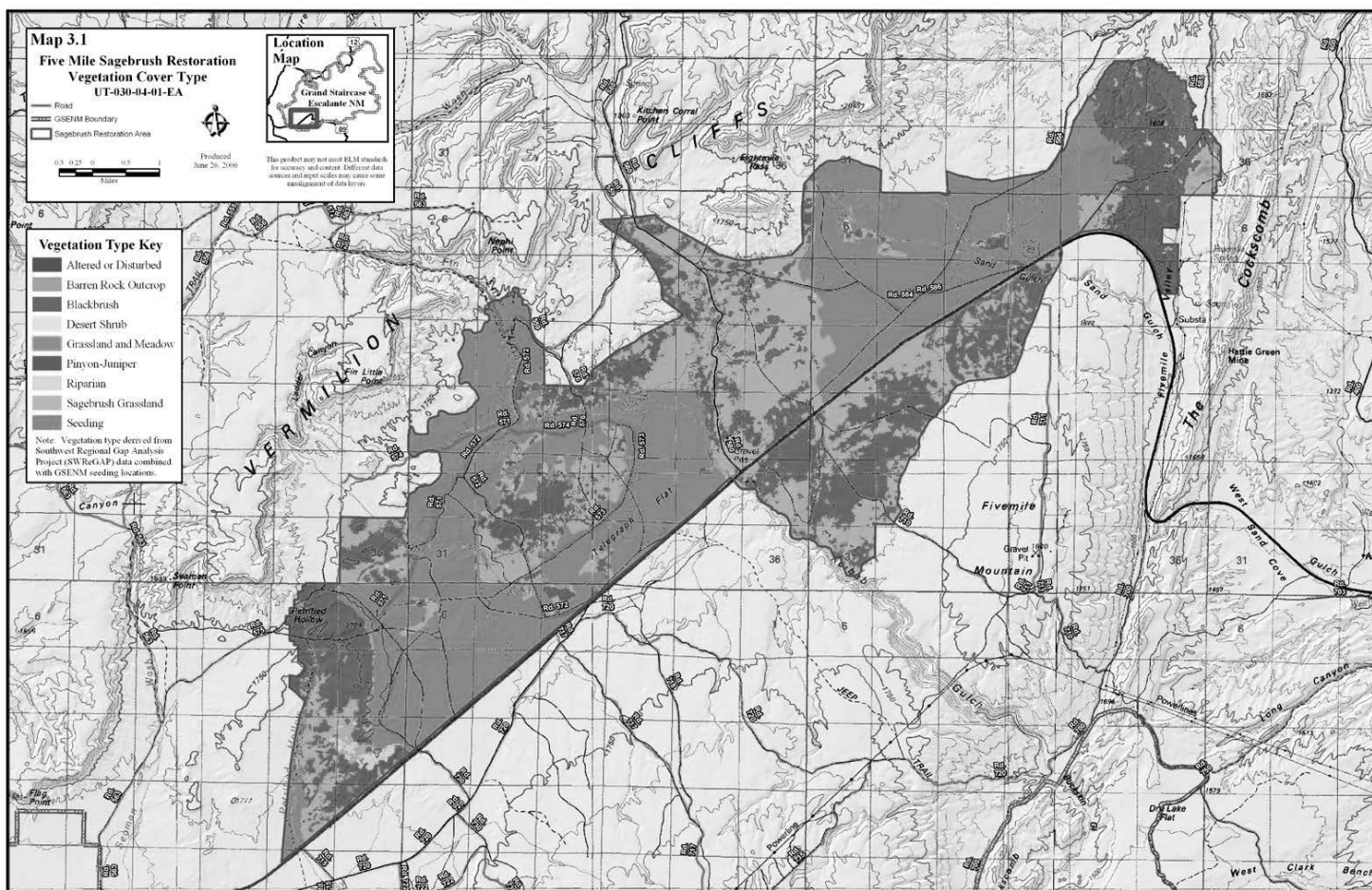
REFERENCES

- Bailey, A. W. & C. E. Poulton. 1968. Plant communities and environmental interrelationships in a portion of the Tillamook burn, Northwest Oregon. *Ecology*. Vol 49, No. 1. pp. 1-13.
- Conover, W. J. 1980. *Practical Nonparametric Statistics* (second edition). John Wiley & Sons, New York. 493pp.

- Broersma, K., M. Krzic, D.J. Thompson, and A.A. Bomke. 2000. Soil and vegetation of ungrazed Crested wheatgrass and native rangelands. *Canadian Journal of Soil Science* 80:411-417.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. Reveal and P. Holmgren. 1977. *Intermountain Flora* (volume six). Columbia University Press, New York. 584pp.
- Daubenmire, R. 1959. A canopy coverage method of vegetational analysis. *Northwest Science* 33:43-66.
- Gifford, G.F., 1975. Beneficial and detrimental effects of range improvement practices on runoff and erosion, pages 216-248 *in* Symposium on Watershed Management, Utah State University, Logan, Utah.
- Giunta, B. C. 1983. Utah interagency big game range trend plant species list. Utah Dept. Of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah.
- Herrick, J.E., W.G. Whitford, A.G. deSoyza, J.W. Van Zee, K.M. Havstad, C.A. Seybold, and M. Walton. 2001. Field soil aggregate stability kit for soil quality and rangeland health evaluations. *Catena* 44:27-35.
- Mosley, J. C., S. C. Bunting, and M. Hironaka. 1986. Determining range condition from frequency data in mountain meadows of central Idaho. *J. Range Manage.* 39:561-565.
- Smith, S. D., S. C. Bunting, and M. Hironaka. 1987. Evaluation of the improvement in sensitivity of nested frequency plots to vegetational change by summation. *Great Basin Naturalist*. 47(2): 299-307.
- Smith, S. D., S. C. Bunting, and M. Hironaka. 1986. Sensitivity of frequency plots for detecting vegetation change. *Northwest Science*. 60:279-286.
- 1U.S. Department of Interior Bureau of Land Management. 1996. Utilization Studies and Residual Measurements, Interagency Technical Reference, BLM/RS/ST-96/004+1730.
- 2U.S. Department of Interior Bureau of Land Management. 1996. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.
- Welsh, S. L., et al. 1993. *A Utah Flora*. Brigham Young University. Provo, Utah.

APPENDIX D

Vegetation Type Map

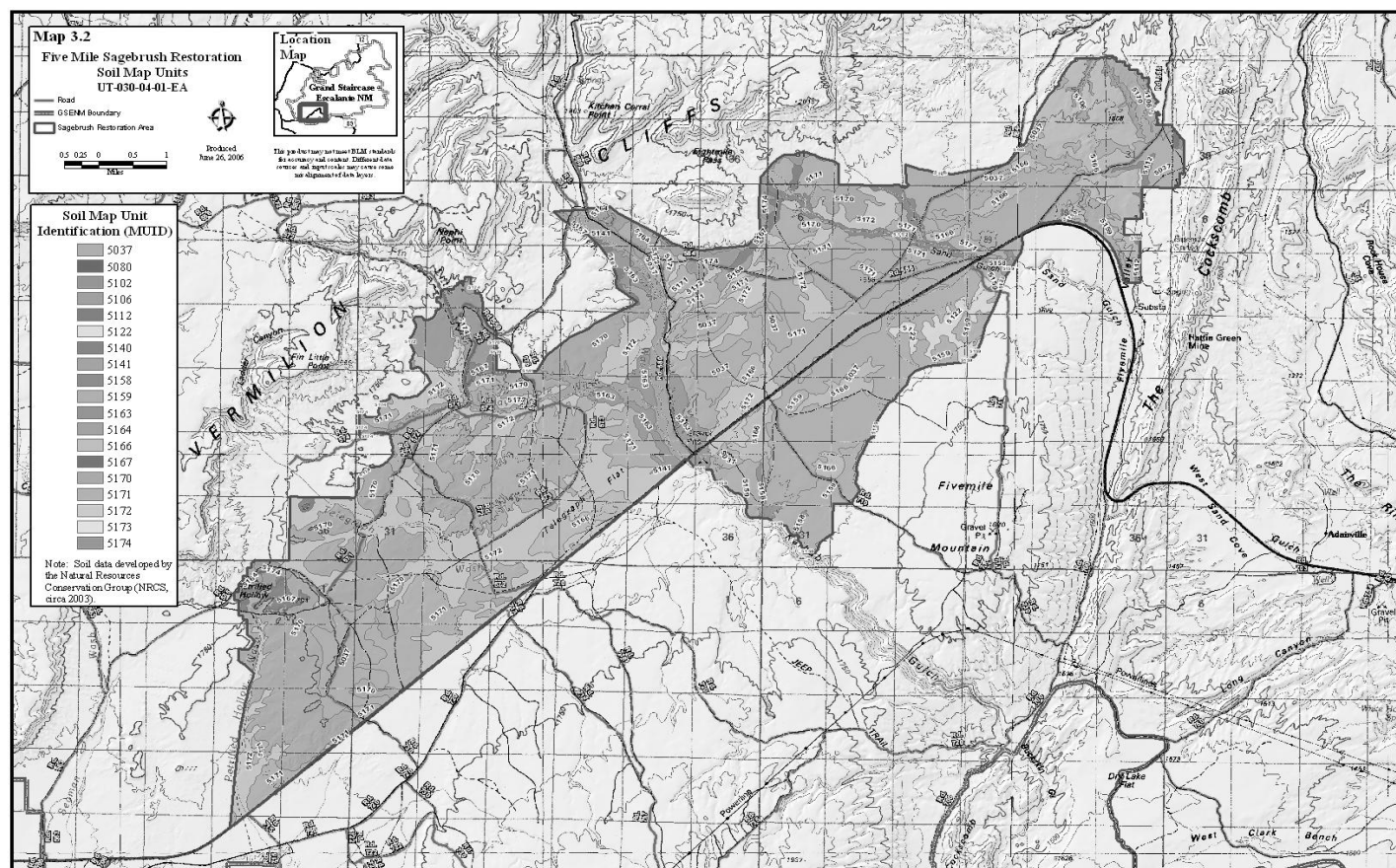


APPENDIX E

Soil Interpretation Maps

and

Soil Survey Details



Soil Survey Details

The following information was derived from GSENM Soil Survey (2005). For more soil information in the project area, see GSENM Soil Survey (2005).

There is great soil variability in the project area. The soil textures range from sand to clay loam; with a majority of the soils being loam or sandy loam. Coarse fragments range from none to extreme; with the majority being none to slight.

Following is a summary of ten soil interpretations that are rated according to characteristics with the associated acreage. Maps with the soil interpretations can found in Appendix F.

- The Kw factor indicates the water erodibility of the surface layer. In the project area 13,741 acres have a high risk, 3,792 acres have a moderate risk, and 17,908 acres have a low risk.
- The wind erodibility group (WEG) indicates the susceptibility of the surface layer to wind erosion. In the project area, 1,104 acres have a high risk, 22,632 acres have a moderate risk, and 11,705 acres have a low risk.
- Rangeland seeding suitability rating represents the relative physical limitations of soil factors upon use of a rangeland drill and the affects of soil and climatic factors upon the probability of establishing a successful seeding. In the project area, 19,590 acres are very poorly suited, 15,311 acres are poorly suited, 540 acres are suited, and 0 acres are well suited.
- Available water holding capacity is the quantity of water that the soil is capable of storing for use by plants. In the project area, 17,910 acres have a high capacity, 8,128 acres have a moderate capacity, 8,955 acres have a low capacity, and 0 acres have a very low capacity.
- Organic matter is the plant and animal residue in the soil surface layer. In the project area, 0 acres have a high percentage, 7,232 acres have a moderate percentage, 26,061 acres have a low percentage, and 1,699 acres have a very low percentage.
- Soil permeability is the ease with which soil transmits water. In the project area, 3,242 acres are rated as very rapid, 4,175 acres are rated as rapid, 7,923 acres are rated as moderately rapid, 19,652 acres are rated as moderate, 0 acres are rated as moderately slow, 448 acres are rated as slow, 0 acres are rated as very slow, and 0 acres are rated as impermeable.
- Soil drainage refers to the frequency and duration of saturated periods. In the project area, 559 acres are excessively drained, 0 acres are somewhat excessively drained, 33,894 acres are well drained, 0 acres are moderately well drained, 540 acres are somewhat poorly drained, 0 acres are poorly drained, and 0 acres are very poorly drained.

- Rooting depth is the depth to a root restrictive layer. In the project area, 959 acres have a depth from 1 to 10 inches, 11,586 acres have a depth from >10 to 20 inches, 7,036 acres have a depth from >20 to 40 inches, and 15,859 acres have a depth >40 inches.
- Salinity is the measure of the concentration of water-soluble salts in the soil. In the project area, 30,076 acres are non-saline, 4,917 acres are very slightly saline, 0 acres are slightly saline, 0 acres are moderately saline, and 448 acres are strongly saline.
- Calcium carbonate is the quantity of CaCO_3 in the soil. In the project area, 0 acres have a high percentage, 13,195 acres have a moderate percentage, and 21,798 acres have a low percentage.

APPENDIX F

Maps 2.1, 2.2, 2.3

**United States Department of the Interior
Bureau of Land Management**

**Environmental Assessment
DOI-BLM-UT-0300-2011-0003-EA**

**Center Knoll Riparian Enhancement Project
March 2014**

Location: South of Cannonville, UT on Rock Springs Bench T38S, R2W, Section 28

Grand Staircase Escalante National Monument
669 South HWY 89A
Kanab, Utah 84741
Phone: 435-644-1200
Fax: 435-644-1250



Center Knoll Riparian Enhancement Project DOI-BLM-UT-0300-2011-0003-EA

CHAPTER 1: Purpose and Need for the Proposed Action

INTRODUCTION

The riparian area near Center Knoll is the only livestock water source in the Rock Springs Bench Pasture on the Upper Hackberry Allotment. Center Knoll spring is one of three live sources of water within the allotment. Currently, the Upper Hackberry Allotment is allocated 654 active Animal Unit Months (AUMs) with a season of use from November 1 to March 31. There are currently two grazing permit holders that use this allotment. Actual use for the allotment has averaged less than 50% of the active AUMs. The Center Knoll spring water source is within the Paria-Hackberry Wilderness Study Area (WSA). Livestock use at this riparian area is affecting riparian resources. In 2003, a Proper Functioning Condition (PFC) assessment was conducted on the Center Knoll spring. The PFC assessment noted there was trailing through the wetland and hoof action. These actions are affecting water quality and trampling of the vegetation in the spring. Some bare spots in vegetative cover were also reported. In addition, there are invasive plant species (tamarisk and Russian olive trees) that are threatening native species and water resources.

The Bureau of Land Management (BLM) proposes to build an enclosure fence around the riparian area near Center Knoll. Tamarisk and Russian olive trees in the riparian area would be cut sprayed with a BLM approved herbicide to enhance the native riparian plant community. The spring would be protected from livestock and some spring water would be made available for livestock and wildlife use outside of the riparian area. The project is scheduled to be implemented summer 2014.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose for the proposed action is to protect the riparian area from livestock grazing and to enhance the native riparian plant communities surrounding the area. The need for the action is that some degradation to the riparian area is evident and nonnative species are encroaching into the native riparian plant community and competing for the available resources. Currently, livestock and wildlife are using the riparian area for foraging and to obtain water. This is the only source of water for this pasture and is used by cattle between November 1 and March 31. Trampling and use of riparian plant species by cattle is evident at the site. Invasive tamarisk and Russian olives are present at the site. Enhancing the native riparian plant community would also improve habitat, food, and water sources for wildlife species such as wild turkeys, mule deer, invertebrates, reptiles and amphibians, rodents, rabbits, coyotes and foxes and other mammals, pinyon jays, bluebirds, and many other species of migratory birds.

MONUMENT MANAGEMENT PLAN CONFORMANCE

This action is in conformance with the Grand Staircase-Escalante National Monument (GSENM) Management Plan, approved February, 2000. Specifically, the plan includes the following objectives:

- The overall objective with respect to riparian resources within the Monument is to manage riparian areas so as to maintain or restore them to proper functioning condition (MMP, p. 20).
- The BLM's objective with respect to water resources is to ensure that appropriate quality and quantity of water resources are available for the proper care and management of the objects of the Monument (MMP, p. 31).

The proposed action is designed to help achieve these objectives by protecting and enhancing riparian and water resources.

The Monument Management Plan also includes several management actions that were considered during development of the proposed action. The proposed action is consistent with the following terms and conditions from the approved management plan.

FW-4 - The BLM will place a priority on protecting riparian and water resources as they relate to fish and wildlife, and will work cooperatively with the U.S. Forest Service to coordinate maintenance of fisheries and flows (MMP, p. 12).

RIPA-6 - The noxious weed control program will target invasive species such as tamarisk and Russian olive, which will improve riparian functioning condition (MMP, p. 21).

WAT-1 - New water developments for other uses could be permitted for the following purposes: better distribution of livestock when deemed to have an overall beneficial effect on Monument resources, or to restore or manage native species or populations. These developments could only be done when a National Environmental Policy Act (NEPA) analysis determines this tool to be the best means of achieving the above objectives and only when the water development will not dewater springs and streams (MMP, p. 32).

FENCE-1 - Fences may be used in certain circumstances to protect Monument resources, to manage livestock, consistent with the Proclamation. They will be designed and constructed in accordance with visual resource management objectives and the Monument Facilities Master Plan (MMP, p. 39).

RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS

The Proposed Action is consistent with Federal, state and local laws, regulations, and plans to the maximum extent possible.

The Federal Land Policy and Management Act 43 USC 1701 Sec. 102 (a) states: The Congress declares that it is the policy of the United States that (8) the public lands be managed in a manner that will protect the quality of scientific, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish

and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use. The proposed action is designed to improve riparian and water resources.

BLM Manual 6330 - Management of BLM Wilderness Study Areas (WSAs) contains policy for activities within WSAs. This manual notes that grandfathered uses, such as livestock grazing that was approved on the date of approval of FLPMA (October 21, 1976), are allowed. These grandfathered uses and facilities may continue in the same manner and degree as on that date, even if this impairs wilderness suitability. In addition, new livestock management developments may be approved in WSAs if they meet the non-impairment standard or one of the exceptions, such as protecting or enhancing wilderness characteristics. The proposed action includes a new development designed to enhance native riparian plant communities and reduce invasive plant species (i.e. tamarisk and Russian olive) at the site. A visual contrast rating was completed and determined that the project would be substantially unnoticeable because the developed are located in a drainage that is hidden from view due to topography and/or vegetative screening. Fences are already common and the additional length of fencing would not attract attention. Also, the new development would not increase AUMs. The proposed action is designed to comply with BLM Manual 6330.

The Kane County General Plan (p. 62) states: Implement rangeland improvement programs, including but not limited to; water developments, rangeland restoration, juniper/shrub control, and weed control to achieve forage and livestock grazing as well as other multiple use resource goals. The proposed action is a water development and weed control project.

ISSUES IDENTIFIED

Two issues were identified to be analyzed in this environmental assessment.

- What impacts to existing grazing use would the proposed exclosure and water facilities produce?
- Will this project impact wilderness values or impair suitability of the Paria-Hackberry Wilderness Study Area?

One issue related to dewatering of the spring was identified during public scoping. This issue was addressed by including features to ensure that the spring would not be dewatered. The proposed action states that water from the overflow will be returned to the riparian area. Also, when livestock are not grazing in the area, the system will be shut off at the headbox.

Concerns related to visual resources were also expressed. The landscape architect determined the project should be designed to preserve the existing character of the landscape and the level of change to the characteristic landscape should be very low and must not attract attention. A contrast rating analysis was performed to determine if the project had the potential to impact visual resource. After completing the analysis, the landscape architect determined no visual contrast would be created by this project because (1) the location is in a forested draw screened from view until on site, (2) the scale and scope is relatively small (i.e. approximately 200 yards of wire fencing, Russian olive and tamarisk removal, approximately 100 yards of buried pipeline,

and trough installation). Visual resources was not identified as an issue because this project as proposed would meet visual resource management Class I objectives.

CHAPTER 2: Alternatives

INTRODUCTION

This environmental assessment focuses on the proposed action and the no action alternative. No other reasonable alternatives were identified. The No Action alternative is considered and analyzed to provide a baseline for comparison of the impacts of the proposed action.

PROPOSED ACTION

Grand Staircase-Escalante National Monument proposes to build a fence to exclude livestock grazing from approximately 2 acres of riparian meadow near Center Knoll. The project area is located south of Cannonville, Utah on Rock Springs Bench, within the Paria-Hackberry Wilderness Study Area (see project maps in Appendix B).

Approximately 200 yards of barbed wire fence would be constructed around the spring and riparian area using standard fencing hand tools and fence posts painted to match surrounding colors. The enclosure fence would incorporate an existing pasture fence into the northern section to complete the enclosure. A head box would be installed in the riparian area to collect water. About 100 yards of pipe would be buried to a depth of 24 inches using a small excavator. Sod from the top layer of the trench will be removed and set aside and then replaced on the top of the trench after pipe installation. Staging for this project will occur outside the WSA boundaries.

A 500-gallon (6-foot radius) trough would be installed at the end of the pipeline outside of the enclosure and riparian area. Overflow from the trough would be piped back into the riparian area as far up as possible (approximately 100 feet) using the same trench as the supply line. A regulating valve would be installed at the head box to ensure that no more water than necessary to maintain the level of the trough will be collected from the spring. The regulating valve would be closed during the time when cattle are not using the pasture to ensure water would not leave the spring source during that period. Cattle typically use the pasture between November 1 and March 31. While cattle are in the pasture, flow into and out of the trough would be monitored and minimized and the amount of flow would be regulated to balance with the use during that time. This system would be gravity fed and would not require the installation of any equipment such as solar panels or pumps (see Appendix D). A wildlife ladder will be installed in the trough.

Visible project infrastructure would be camouflaged with black or gray paint. Tamarisk and Russian olive trees in the riparian area would be cut as close to horizontal as possible to the ground using chainsaws. The herbicide Garlon4 (an herbicide recommended for riparian areas and widely used on the Monument) would be applied to the target species to reduce resprouting and enhance the native riparian plant community.

The fence and water system would be maintained under cooperative agreement with the Upper Hackberry grazing permit holders and the BLM. The project will be maintained by personnel on

foot and does not require motorized access for maintenance. All new surface disturbance will be raked of tracks and rehabilitated to a natural appearance. Construction activities on this project would not be during migratory bird breeding season (April 15 - June 30) or the project would be cleared for nesting birds by a qualified biologist before construction activities begin.

The condition and extent of the riparian vegetation will be monitored as indicators of hydrologic alteration of the spring. Should the spring dry up and no longer produce water, or if livestock grazing is removed from the pasture or allotment, the headbox, trough, and enclosure fence would be removed from the project area and the habitat and topography would be restored to a state as close to natural as possible.

NO ACTION

Under No Action, livestock grazing would continue to use the available water in the riparian area. Trampling of vegetation in the riparian area would continue. Tamarisk and Russian olives would not be removed and would continue to compete with native plant species for available resources. Habitat for many species of migratory birds, wild turkeys, mule deer, invertebrates, and reptiles would continue to be affected by the presence of invasive plant species. Wildlife would also compete with livestock for water at this location.

CHAPTER 3: Affected Environment

GENERAL SETTING

The affected environment was identified and analyzed by an interdisciplinary team, as documented in the Interdisciplinary Team Analysis Record Checklist (see Appendix A). Resources that are predicted to be impacted by the proposed action are described in Chapter 3 and impacts on these resources are analyzed in Chapter 4.

The spring and riparian area associated with the proposed project is located on an elevated plateau east of the Paria River drainage on Rock Creek Bench (see Map, Appendix B). The project area is located within the upper edge of the Paria-Hackberry WSA. Water from the spring, which will be enclosed by fencing, flows into side tributaries of the Paria River. The spring and riparian are located in rolling pinyon and juniper covered hills. The country surrounding the spring is dominated by pinyon, juniper, and big sage brush. Much of the area has been chained and reseeded with a mixture of introduced and native species. West of the project area, the country drops off in a series of cliffs to the Paria River. Riparian plants are rush (*Juncus*) species, wild rose, grasses, Russian olive, and tamarisk.

RANGELAND HEALTH

Currently, the Upper Hackberry allotment is allocated 654 active AUMs with a season of use from November 1 to March 31 and an additional 30 days between April 16 and May 15 based on an exchange of use agreement for adjacent unfenced private land. Livestock use in this allotment is a grandfathered use and can continue in the same manner as when FLPMA was enacted even if it impairs wilderness suitability. Actual use for the allotment has averaged less than 50% of the active AUMs. Cattle use the spring area and adjacent seeding on a rotational basis for a 2-3 month period each year, depending on forage availability. For example, it would be used from

November through the end of January the first year and the second year it would be used from February through the end of March. The pasture in which Center Knoll spring is located is not used between March 31 and April 16. The period of grazing is during the time of year when plants are dormant and not growing. The Center Knoll spring is one of three live sources of water within the allotment. In 2003, a proper functioning condition (PFC) assessment was conducted. This assessment noted there was livestock trailing through the wetland. These livestock grazing activities are affecting the water quality and trampling of the vegetation in the spring. Some bare spots in vegetative cover were also reported.

WILDERNESS STUDY AREA

BLM's management policy is to continue resource uses on lands designated as WSAs in a manner that maintains the area's suitability for preservation as wilderness. In carrying out this mandate, BLM Manual 6330-Management of BLM Wilderness Study Area (7/13/2012), outlines guidance for management of WSAs. The Center Knoll Springs project falls under an identified class of allowable exceptions to the non-impairment mandate. BLM Manual 6330 1.6.C.2.(f) indicates BLM should protect or enhance wilderness characteristics or values: Actions that clearly benefit a WSA by protecting or enhancing these characteristics are allowable even if they are impairing, though they must be carried out in a manner that is least disturbing to the site (p. 1-13).

The Upper Paria-Hackberry allotment is a pre-FLPMA livestock use and is considered a grandfathered use. Use by cattle is expected to continue to occur in this location.

The Paria-Hackberry WSA includes 135,822 acres of public land administered by the Bureau of Land Management within Grand Staircase-Escalante National Monument. The Paria-Hackberry WSA includes much of the Paria River and Hackberry Creek drainages between U.S. Highway 89 on the south and Cannonville on the north. Elevation ranges from 4,700 feet on the Paria River at the south end of the WSA to 7,200 feet in the west-central and northern part of the study area. The varied terrain includes plateaus, benches, a portion of the Cockscomb ridge, scattered sand dunes, rock knobs and domes, and natural arches. The predominant vegetation type is pinyon-juniper woodland.

The BLM Intensive Wilderness Inventory (April 1980; pp. 205-206) and BLM Utah Statewide Wilderness Final Environmental Impact Statement (November 1980; Vol. 1, pp. 346) proposes 95,042 acres are suitable for wilderness designation and 41,180 are not suitable for wilderness designation. For the areas proposed to be suitable, the Final EIS states "nearly all of the area has outstanding opportunities for solitude and primitive recreation. Scenic and ecological special features are present. The proposal represents a large area with very high quality wilderness values." The area proposed as not suitable includes the Paria River corridor and notes the traditional use as a vehicular access route and the southwest portion of the WSA (Deer Range) that was judged to lack outstanding opportunities for solitude and primitive recreation.

The project area at Center Knoll lies within several hundred feet of the eastern boundary of the Paria Hackberry WSA on Rock Springs Bench. This boundary borders a section of BLM/GSENM lands inventoried in 1980 that was found not to possess wilderness characteristics.

CHAPTER 4: Environmental Consequences

DIRECT AND INDIRECT IMPACTS

Proposed Action

This section analyzes the impacts of the proposed action to those affected resources described in the Chapter 3.

Rangeland Health

The proposed action would remove livestock associated impacts from the riparian area (trailing, hoof action), enhancing water quality and vegetation. Livestock would be excluded from approximately 2 acres of riparian area. Within the 2-acre enclosure, vegetation would no longer be trampled and vegetation would re-occupy bare spots. Livestock would need to trail around the enclosure to access the new water trough. In addition, tamarisk and Russian olive would be cut. These activities would increase the amount of native plant species and enhance the native riparian plant communities. Over time, rangeland health would be expected to improve.

Wilderness Study Area

The proposed action would protect and enhance wilderness values by working to restore the historic natural water source and the natural riparian ecosystem without the presence of livestock. Livestock use of this water source is a condition of the grandfathered use. Fencing the spring would protect the riparian area from livestock impacts. Removing the invasive plant species (Russian olive and tamarisk) would promote recovery of the native riparian plant community and provide an overall enhancement of wilderness values.

Implementation of the project will be carried out in a manner least disturbing to the site. Staging for this project will occur outside the WSA boundaries. Trenching will include lifting off the grass and soil layer and re-placement on the surface of the trench. Use of the small excavator will follow an existing two-track for one day's work. A Minimum Requirements Decision Guide (MRDG) worksheet was completed for this project and is contained in the project file. Use of machinery was determined to meet minimum requirements because it will expedite trenching operations and sod can be quickly placed back into the disturbed area to minimize the time it takes to return to naturalness. The project does not require motorized access for maintenance. All new surface disturbance will be rehabilitated to a natural appearance. Design features and seasonal shut-off will ensure re-charge of the natural hydrologic system and the riparian plant community's ability to utilize naturally occurring water within the springs. The physical infrastructure will be hidden behind brush or painted to camouflage appearance and lessen noticeability. Restoration of the riparian community will protect and enhance wilderness characteristics and values.

Design features serve to mitigate any potential for indirect effects such as loss of wilderness suitability of this area. The return of migratory birds and natural screening offered by a more robust native riparian community will help to off-set impacts to the natural setting of the Paria-Hackberry WSA.

No Action

Rangeland Health

Livestock would continue to graze and water in the riparian area. The impacts associated with this use would continue. Tamarisk and Russian olive would continue to occur in the riparian area.

Wilderness Study Areas

Under the No Action alternative, existing wilderness characteristics within the Paria-Hackberry WSA would continue to be generally protected and managed “so as not to impair suitability of such areas for preservation as wilderness” (BLM Manual 6630, p. 1). However, grazing, as a grandfathered use, is expected to continue to occur in the riparian area and trampling of vegetation and hoof action will continue to be evident. Tamarisk and Russian olive will continue to displace native riparian plant communities.

CUMULATIVE IMPACTS

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

The cumulative impact analysis area for rangeland health is the Upper Hackberry Grazing Allotment, which is the only allotment affected by the proposed action. The past, present, and reasonably foreseeable actions associated with the rangeland health are continued livestock grazing and maintenance of existing range improvement. Cumulatively, livestock would continue to consume and trample vegetation throughout the allotment. When added to the no action alternative, rangeland health would continue to be affected by trampling of vegetation in the riparian area and presence of invasive species that compete with and reduce native riparian plant communities. When added to the proposed action, rangeland health and native riparian vegetation would be expected to increase because trampling would be reduced and invasive species would be removed.

The cumulative impact analysis area for WSA is the geographic boundary created by the Rock Springs Bench portion of the Paria-Hackberry WSA. The past, present, and reasonably foreseeable actions associated with the WSA are livestock grazing and maintenance of livestock improvements in the Rock Springs Bench portion of the Paria-Hackberry WSA.

Livestock grazing and maintenance of existing range improvements are ongoing and are expected to continue. Cumulatively, there would be no loss of wilderness characteristics, i.e. “naturalness” or “outstanding opportunities for primitive and unconfined recreation.” Recreational users in the area already view or encounter human-created infrastructure because of other pre-existing range improvements in this section of the WSA. Existing infrastructure in this northern segment consists of a series of fences associated with grazing and several two-tracks of linear disturbance. The combined infrastructure would be viewed by users; however this infrastructure would not affect suitability for wilderness designation.

The protection and restoration of a natural spring and riparian habitat is a beneficial impact to the WSA. This project would not alter the “naturalness” or wilderness characteristics permanently nor impact long-term suitability for wilderness designation.

CHAPTER 5: Consultation and Coordination

This project was posted on the Utah Environmental Notification Bulletin Board on June 6, 2012. A public scoping letter was mailed to interested publics on July 9, 2013.

LIST OF PERSONS, GROUPS, AND AGENCIES CONSULTED

Upper Paria Grazing Association	Mr. and Mrs. Mark Habbeshaw
Southern Utah Wilderness Alliance	Juniper Allison
Western Watersheds Project	Brian Hawthorne
Five County Association of Governments	Leigh Kuwanwisiwma
Matt Seddon	Betsy Chapoose
Earth Justice	Bob Bennet
Sierra Club	Jim Matheson
Bob Wallen	Dixie National Forest
Joro Walker	Zion National Park
Jill Ozarski	Forest Guardians
Evelyn James	Utah Cattleman's Association
Irene Nez-Whitekiller	Navajo Nation
Pipe Springs National Monument	Orrin Hatch, US Senate
Bryce Canyon National Park	Rob Bishop
Michael Noel	Vermillion Cliffs National Monument
Scott Phillips	Utah Farm Bureau
Allison Jones	Great Old Broads for Wilderness
Hal Stout	Color Country Rural Alliance
Brian Bremner	Kaibab-Paiute Tribe
Leo Manheimer	Paiute Tribes of Utah
Neal Crank	Chris Cannon
Phillip J. Brown Sr	Glen Canyon NRA
Grand Canyon National Park	Utah Office of Planning and Budget
North Kaibab Ranger District	Utah Division of Wildlife Resources
George Hansen	Utah Division of Water Quality
Thomas Hatch	Utah Division of State History
Karen Budd Falen	Stephen and VerJean Clark
Loren Panteah	Steve Goulding
Billy Arizona	USGS Water Resources Division
Teddie Bedonie	Kane County Commissioners
Coral Pink Sand Dunes State Park	Town of Big Water
Kaibab National Forest	Town of Alton
Anasazi State Park	Town of Glendale
Capitol Reef National Park	City of Kanab

Town of Boulder
 Kelly Shakespear
 Joseph Hughes
 Kanab Field Office
 Garfield County Commissioners
 Town of Tropic
 City of Escalante
 Town of Cannonville
 Town of Henrieville
 Town of Orderville
 Kenneth Goulding Jr

Paul Mangum
 Stanley Mecham
 Tomas and Shilo Richards
 Duane Stewart
 Slate and Pennie Stewart
 J Robert and Myra Loy Ott
 Trinity Richards
 Quinn and Georgia Willis
 Barton Palmer
 Franz Shakespear
 Lonnie and Vance Pollock

LIST OF PREPARERS

Name	Title	Responsible for the following section(s) of this EA
Terry Tolbert	Project Lead	Wildlife, Document Preparation
Jason Bybee	Range Management Specialist	Range
Lora Gale	Outdoor Recreation Planner	Wilderness Study Areas
Kevin H. Miller	Science Administrator	Hydrology
Katherine Farrell	Planning and Environmental Coordinator	NEPA Compliance

APPENDIX A**INTERDISCIPLINARY TEAM CHECKLIST****Project Title:** Center Knoll Riparian Enhancement Project**NEPA Log Number:** DOI-BLM-UT-0300-2011-0003-EA**Project Leader:** Terry Tolbert**DETERMINATION OF STAFF:** *(Choose one of the following options for the left column)*

NP = not present in the area impacted by the proposed or alternative actions

NI = present, but not affected to a degree that detailed analysis is required

PI = present with potential for relevant impact that need to be analyzed in detail in the EA

NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section D of the DNA form.

The Rationale column may include NI and NP discussions.

Resources and Issues Considered (includes Supplemental Authorities from Appendix 1 of H-1790-1)

Determination	Resource	Rationale for Determination*	Signature	Date
NI	Air Quality (Anderson)	The project will not impact air quality to any measurable degree. Project activities including fence and pipeline construction would result in minimal surface disturbance of less than 1 acre. Any particulates generated would be quickly dispersed and non-measurable.	/s/ J. Norman	5/9/2012
NP	Areas of Critical Environmental Concern	No Areas of Critical Environmental Concern (ACECs) are designated in the Monument Management Plan.	/s/ J. David	4/11/2012
NI	Biological Soil Crusts (Anderson)	Impact to the whole of the cryptogamic soils will be negligible.	K. Anderson	January 20 2011
NP	BLM Natural Areas	No Natural Areas are designated in the Monument Management Plan.	/s/ J. David	4/11/2012
NP	Cultural Resources (Zweifel)	A cultural resource inventory has been completed and no historic properties are located within the Area of Potential Effect.	M. Zweifel	3/4/2011
NI	Greenhouse Gas Emissions (Anderson)	Release of greenhouse gasses will not impact air quality to any measurable degree. Project activities including fence and pipeline construction would result in minimal surface disturbance of less than 1 acre. The work would be completed primarily by hand with some use of mechanized equipment for the pipeline trench. Any emissions generated would be non-measurable.	/s/ J. Norman	5/9/2012

Determination	Resource	Rationale for Determination*	Signature	Date
NP	Environmental Justice	According to the EPA Region VIII, State of Utah, Environmental Justice Map, the region has been categorized as a minority population area of 0-10% and a poverty population area of 10-20%. No minority or economically disadvantaged communities or populations are present which could be affected by the proposed action or alternatives. (see http://www.epa.gov/enviro/ej , 04/11/12).	/s/ J. David	4/11/2012
NP	Farmlands (Prime or Unique)	No Prime or Unique Farmlands exist within the Monument. (see http://www.ut.nrcs.usda.gov/technical/nri/1997resultscropland .)	/s/ J. David	4/11/2012
NI	Fish and Wildlife Excluding USFW Designated Species (Tolbert)	Wildlife would continue to have access to riparian resources. The timing of this project or having a qualified biologist present during construction will help ensure no migratory bird species will be affected by this project.	/s/ T. Tolbert	3/3/2011
NP	Floodplains (Anderson)	There is no apparent flood plain in the lentic system. The proposal is to fence a spring riparian system. Based on a site visit and GIS map review there is no floodplain present.	/s/ J. Norman	5/9/2012
NI	Fuels/Fire Management (Bate)	The cutting of the non-native woody species would not increase the fuel loads around the riparian area. The reason is that the slash would be spread across the areas next to the riparian area.	/s/ A. Bate	04/19/11
NI	Geology (Titus)	No bedrock geological formations or resources would be impacted by Proposed Action.	/s/ Alan Titus	4/7/2011
NI	Hydrologic Conditions (Norman)	The project is designed to enhance the hydrologic condition. The project is designed to enhance the hydrologic condition of the spring brook due to protection by fencing.	/s/ J. Norman	5/9/2012
NI	Invasive Species/Noxious Weeds (Brinkerhoff)	The project will not impact the spread of invasive species and noxious weeds. All equipment will be weed washed before entering project site.	/s/ R. Brinkerhoff	2/16/2012
NI	Lands/Access (H. Wolfe)	Review of LR2000 shows no lands actions present in T. 38 S., R 2 W., sec 28. The Master Title Plat identifies this section as a withdrawal based on Proc. 6920. This action will not impact the withdrawal of GSENM.	/s/H. Wolfe	4/18/2012
NI	Livestock Grazing (J. Bybee)	The proposed project will be small in size and the impacts to livestock grazing will be minimal. This project will eliminate 1 AUM of available forage for livestock. This is deemed an insignificant amount and would not affect the current carrying capacity of the allotment/pasture. The proposed establishment of an offsite water source for livestock use will have minimal impacts to livestock grazing.	/s/Jason Bybee	4/18/2012

Determination	Resource	Rationale for Determination*	Signature	Date
NI	Mineral Resources/ Energy Production (Titus)	No energy or mineral leases exist in the area of the Proposed Action. No federally designated energy corridors are located nearby. No materials pits are close by.	/s/ Alan Titus	4/7/2011
NP	Native American Religious Concerns (Zweifel)	No Native American sites are located within the APE, and no access restrictions will be involved. This project has been included in the 2011 annual GSENM Native American consultation meeting, and no comments were received.	M. Zweifel	4/18/2012
NI	Paleontology (Titus)	Project would be conducted on subcrops of the Thousand Pockets Tongue of the Page Sandstone. This unit has very low potential for fossil resources. In addition, the type of work being done would require only very shallow ground disturbance entirely in recent alluvium. The potential use of mechanical equipment does not change this assessment.	/s/ Alan L Titus	4/18/2012
PI	Rangeland Health Standards (J. Bybee)	Installation of piping and fencing will positively impact the site and eliminate the trailing and hoof action, this will be addressed in the document.	/s/Jason Bybee	4/18/2012
NI	Recreation (Beal)	Recreation activities occurring at or near the project area include hunting, hiking, picnicking, wildlife viewing and photography. Although Rock Springs Bench receives moderate recreation use the overall visitation to Center Knoll Spring is low. The proposed project would not interfere with current or future recreation activities. Visitors to the area would not be displaced because of this project. Most recreationists appreciate efforts to improve the health of riparian areas and wildlife populations. No adverse effects to recreation are anticipated.	/s/ J. Beal	5/2/2012
NI	Socio-Economics (David)	The project is not anticipated to affect local area social systems or economics, as the construction and operation of the development and associated work would not lead to a perceptible increase in local revenue.	/s/ J. David	4/11/2012
NI	Soils (Norman)	Project will be constructed on Parkelei-Plumansan, moist Pinpoint complex of 2-15 % slope, which are well drained and in a Low Runoff Class. Project activities including fence and pipeline construction would result in minimal soil disturbance of less than 1 acre. At the conclusion leave the surfaces as rough as practical to provide stability until the surface crust and drainage patterns reform.	/s/ J. Norman	5/9/2012
NP	Threatened, Endangered or Candidate Plant Species (Hughes)	<i>Lesquerella tumulosa</i> (Kodachrome Bladderpod) is nearby the project area. The project site and the surrounding area does not have required habitat for this species. No other listed species or their habitat are in or near the project site.	/s/ Amber Hughes	3/4/2011

Determination	Resource	Rationale for Determination*	Signature	Date
NP	Threatened, Endangered or Candidate Animal Species (Tolbert)	The Paria River corridor has been surveyed for T and E species and no T and E species were found or are known to use or inhabit the affected area for this project. Although the project is within a Designated critical habitat zone it does not meet the criteria or have the critical elements for Mexican Spotted Owls.	/s/ T. Tolbert	3/3/2011
NP	Wastes (hazardous or solid) (Anderson)	Hazardous wastes will be within acceptable levels. In case of an oil spill in excess of 25 gallons, immediate notification will be given to the hazmat coordinator for the Monument.	/s/ K. Anderson	January 20 2011
NI	Water Resources/Quality (drinking/surface/ground) (Anderson)	The project is proposed to help protect water quality. Current water has not been tested or deemed safe for human consumption. This project is not designed to provide water for human consumption.	/s/ J. Norman	5/9/2012
NP	Water Rights (Anderson)	No water rights identified for this site.	/s/ J. Norman	5/9/2012
NI	Wetlands/Riparian Zones (Anderson)	The project is designed to protect and enhance the wetland/riparian area.	/s/ K. Anderson	January 20 2011
NP	Wild and Scenic Rivers (Gale)	The proposed project is not within an eligible segment of the Paria River (WSR eligible).	/s/ L. Gale	5/17/13
PI	Wilderness/WSA (Gale)	The proposed project is within the Paria-Hackberry WSA. Project would cause new surface disturbance and impact wilderness characteristics.. Design features and EA needs to explain how de-watering will not occur in order for restoration of the native riparian ecosystem. Protection and restoration of riparian would be an allowable exception under "protecting or enhancing wilderness characteristics or values" BLM Manual 6330 1.6.C (f) Implementation needs to assure least impact to WSA.	/s/ L. Gale	5/17/13
NI	Woodland / Forestry (Bate)	The proposal would not impact the woodland species in the area.	/s/ A. Bate	04/19/11
NP	Vegetation Excluding USFW Designated Species (Hughes)	There are no BLM sensitive species or their habitat at or near this project site	/s/Amber Hughes	3/4/2011
NI	Vegetation Restoration (Hughes)	The riparian area should respond positively to this project, with the removal of the two invasive woody species and blocking livestock from the area will also benefit the native riparian vegetation.	/s/Amber Hughes	3/4/2011

Determination	Resource	Rationale for Determination*	Signature	Date
NI	Visual Resources (Angus)	Project is located in VRM Class II (per MMP) but is managed as VRM Class I due to policy clarification post-MMP finalization stating that WSAs are to be managed as VRM Class I. As such the project should preserve the existing character of the landscape and the level of change to the characteristic landscape should be low and must not attract attention. A contrast rating analysis performed to determine potential impact to visual resources determined no visual contrast would be created by this project. The location (in a forested draw screened from view until on site) and scale and scope (i.e. ~200 yards of wire fencing, Russian Olive and tamarisk removal, ~100 yards of buried water pipeline, and trough installation) of this project allow this project to meet VRM Class I objectives as proposed.	/s/ A. Angus	4/26/12
NP	Wild Horses and Burros (S. Stewart)	No designated WHMA in or near the project area	/s/Sean Stewart	4/18/2012
NP	Lands with Wilderness Characteristics (LWC) (Gale)	The project area is within an area already inventoried and recommended for study as a WSA. See above.	/s/ L. Gale	5/17/13

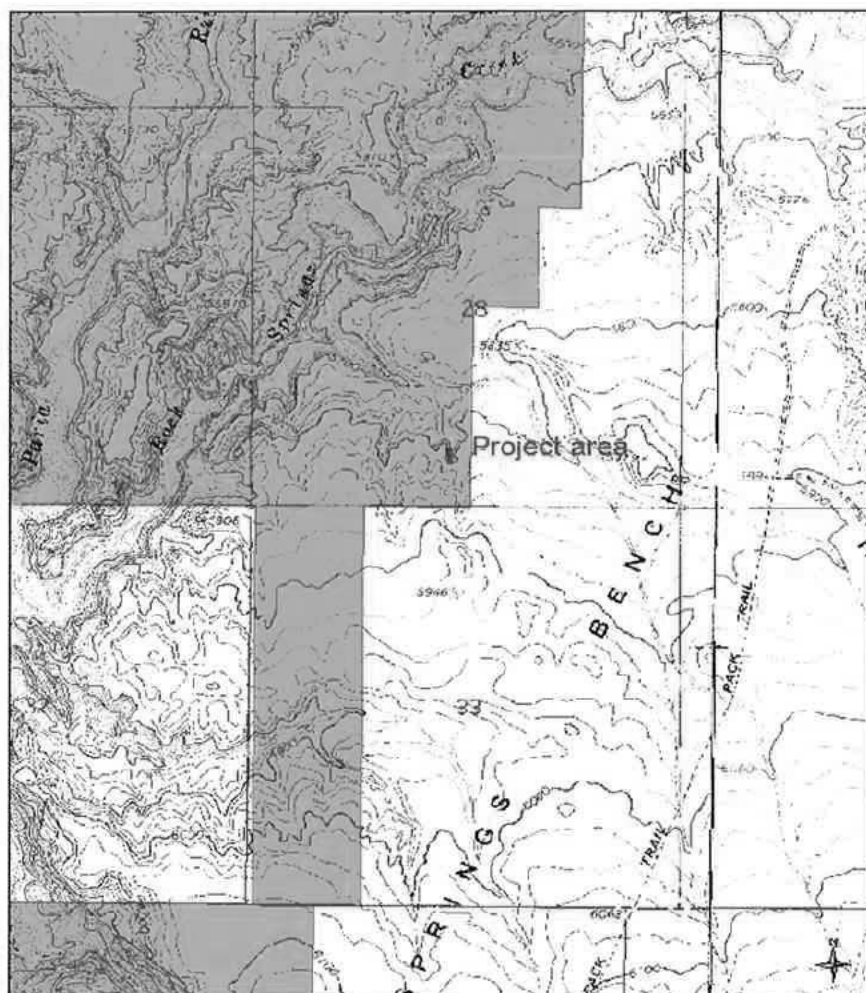
FINAL REVIEW:



Reviewer Title	Signature	Date	Comments
Environmental Coordinator	<i>Hathorne Farrell</i>	3/28/14	
Authorized Officer	<i>Sarah Surland</i>	3/31/14	

APPENDIX B

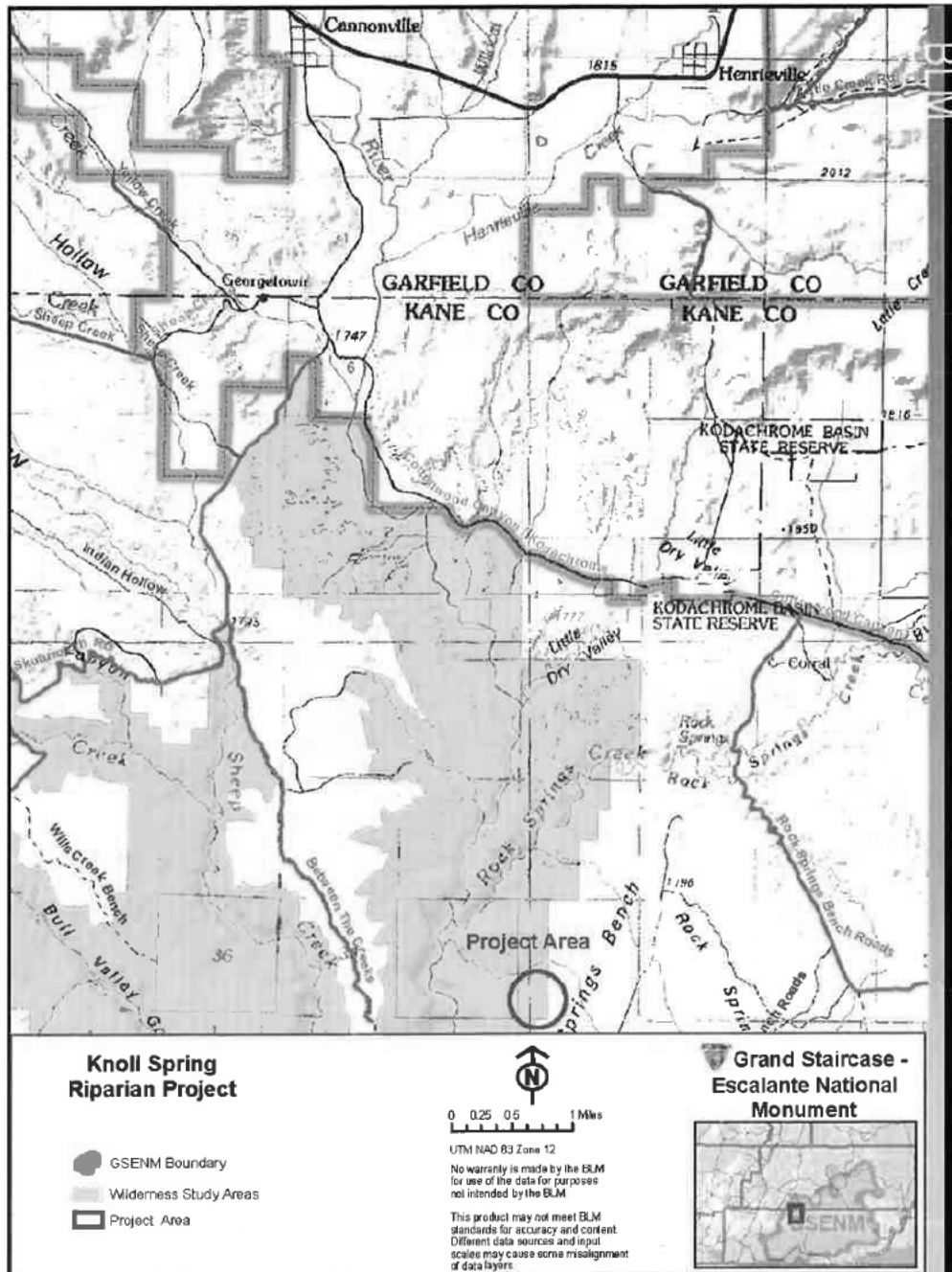
PROJECT MAPS

Knoll Spring Riparian Enhancement Project



 Wilderness Study Area
 Proposed Project Area

0 0.25 0.5 1 Miles

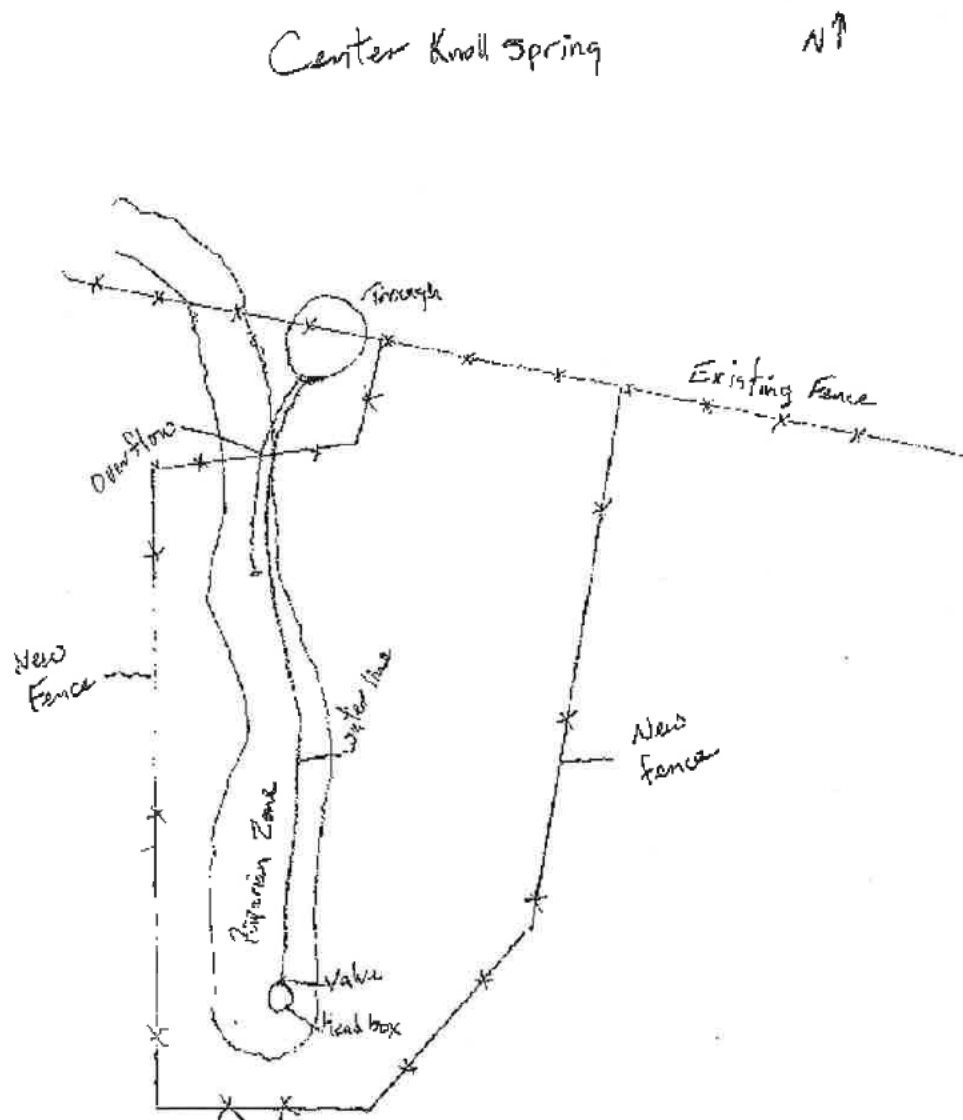


Appendix C

VISUAL CONTRAST RATING WORKSHEET

(See separate file)

Appendix D
PROJECT DIAGRAM



Pipeline @ 100 yds
Enclosure @ 2 acres

Appendix E

PICTURES

